R. T. EARLE.

FUEL OIL BURNER.

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1,124,399. Patented Jan. 12, 1915.

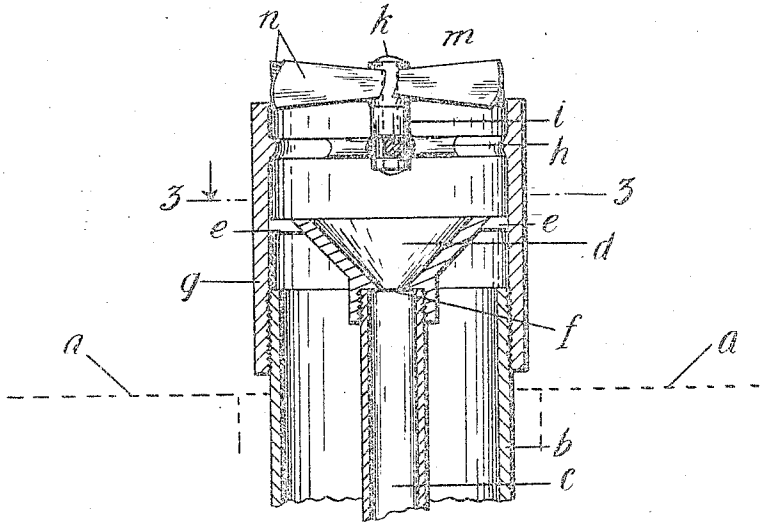


Fig. 1.

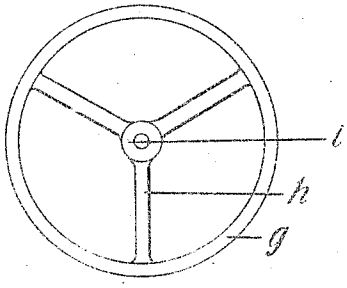


Fig. 2.

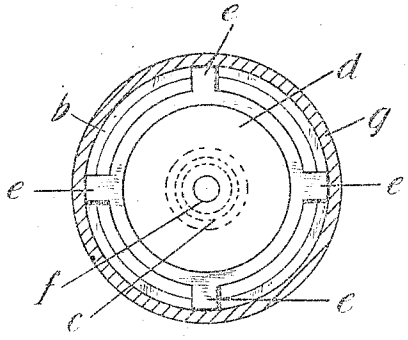


Fig. 3.

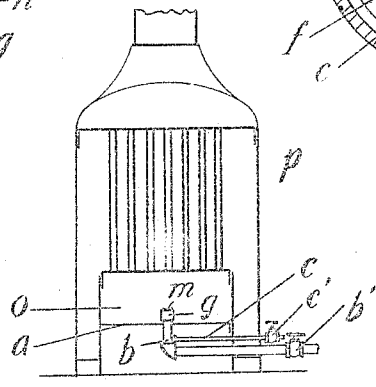


Fig. 4.

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FUEL-OIL BURNER.

1,124,399. Specification of Letters Patent. Patented Jan. 12, 1915.

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To all whom it may concern:

Be it known that I, RICHARD T. EARLE, a citizen of the United States, and a resident of Portland, county of Multnomah, and State of Oregon, have invented a new and useful Improvement in Fuel-Oil Burners, of which the following is a specification.

My invention relates to fuel oil burning devices by which the crude or fuel oil is atomized by and intermixed with compressed air or steam so as to promote intense combustion.

My invention is particularly adapted for use in boilers of the vertical type. Under present conditions, the life of the tubes in such boilers is unduly shortened, because the flame is not uniformly spread under all the tubes, and in consequence the tubes are not heated uniformly, and the varying temperature stresses cause distortion and consequent leakage of the tubes.

The object of my invention is, therefore, to provide a burner producing a blast flame of high efficiency, which will be spread throughout the top of the firebox of the boiler, and thus uniformly under all the tubes.

I attain my object by making a burner which comprises an outer fuel-oil tube, an inner atomizing-fluid tube, providing a burner-cap on the discharge end of said outer tube, placing a funnel-shape flaring head on the outer end of said inner tube, so as to cause the atomizing fluid to spread out within the burner-cap, and placing the revolving fan at the outlet end of the burner-cap, which fan is revolved by the discharge of the combustible vapors from the burner-cap, and serves to spread the resultant flame throughout the firebox; the details of construction and operation of my burner being hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical, diametrical section of my device; the broken line of this figure indicates the floor of the fire-box of a vertical boiler, in connection with which my device is used. Fig. 2 is a plan view of the burner-cap in which the fan is mounted; Fig. 3 is a horizontal section taken approximately on the line 3—3 of Fig. 1, and Fig. 4 is a diagrammatic vertical elevation of a vertical multitubular boiler showing my device as installed therein.

Having reference to the illustrations; *a*, indicates the floor of the fire-box, *o*, of a vertical boiler, *p*.

b, is the fuel oil tube projecting vertically above the floor, *a*, of the fire-box, *o*, and at the center of the latter. An atomizing fluid tube, *c*, is located co-axially in the tube, *b*, and extends to the same height as the latter. These tubes are provided with control valves, *b'* and *c'*, respectively, and connect the burner nozzle with the fuel and atomizing fluid reservoirs. Threaded on the upper end of the tube, *c*, is a flaring, funnel-shape head, *d*. The upper rim of the head, *d*, is provided with peripheral-radial spacing lugs, *e*, and the bottom or inlet orifice of said head is reduced to a diameter slightly smaller than the inside diameter of the tube, *c*, thereby forming the shoulder *f*, against which the outer portion of the atomizing fluid current will impinge.

Threaded on the upper end of the fuel-oil tube, *b*, and inclosing the head, *d*, is a burner cap, *g*. The lugs, *e*, of the head, *d*, are adapted to have a sliding fit in the burner-cap, *g*, so as to hold the tube, *c*, and head, *d*, in their central position with respect to the tube, *b*. The upper end of the burner-cap, *g*, is provided with radial spokes, *h*, which have at their common center a bearing, *i*, in which a vertical pivot post, *k*, is mounted. A fan, *m*, provided with blades, *n*, is rotatable on said pivot post, and the diameter of the fan is slightly smaller than the inside diameter of the burner cap, *g*. This allows the fan to be partially inclosed by the upper end of the cap, *g*, the object of which will be readily understood by having reference to the following description of the action of the device. Fuel oil flowing through the tube, *b*, from a storage tank (not shown) will well-up through the open spaces between the lugs, *e*, of the head, *d*, and flow downward by gravity in a thin film on the inner surface of said head, *d*, to the shoulder, *f*. The atomizing blast through the tube, *c*, will catch the over-flowing film of oil and break it up, at the same time mixing with it in the proper proportions. The outer portion of the atomizing blast current will strike the under side of the projecting shoulder, *f*, and the result will be a conical blast of inflammable oil which will impinge on the blades of the fan at their outermost ends. This driving force will rotate the fan, *m*, thereby

further mixing the oil and atomizing fluid particles, at the same time spreading the same in a horizontal fan-like sheet. The unmixed particles of oil will be driven against the upper end of the burner cap, *g*, and will drop back into the mixing chamber.

The advantages of my particular form of burner are readily apparent. Perfect combustion of burned fuel is obtained, and there is no dripping of unburned oil onto the floor of the firebox. Furthermore, a perfectly uniform flame is produced under the tubes of the boiler, and all of such tubes will be heated uniformly to the same degree. In this way there will be no cold tubes, and highest efficiency of the boiler will be the result.

I claim:

1. In a fuel-oil burner the combination with an outer-fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

2. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer-tube, said head being made with an inlet orifice of lesser diameter than said inner tube, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

3. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer-tube, said head being made with an inlet orifice of lesser diameter than said inner tube, the rim of said head being of greater diameter than said inner-tube, but spaced from the sides of said burner-cap, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

4. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, the inlet orifice of said head being made with an internal flange or shoulder, the rim of said head being of greater diameter than said inner tube, but spaced from the sides of said burner-cap, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

5. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a funnel-shape head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

6. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle, comprising a burner-cap on the discharge end of said outer tube, a funnel-shape head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer-tube, said head being made with an inlet orifice of lesser diameter than said inner-tube, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

7. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a funnel-shape head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, said head being made with an inlet orifice of lesser diameter than said inner-tube, the rim of said head being of greater diameter than said inner-tube, but spaced from the sides of said burner-cap, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

8. In a fuel-oil burner, the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a funnel-shape head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, the inlet orifice of said head being made with an internal flange or shoulder, spacing lugs on the rim of said head spacing the rim from the inner walls of said burner-cap, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner.

9. In a fuel-oil burner the combination

with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer-tube, and a fan, journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner, and the fan being set partially within said burner-cap.

10. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer-tube, said head being made with an inlet orifice of lesser diameter than said inner-tube, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner, and the fan being set partially within said burner-cap.

11. In a fuel-oil burner the combination with an outer fuel-oil tube, an inner atomizing-fluid tube, of a burner-nozzle comprising a burner-cap on the discharge end of said outer tube, a flaring head on the discharge end of said inner-tube, said head projecting above the discharge end of said outer tube, said head being made with an inlet orifice of lesser diameter than said inner-tube, the rim of said head being of greater diameter than said inner-tube, but spaced from the sides of said burner-cap, and a fan journaled at the outlet end of the latter, said fan being spaced from the top of said head and rotating in a plane perpendicular to the axis of the burner, and the fan being set partially within said burner-cap.

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