E. A. EDWARDS.

HYDROCARBON BURNER.

No. 251,849. Patented Jan. 3, 1882.

Fig. 1.

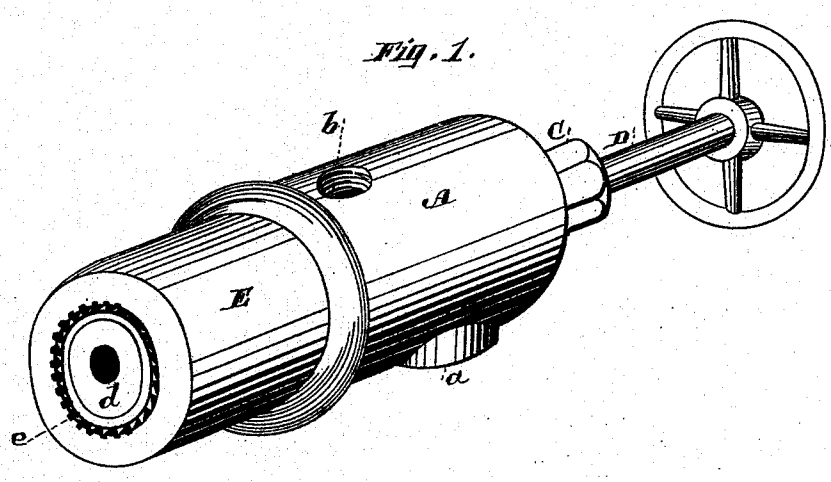



Fig. 2.

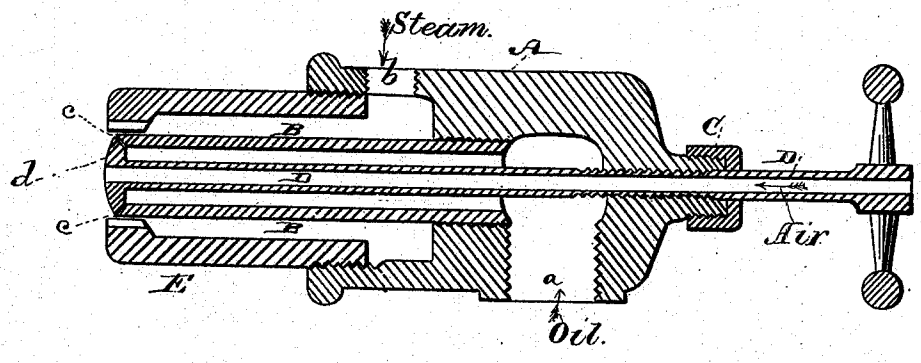
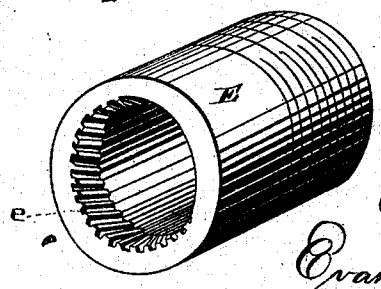



Fig. 3




Witnesses

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# UNITED STATES PATENT OFFICE.

EVAN A. EDWARDS, OF SAN BUENAVENTURA, CALIFORNIA.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 251,849, dated January 3, 1882.

Application filed August 31, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, EVAN A. EDWARDS, of San Buenaventura, county of Ventura, State of California, have invented an Improvement in Hydrocarbon-Burners for Steam-Boilers; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the class of hydrocarbon-burners which are adapted to burn liquid fuels and to be attached to steam-boilers.

It consists in a peculiar and novel construction of parts, whereby the steam, oil, and air open out separately from the end of the burner. The steam is conducted in a separate passage around the oil-passage and allowed to mix with and atomize the oil only after said oil has passed its valve and is beyond the end of the burner—a point of advantage being herein considered. The air is drawn in through a passage made through the valve-stem, so that the oil, steam, and air come together beyond the mouth of the burner and within the combustion-chamber of the furnace, the advantage of which will hereinafter fully appear.

Referring to the accompanying drawings, Figure 1 is a perspective of my burner. Fig. 2 is a longitudinal section of same. Fig. 3 is a detail showing steam-exit.

Let A represent a circular casting having an open hollow end extending about half-way through, and provided with screw-threads on its inner side. An aperture, *a*, is made in one surface of the casting toward its rear end, in the solid part thereof, and is provided with screw-threads. On the opposite surface, near the front, is a smaller aperture, *b*, opening into the hollow end of the casting and having screw-threads.

B represents a pipe screwed into the casting A through the hollow end, and passing back into the solid part, and having open relation with the aperture *a*. In the forward end of the pipe B is constructed a conical valve-seat, *c*, as shown.

Upon the rear end of the casting A is a suitable bushing, C, through which passes a hollow stem, pipe, or tube, D, the rear end of which is provided with a hand wheel or crank. The stem D passes entirely through the pipe B, being smaller than said pipe, so that a space is left between them, and has on its forward end a conical valve, *d*, adapted to fit the seat *c*. This stem D, as before said, is hollow, and is open at both ends, so that a free passage is made through the device from end to end. It is made to turn in the bushing C, so that it may advance its valve *d* away from the seat *c*, or close it against it.

Into the forward hollow end of the casting A is screwed a pipe, E. It surrounds pipe B and is larger, so that a space is left between the two. Its forward end is contracted somewhat, and has spiral or inclined channels or grooves *e* cut in its inner face, so that when the said pipe is screwed in tightly its end fits snugly about the end of pipe B, and the only passages into the pipe E from the outside in front are through the spiral or inclined grooves *e*.

The burner is intended to be inserted in the combustion-chamber of the furnace, its rear end remaining without to regulate it. With aperture *a* is connected the oil-pipe, and with aperture *b* is connected the steam-pipe. The oil passes in through *a*, and, entering pipe B, passes forward and is allowed to escape around the valve *d*, which, as the construction shows, may be regulated to permit as free a flow as desirable. The steam enters aperture *b*, and passes forward through the large pipe E, and escapes through the spiral or inclined grooves *e* in a whirl, and mixes with the oil to atomize it. When the flame is started the draft causes air to flow in from the outside through the central hollow valve-stem, D, and, mixing with the steam and oil, assists combustion. This is the general operation, the principle of which is well known.

Now, it will be observed that the exits of the oil, steam, and air are all about in a line, and are at the end of the burner, so that they do not come together and are not mixed inside in a contracted space and all come out of the burner together. In this each comes out from the end separately and mixes just at the end, but outside from the burner, in the combustion-chamber.

In all hydrocarbon-burners of which I am aware the steam and oil, or the air, steam, and oil, are brought together before reaching the end of the burner, so that they all come out together, and, having to be regulated, they are made to pass a valve or other contracted opening and be ejected with considerable force. The flame therefore is some distance from the end

of the burner. In my burner these parts flow out separately, and not being forced through a narrow opening, the flame plays right at the end of the burner.

The most serious objection to burners which force the oil and steam out together is that under certain circumstances the force of the steam will hold back the oil. The reason is this: There is but a narrow exit for both, and while the steam has not much force it does not occupy all the space in trying to find an exit, and so allows the oil to flow past its valve; but when the steam has greater pressure it passes through the exit with such force that the oil, with its constant pressure, cannot flow, but is held back, and the flame is therefore lessened or extinguished. This difficulty is obviated in my burner, and its operation in this respect is its advantage. The steam, oil, and air do not come together until the end is reached. Each comes out separately, and they mix outside of the burner, so that no matter how great the pressure of steam it cannot hold back the oil. This is therefore entirely regulated by its valve, and its flow is constant. The steam, passing through the spiral or inclined passages or grooves *e*, comes out in a whirl, and by its action causes the oil to atomize or spray with better effect than if it came out in a straight flow. The central passage through the valve-stem furnishes abundant air to assist the combustion.

In my burner I have no stop-cock to regulate the flow of oil, this being done by the valve *d* at the end of the passage, and it can therefore be regulated instantly.

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

1. In a hydrocarbon or liquid-fuel burner, the oil-passage B, in connection with the oil-supply, and having a regulating-valve, *d*, at its exit end, in combination with the steam-passage E, in connection with the steam-source, said steam-passage having its exit end provided with spiral or inclined grooves or passages *e*, opening out of the end of the burner separately from the said oil-passage, substantially as and for the purpose herein described.

2. The hydrocarbon-burner consisting of the casting A, with its apertures *a* and *b*, pipe B, with its valve-seat *c*, open-ended hollow stem D, with its valve *d*, and bushing C, and the pipe E, with its spiral or inclined grooves or channels *e*, when arranged substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

EVAN A. EDWARDS.

Witnesses:
FRANK A. BROOKS,
S. H. NOURSE.