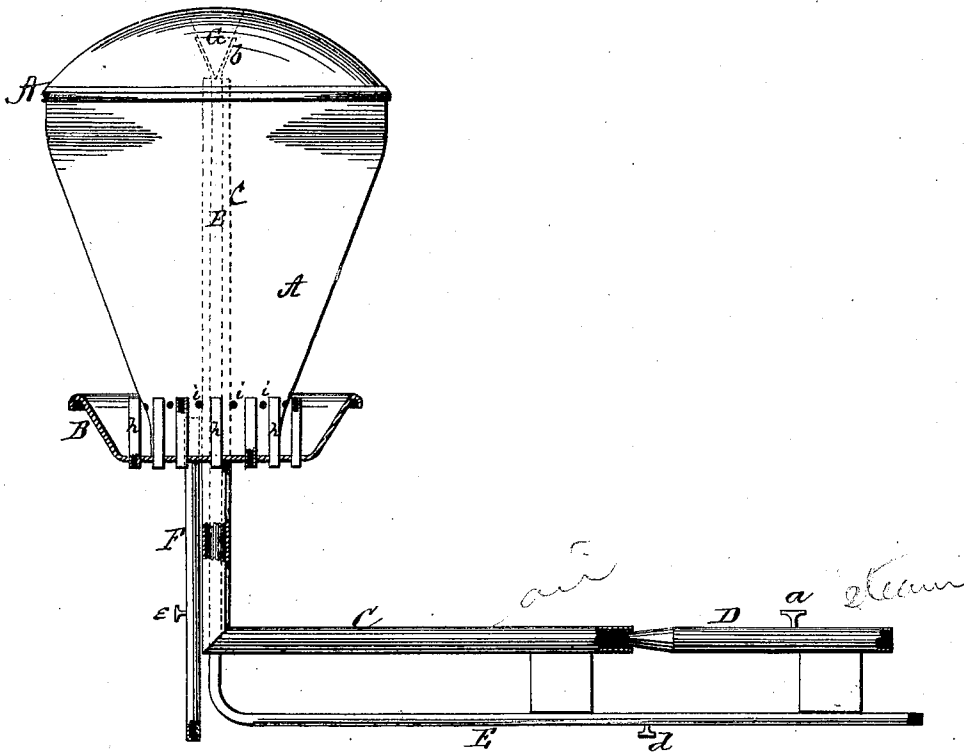


A. C. RAND.

Improvement in Apparatus for Burning Hydrocarbons.

No. 132,491.

Patented Oct. 22, 1872.



Witness:

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UNITED STATES PATENT OFFICE

ALONZO C. RAND, OF AURORA, ILLINOIS.

IMPROVEMENT IN APPARATUS FOR BURNING HYDROCARBONS.

Specification forming part of Letters Patent No. 132,491, dated October 22, 1872.

To all whom it may concern:

Be it known that I, ALONZO C. RAND, of Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Apparatus for Burning Petroleum for Generating Steam and for other purposes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing which forms a part of this specification, and which represents a side view, part in section, of my apparatus.

A represents the dome for vaporizing the hydrocarbon liquid. B is a pan surrounding the lower end of the dome, and used to hold some of the oil before the dome is hot enough to vaporize it. C is the steam and air pipe leading up through the bottom of the cone A to near the top of the same. D is the steam-pipe pointing into the exterior end of the pipe C to inject air into the same. This pipe is provided with a stop-cock, *a*. E is the oil-feed pipe leading from the oil-supply tank, and passing up through that part of the pipe C which is within the cone A. It extends up to the inner end of said pipe C, and is at this end formed or provided with a funnel, *b*. The steam and air thus pass around this part of the oil-pipe E, but within the pipe C. The pipe E is also provided with a stop-cock, *d*. F is a pipe leading from the bottom of the dome A to draw off any heavy material that does not become converted into vapor in the dome. This pipe has a stop-cock, *e*. *h h* are air-pipes through the pan B, as shown. G is a cone attached to the under side of the top or cover of the dome A, and extending down into the funnel *b*, at the inner end of the oil-pipe E. This cone G is used to spread the liquid in a fine film over the inside surface of the dome to facilitate its vaporizing. The stop-cock *a* on the steam-pipe D is used to regulate the flow of steam into the end of the air-pipe, thus controlling the quantity of air that is injected into the dome. The cock *d* on the oil-pipe E is to regulate the quantity of oil furnished to the

dome, and the cock *e* on the pipe F is to be opened when the process is in operation. In the lower end, near the bottom of the dome, are outlets *i i* for the gaseous fuel.

Many devices have been invented for burning petroleum, two patents for this purpose having been issued to me. It is well known that the rich hydrocarbon vapors of petroleum will not burn in a natural atmosphere without smoking, and that air is a good diluent. Steam has also been used as a diluent when superheated. In my apparatus the dome answers many purposes. It vaporizes the petroleum, superheats the steam, combines it with the air, and heats the whole mass or mixture to a temperature where it is highly rarefied, greatly attenuated, and consequently burns with intense heat with a blue flame. Of course the color of the flame depends upon the operation of the steam-cock *a* that regulates the supply of air as a diluent.

The operation of this invention in use for generating steam is as follows: The apparatus having been placed underneath the steam-boiler and all air excluded except that which passes through the tubes *h h* in the bottom of the pan B, the stop-cock *d* in the oil feed-pipe E is first opened, and a sufficient quantity permitted to flow into the dome A to flood the lower part, where it makes its exit through the perforations *i i* and into the pan B. It is then ignited, and in a few moments the dome becomes hot, and the oil issuing through the oil-pipe at its end, near the top of the same, comes in contact with the cone G and is spread over the inside surface of the dome, where it is converted into vapor.

It is of course understood that the oil-supply tank should have an elevation sufficient to force the oil upward against the cone. The intimate mixture of the air passing through the tubes *h h* in the pan with the vapor prevents smoke, yet the color of the flame does not indicate perfect combustion. It, however, develops sufficient heat to soon generate steam, and as soon as this is accomplished the cock *e* in the pipe F is opened, the lower end of said pipe being submerged in water in a sunken tank. This seals off the escape of gas, and if any of the heavier portions of the petroleum are not vaporized they run into the pipe and down under the water in the sunken tank,

when it may be taken up when any accumulation occurs. The steam-cock *a* is then opened, and the current of steam induces a flow of air into the air-pipe and thence into the dome. The color and the intensity of the flame change immediately, and the combustion is, simply stated, perfect. Of course the heat can be regulated with as much nicety as an ordinary gas-flame by the supply-cocks for oil and air.

The advantages of this invention are many. The great increase in the production of crude petroleum has made the business of producing it of late far from profitable, and this invention will open up a large market for its use. With this contrivance the boiler-door is very seldom opened, and therefore no heat is withdrawn by the usual rush of cold air through the flues. No skilled labor is required to use it. The apparatus constructed of cast-iron is cheap, coming within reach of all, and at the present price of crude petroleum it has proven itself cheaper fuel than coal transported an equal distance.

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

1. The dome A, in combination with the induction, air, and steam pipe C, the steam-jet D, and oil-pipe E, all substantially as and for the purposes herein set forth.

2. The cone G within the top of the dome A, fitting in the inner end of the oil-supply pipe E, substantially as and for the purposes herein set forth.

3. The combination of the dome A with cone G and outlets *i i*, pan B with air-pipes *h h*, steam and air pipe C, steam-pipe D, oil-pipe E, and the pipe F, all constructed and arranged substantially as and for the purposes herein set forth.

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Witnesses:

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