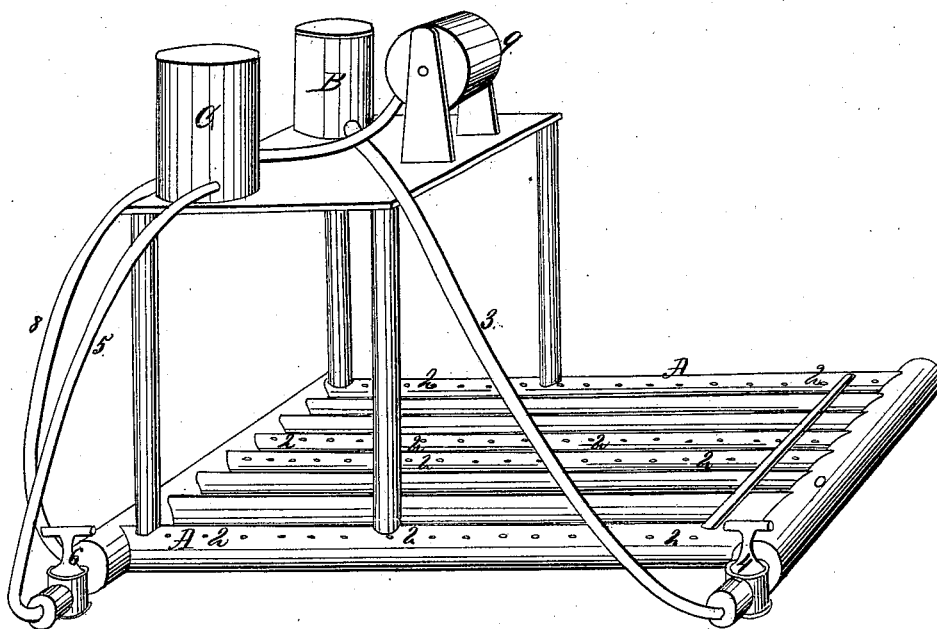
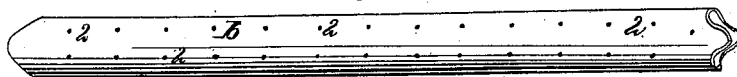


*S. C. Salisbury,*  
*Burning Hydrocarbon.*  
*N<sup>o</sup> 54,216.      Patented Apr. 24, 1866.*

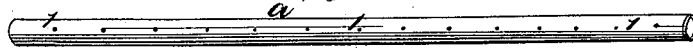
*Fig. 1*




*Fig. 2*



*Fig. 3*



*Witnesses;*  
*J. D. Lawrence*  
*W. R. Donald*

*Inventor.*  
*Fig. 4*  
 *S. C. Salisbury*

# UNITED STATES PATENT OFFICE.

SILAS C. SALISBURY, OF NEW YORK, N. Y.

IMPROVED APPARATUS FOR APPLYING OIL AND WATER TO ASSIST THE COMBUSTION OF COAL, &c.

Specification forming part of Letters Patent No. 54,216, dated April 24, 1866; antedated April 10, 1866.

*To all whom it may concern:*

Be it known that I, SILAS C. SALISBURY, of the city of New York, in the county of New York and State of New York, have invented certain new and useful improvements in tubular retorts for producing gases from oils, water, &c., for burning in combination with the gases evolved from the ordinary combustion in furnaces, which retorts can be used in place of the ordinary grate-bars; and I do hereby declare that the following is a full, clear, and exact description thereof and of their mode or manner of operation, reference being had to the accompanying drawings, and to the letters of reference marked thereon, and making a part of this specification.

My invention consists in the construction and arrangement of tubular retorts which are adapted to or suitable for the production of gases from hydrocarbon oils, water, and air, which gases are designed for burning in combination with the gases evolved or produced from the combustion of the coal and air used in the ordinary furnace-fire, which retorts can also be used in the place of the ordinary grate-bars of furnaces.

Figure 1 shows a series of such retorts arranged as a grate. Fig. 2 is a view of the exterior tube of one of the retorts. Fig. 3 is a view of the interior tube of the retort. Fig. 4 is a sectional view through one of the retorts, showing the relative position of the tubes.

Each retort A is made up of two hollow tubes, *a* and *b*, one placed within the other and properly secured together. On the top or along the top surface of the inner tube, *a*, are made a series of small holes, 1 1, from a quarter to half an inch apart, and furnishing communication between such tube and the inclosing-tube *b*. Through each side of and near to the top of such outer tube *b* similar holes 2 2 are also made, furnishing communication between such tube and the fire about or upon it. One series, *a*, of such tubes—that is, the inner tubes—connect with and open into the cross or end tube, *c*, which is connected through a pipe, 3, with a reservoir, B, containing petroleum or other hydrocarbon oil, the quantity of oil furnished to such inner tubes being regulated by the stop-cock 4. The other or outer series, *b*, of such tubes connects with the cross or end tube, *d*, to which water is supplied through the pipe 5 from the reservoir C, the supply being

regulated by the stop-cock 6. These tubes *b* should not, however, be filled with water above the orifices 2 2. As soon as the retorts become heated the oil in the inner tube, *a*, is converted into a gas, and, passing through the orifices 1 1 in such tube, is discharged into the outer tube, where it is mixed and combined with the vapor-gas produced from the evaporation of the water contained in such outer tube. These gases of the oil and water, being so mixed together, then pass out through the orifices 2 2 in the outer tube into the furnace, and are there burned in combination with the gases produced from the coal and air consumed in the furnace. There is also admitted into the retorts A with the oil and water, as before mentioned, a proportionate supply of air through the tube 8, put in motion by an air-blast, 9, and the supply regulated by the stop-cock 10.

The required proportion of the oil, water, and air supplied to the retort should be such as to insure a combination of the different gases therefrom which shall not be explosive as it comes in contact with the gases obtained from the fuel and air of the furnace. From experiments already made it has been determined that a cubic inch of oil to two and a half cubic feet of water and five cubic feet of air is a satisfactory proportion, though this may be varied somewhat. These gases so produced from the oil, water, and air in the retorts and there combined and mixed together unite or combine as they pass out of the retorts with the gases derived from the coal and heated air of the furnace in a greatly increased volume, and such combination produces a flame more intense than the combustion of coal as 5 to 1.

The particular manner of supplying the oil and water and air to the tubes of the retort is not material, nor is the relative size of the several tubes or their shape, whether round, or oval, or square, a matter of importance. The tube for receiving the oil will naturally be the smallest, as a less quantity of oil is required. The supply of air may also be admitted to both tubes, if desired.

The drawings represent the oil and water reservoirs and the air-blast as placed above and supported on the retorts. This arrangement, however, is only for convenience of grouping, and in practical use their relative positions will be different.

The use of such tubular retorts in the place of the ordinary grate-bars, and particularly when the retorts are made of circular pipes, has a tendency to prevent the fire choking or clogging, the form of the retorts naturally causing the ashes to drop down between them, and this action being assisted by the continued passage of the gases through the orifices of the outer tube. This, to a great extent, renders unnecessary frequent raking of the grates, and thus insures still greater economy in the combustion of ordinary fuel.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The construction and arrangement of the tubular retort A, composed of an inner and outer perforated tube, substantially as and for the purposes set forth.

2. The combination of a series of retorts so constructed for use and application in furnaces in the place of ordinary grate-bars.

3. The combination of a retort so constructed with an oil and water reservoir or supply and an air-blast, for the purposes set forth.

SILAS C. SALISBURY.

Witnesses:

S. D. LAW,

W. R. RONALDS.