

Dickerson & Whipple.

Hydrocarbon Gas.

N^o 102,662.

Patented May 3, 1870.

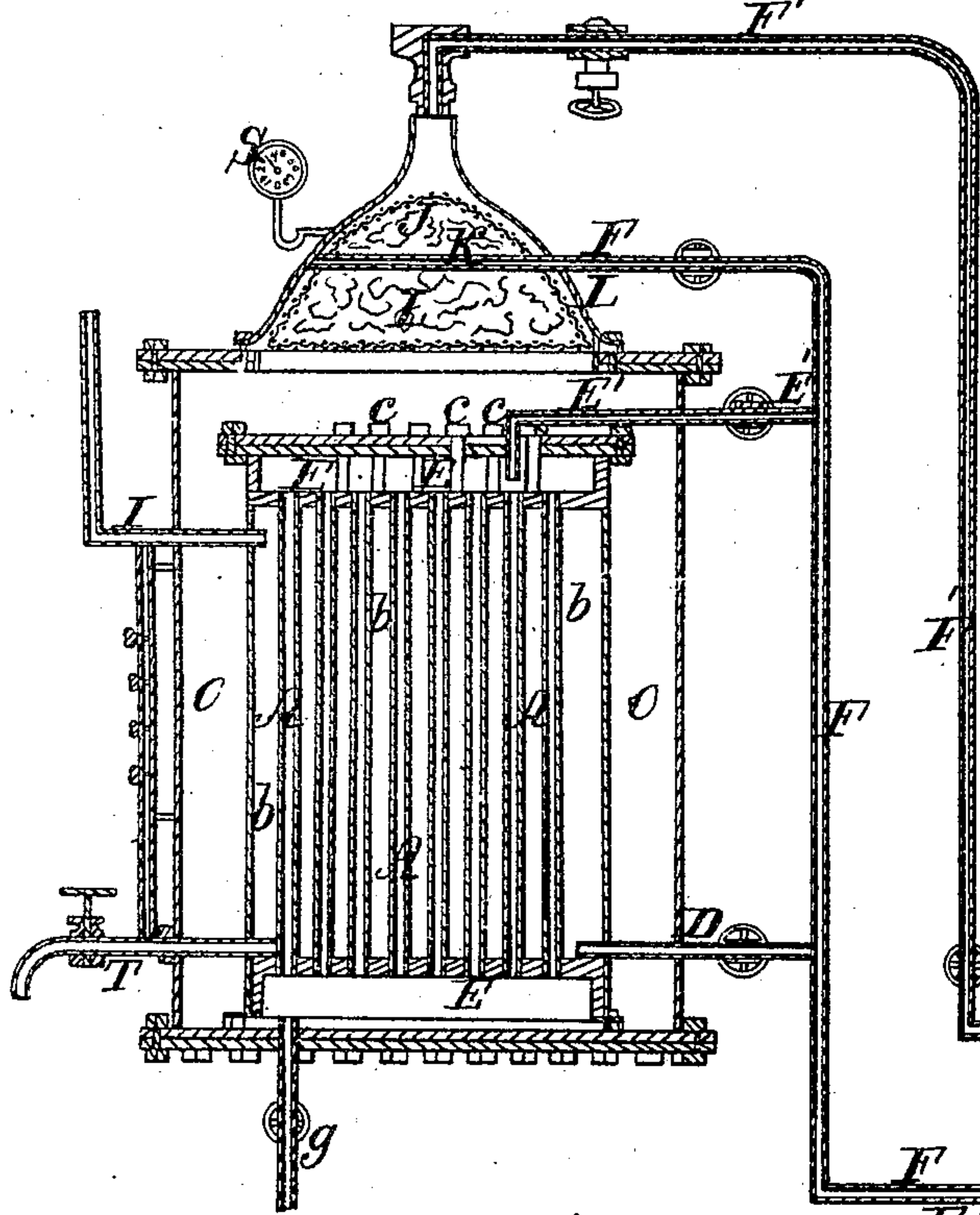


Fig: 2.

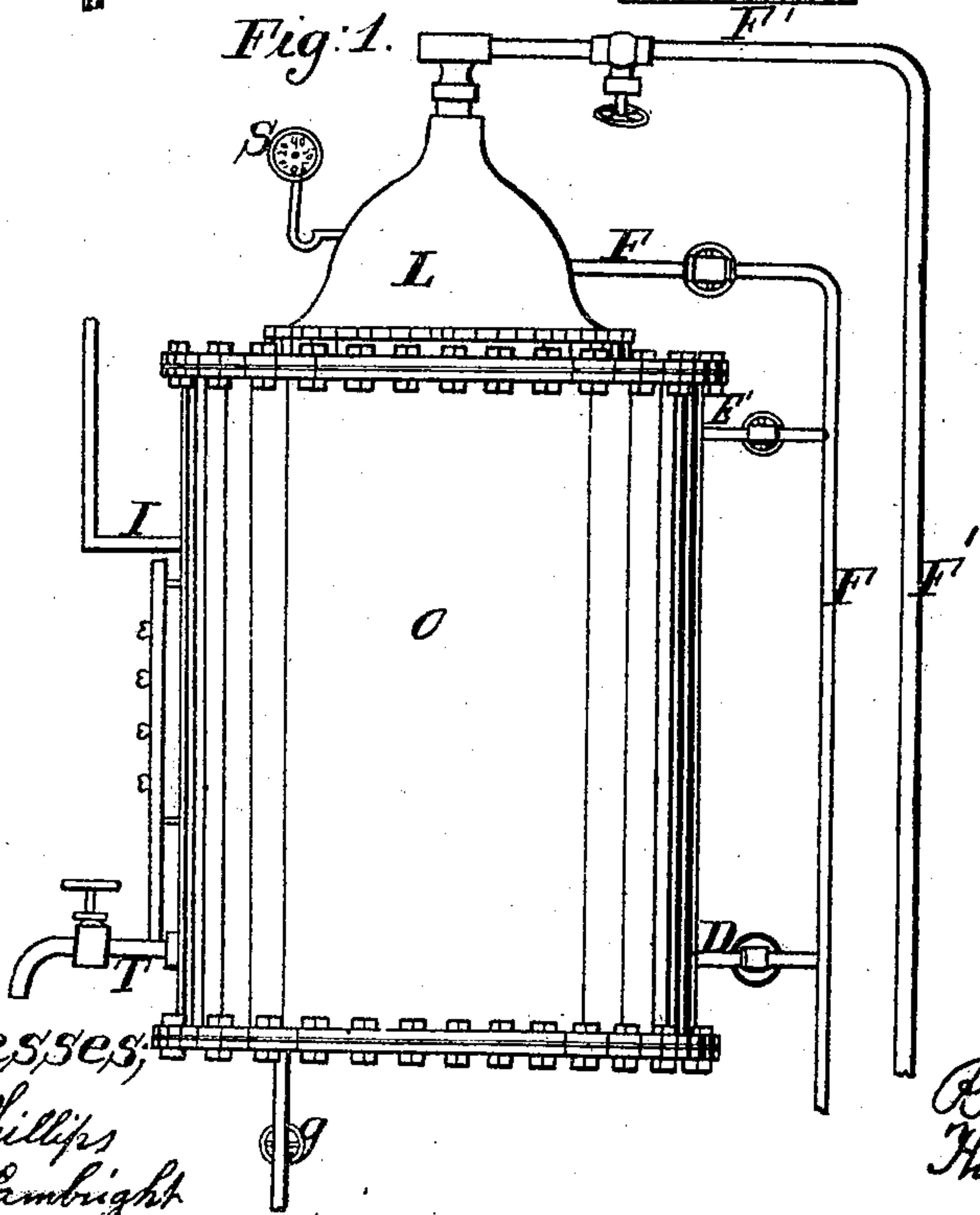


Fig:1.

Witnesses;

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PROCESSES AND APPARATUS FOR USING LIQUID FUEL FOR PRODUCING HEAT AND LIGHT.

Specification forming part of Letters Patent No. 102,662, dated May 3, 1870.

To all whom it may concern:

Be it known that we, RODNEY M. WHIPPLE and THOMAS S. DICKERSON, both of Chicago, in the State of Illinois, have discovered and invented a new and improved mode of generating and manufacturing vapor or gas from oil, petroleum, and other oleaginous and carbonaceous substances, and using the same in combination with superheated steam, vapor, and gas from water, and applying the same to purposes of illumination, heat, and propulsion of machinery, the same being a new and useful invention and apparatus for the purposes aforesaid; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings forming a part of these specifications, in which—

Figure 1 represents an elevation of the invention or machine, showing external of the generator and receiver and their connections. Fig. 2 represents a sectional view of the generator, receiver, fire-box, superheater, and their connections, taken in line of center.

Similar letters of reference in the several figures indicate corresponding parts.

The nature of our invention consists in producing vapor or gas from oil, petroleum, and other oleaginous and carbonaceous substances, by means of superheated steam, and by uniting and using the same with other steam or superheated steam, operating in the manner hereinafter described.

By using superheated steam for vaporizing the oil, the formation and deposition of solid carbon is prevented, by the diffusion and application of heat in such manner and degree as is necessary without decomposing it; and by mixing superheated steam with the vapor or gas thus produced we increase the heat, combine the vapors, produce gases for heating and illuminating purposes, secure perfect combustion, and save largely in the amount of carbonaceous substances required.

To enable others skilled in the art to make and use our invention and apparatus, we proceed to describe its construction and mode of operation.

The generator for producing the gas or vapor is composed of a cylinder made of boiler-iron, with tube-heads riveted to the cylinder

at each end. Inside of the tube-sheets, which are turned up about two inches, are cast or wrought iron rings, riveted to the tube-sheets and cylinder. This is done so that the heads may be bolted on to form a steam-space about two inches wide at each end of the cylinder. The tube heads or sheets are connected by copper tubes about five-eighths of an inch in diameter and about one-fourth of an inch apart inside the cylinder. The tubes connecting the steam-spaces are shown by letters A A, Fig. 2. The space in the cylinder around the tubes, as shown by letters b b, is filled with the oil. The upper head of the cylinder and the upper tube-sheet are connected and secured by tube-bolts, as shown by letters c c, having screws cut at each end, upon which nuts are used to fasten the tube-bolts on each side of the double cylinder-head, and thus allowing the vapor or gas to escape freely through the tube-bolts into the outside case or gas-holder, which is represented by the letters O O. This gas-holder is made of boiler-iron, and is placed around and inclosing the generator, and secured thereto by proper clamps and braces, and is surmounted by a dome or cap made of cast or wrought iron, as represented by letters L L, thus providing space for holding a sufficient amount of the gas or vapor for working purposes. Letter D represents a pipe leading directly into the oil in the generator, and may be used for the introduction of superheated steam from the steam-pipe F, to clean out the machine, and to assist in converting the oil into gas or vapor, and preventing carbonization, as may be required. Letters E E represent steam-spaces between the double heads at each end of the generator, which, being connected by the steam-pipes A A, secures complete circulation of the superheated steam, and exposes the oil in the generator to the greatest practicable amount of heating-surface. Letters F F F represent a steam-pipe leading from the superheater in the fire-box into the dome of the machine. Letters E' E' represent a steam-pipe leading from the steam-pipe F into the steam-space E in the generator. Letter g represents an escape-pipe from the generator to carry off the condensed steam. Letters H H represent a metallic tube leading from the oil-space in the generator, or from

the pipe T, and affixed to the outside of the machine, with stop-cocks suitably arranged, by which to ascertain the amount of oil in the generator. Letter I represents a pipe, through which to fill the oil-space *b b*. Letters J J represent a quantity of elastic sponges inclosed in wire netting and placed in the dome of the machine, for the purpose of steadying the pressure and securing a uniform flow of the gases or vapors, and for taking up and holding any unvaporized portions of the oil, and exposing the same to the further action of superheated steam there to be introduced, and for the better uniting and combining the vaporized oil with the superheated steam at that point. Letter K represents a continuation of the steam-pipe F through the dome and the sponges, and is perforated with numerous small holes along the upper parts to allow the superheated steam to escape upward and mingle perfectly with the gas or vapor from the oil in the dome, and further to vaporize any liquids or fluids which may be held in the sponges. Letters L L represent the dome which caps the machine, and is secured firmly by rivets, screws, and nuts to the gas-holder. Letters F' F' represent the vapor or gas pipe leading from the top of the dome into the fire-box. Letters *m m* show the tubes inserted inside of the gas-pipe F, through which the united gases or vapors from the machine are introduced for combustion. Letter N represents a superheater placed in the fire-box, composed of a cast-iron cylinder filled with scraps or pieces of iron, and secured with steam-tight heads, through one of which steam is introduced from the boiler, and through the other superheated steam is conveyed by the connecting-pipes to the machine. Letters Q Q represent the boiler, from whence steam is taken by the pipe *q q* to the superheater. Letters R R represent the fire-box filled with flame from the burning vapors or gases. Letter S represents a common steam-gage, by which to show the pressure of the gases or vapors upon the machine. Letter T exhibits the pipe used for drawing oil from the generator, and cleaning the same.

The mode of operating the machine is as follows, to wit: Steam is taken from the boiler Q through the pipe *q* into the superheater N, and there superheated by the combustion in the fire-box R, from whence it passes with great force of pressure through the pipe F into the steam-space E in the generator, instantly filling the steam-tubes A A and the other steam-space E with superheated steam, and thereby heating the oil in the space *b b* in the generator, so that it is immediately converted into gas or vapor, and passes off through the tube-bolts *c c* into the gas-holder O. From thence it passes, by the force of its own pressure, into and through the sponge J J in the dome L, where additional quantities of superheated steam are introduced by means of the pipes F and K into the sponges, and there perfectly united with the gas or vapor

from the oil by force of the combined pressure of the steam-boiler, the superheater, and the generator. This supply of superheated steam in the dome L, regulated by proper stop-cocks, enables the engineer to compound the same with the gas or vapor from the oil in the exact proportions necessary to produce the greatest amount of heat with the least possible combustion of oil. From the top of the dome the united and compounded gases and vapors are conducted, through the pipe F' F' and the gas-tubes *m m*, into the fire-box R R, where perfect combustion is produced.

Suitable stop-cocks, valves, and wire netting should be placed between all the connections, always under control of the engineer, by which the utmost safety may be secured.

The word "oil," whenever and wherever it occurs, and standing alone as descriptive of the material from which gas or vapor is produced in the generator, is intended to include and describe any and every oleaginous and carbonaceous substance which may or can be introduced into the generator in a liquid or fluid state.

The advantages gained by our invention are, that the apparatus is more compact and simple, making it especially adapted for use on locomotives and other portable engines.

The gas-holder, being placed as a jacket around the generator, serves to strengthen it, and also to prevent any loss of heat by radiation. The steam-pipe K in the dome discharges steam or superheated steam into the sponges, so as to assist in carrying off the gas as fast as formed, and before any condensation or deposit of carbon can take place. The vapor and gas are also more readily formed in the generator by being rapidly removed when formed, and a thorough mixture of gas and steam is effected.

We have described a suitable form of superheater; but any other known form of apparatus used for superheating steam may be employed.

We have described our invention with special reference to the burning of petroleum, coal-oil, shale-oil, and the like; but we do not limit ourselves to the use of those materials, since there is a large number of hydrocarbons which may be vaporized by superheated steam, and then mixed and combined with steam or superheated steam, so as to produce the combustible gas or vapor which constitutes one part of our invention.

Having described our invention, parts of which are already secured to us by Letters Patent numbered 95,665, and dated October 12, 1869, (reference thereunto being had,) and without now claiming anything therein contained, what we now claim, and wish to secure by Letters Patent, is—

1. The improved apparatus herein described, composed of a steam-boiler, superheater, gas-generator, and gas-holder, arranged and combined as described.

2. The combination of the generator and

gas-holder, so as to form one compact vessel, as described.

3. The combination of the dome, generator, and gas-holder.

4. The combination of the pipe K with the dome L, for the purpose of supplying steam to aid in carrying off the gas or vapor, and for mixing with the same, as described.

5. The steam-pipe F, with its two branches D and E, or their equivalents, so as to supply steam to the different parts of the apparatus, for the purpose described.

6. The introduction of superheated steam into the dome or top of the machine, so as to mix and combine with the gases or vapors from the oil, in any desired proportions, and

thereby produce a new compound or gas, as described.

7. The process herein described for burning petroleum and other vaporizable hydrocarbons, the same consisting in first vaporizing the gas-producing material by means of superheated steam, and then mixing with the gas or vapor superheated steam, substantially as described.

The above specification signed by us this 22d day of March, 1870.

RODNEY M. WHIPPLE.

THOMAS S. DICKERSON.

Witnesses:

JOHN H. RICE,

WM. P. COPELAND.