

R. M. WHIPPLE & J. G. BLUNT.

Manufacture of Gas for Illuminating, Heating, &c.

No. 137,521.

Patented April 1, 1873.

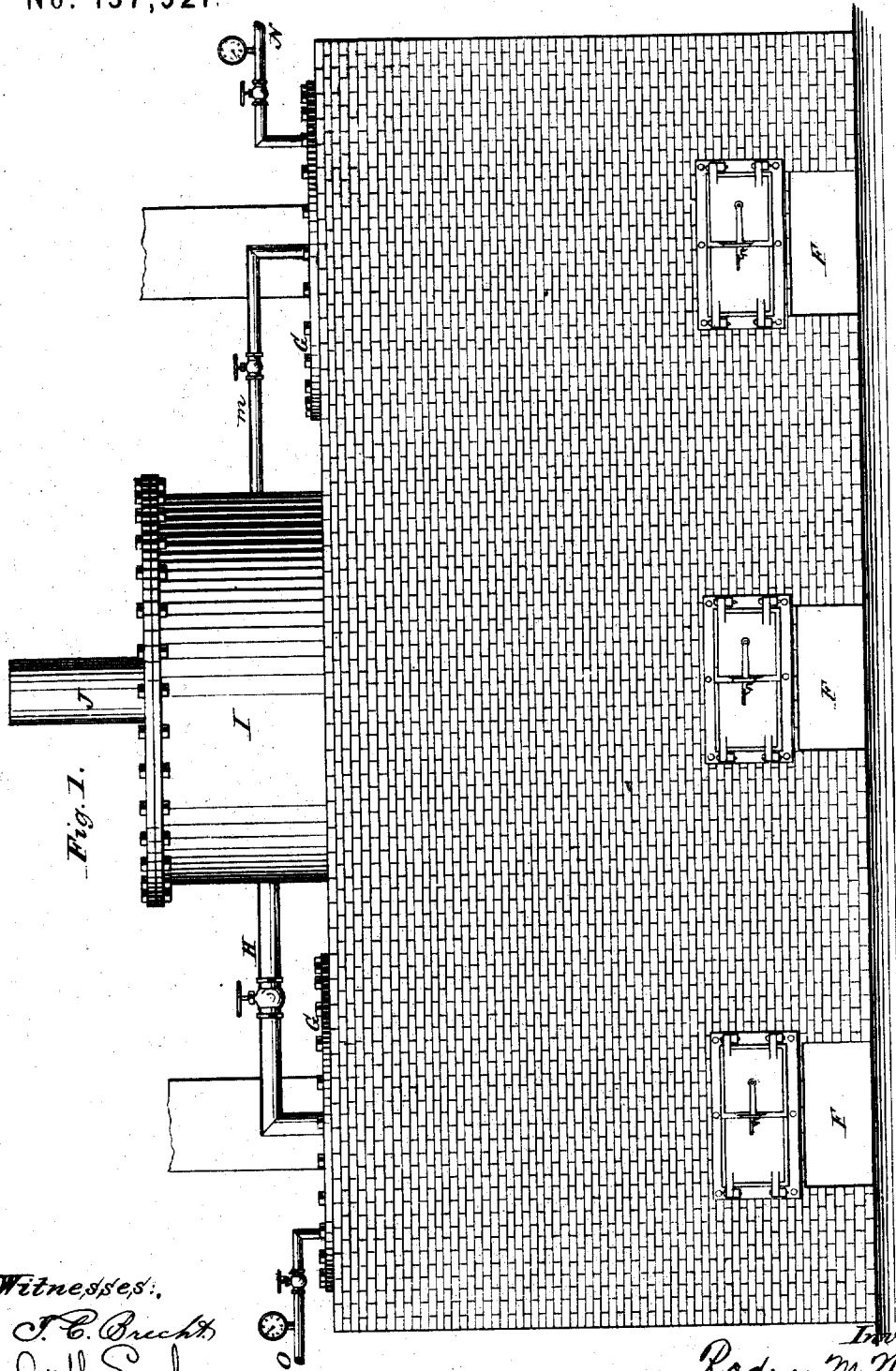


Fig. 1.

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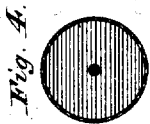
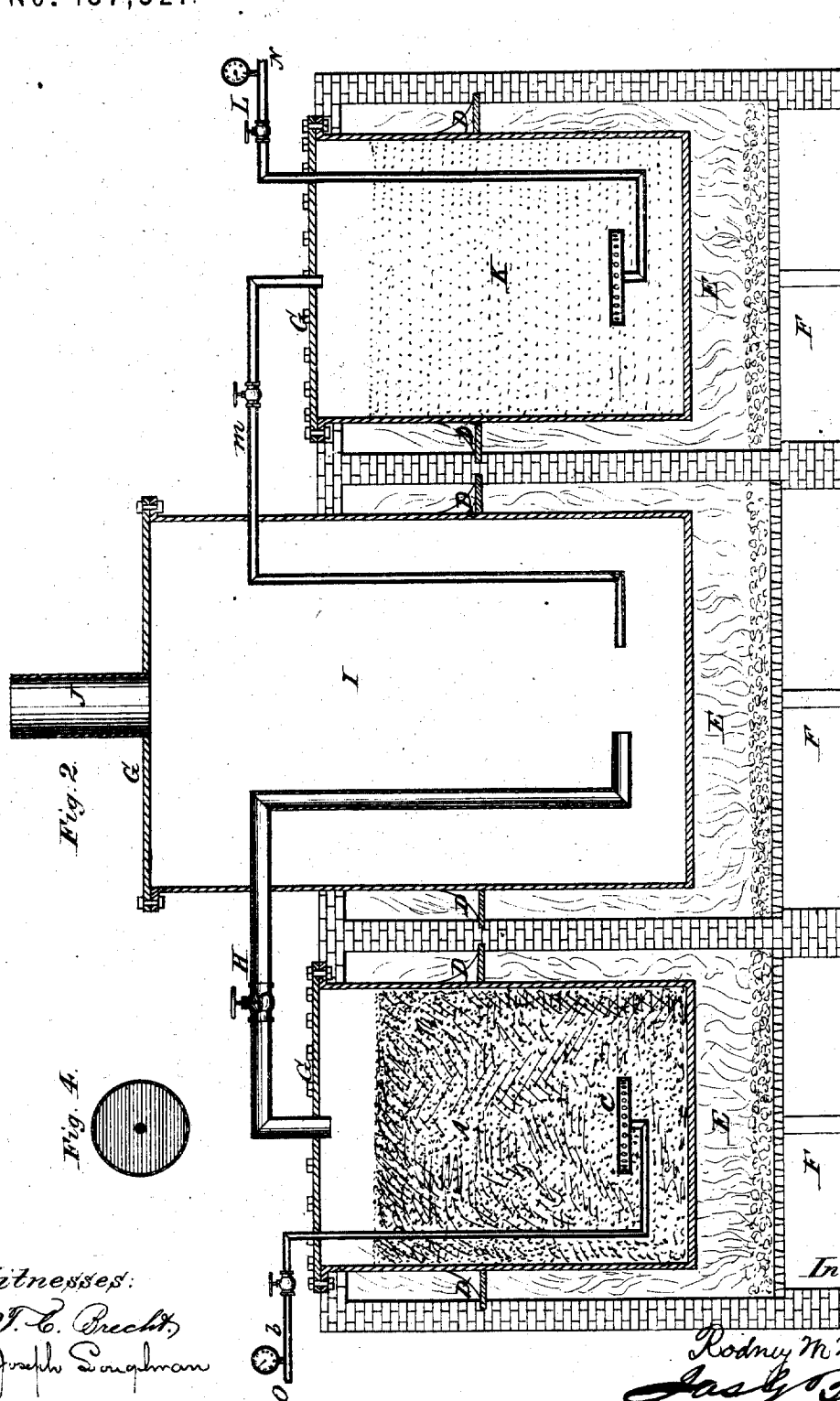
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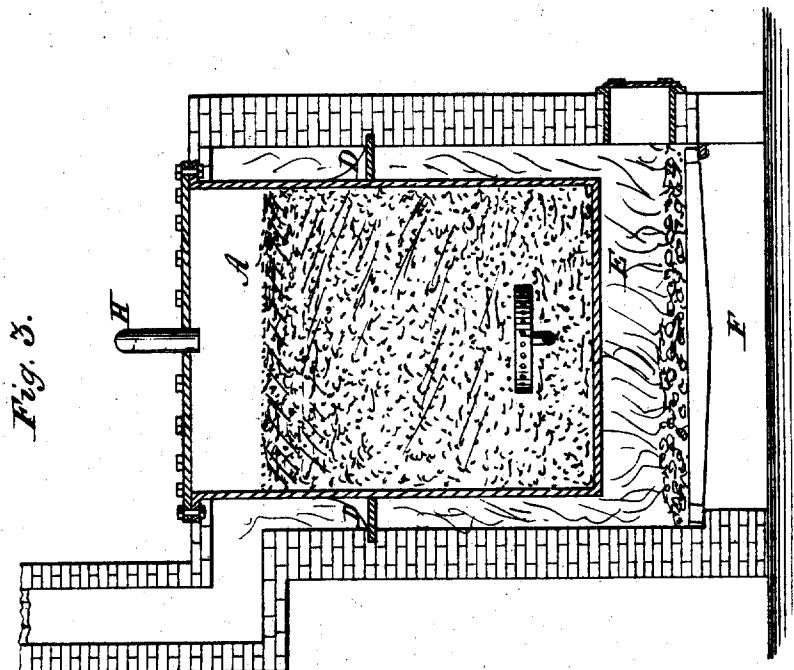
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UNITED STATES PATENT OFFICE.

RODNEY M. WHIPPLE, OF CHICAGO, ILLINOIS, AND JAMES G. BLUNT, OF
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IMPROVEMENT IN THE MANUFACTURE OF GAS FOR ILLUMINATING, HEATING; &c.

Specification forming part of Letters Patent No. **137,521**, dated April 1, 1871; application filed
March 29, 1872.

To all whom it may concern:

Be it known that we, RODNEY M. WHIPPLE, of the city of Chicago, county of Cook and State of Illinois, and JAMES G. BLUNT, of the city of Leavenworth, county of Leavenworth and State of Kansas, have discovered and invented a new and useful Improvement in the Manufacture of Gas for Illuminating, Heating, and for other Purposes, the carbon being taken from petroleum or any other oleaginous and carbonaceous substances, and the hydrogen formed by the decomposition of steam, thus forming, when combined in the manner hereinafter specified, a cheap and useful carbureted-hydrogen gas, 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 drawing forming a part of this specification, in which—

Figure 1 represents a front elevation of the apparatus with its connections. Fig. 2 represents a vertical section of the same taken in line of center, showing the apparatus and its connections. Fig. 3 represents a sectional end view of the same. Fig. 4 represents the cap attached to the steam-pipe in the hydrogen-retort.

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

The nature of our invention consists in producing, in a more economical way than has heretofore been accomplished, a carbureted-hydrogen gas by decomposing superheated steam and carbureting the same by means of a carbon-gas made from petroleum or any other oleaginous substance, and combining the same together under great heat, thereby producing a fixed carbureted-hydrogen gas, in the manner hereinafter described.

Many attempts have been made by parties manufacturing hydrocarbon-gas to find a means of reducing the illuminating-powers of the same to the standard of ordinary illuminating-gas, but have utterly failed to find anything to accomplish it. We are aware that atmospheric air has been used for this purpose, but has utterly failed to accomplish the desired result. By our invention we are en-

abled to dilute the richest carbon-gases and reduce the same to any standard illuminating-power we may desire.

Our apparatus consists of a bench of three iron retorts, set perpendicular and inclosed in a furnace of fire-brick or other material, with a partition dividing each retort and furnace from the other, thus making three separate compartments under and around each retort for heating the same. The two end retorts are smaller in size than the center one. One of the end retorts for making hydrogen is filled with charcoal or any other carbonaceous substance, through which the steam passes from the bottom to the top. The steam passes through a pipe through the top of the retort nearly to the bottom of the same, with an elbow carrying it nearly to the center of the retort, upon which there is an iron cap, perforated at the bottom, which throws the steam against the bottom of the retort, or near it, thus protecting the bottom of the retort from the action of the fire on the outside. The retort is heated to a high degree of heat from the furnace below, and the charcoal inside is heated to as high a degree of heat as is necessary, and the steam, passing from the bottom of the retort up through the incandescent charcoal, is converted into a fixed hydrogen-gas by the affinity of the carbon of the coal for the oxygen of the steam, which is converted into a carbonic oxide, and thus making free-hydrogen gas. The carbonic oxide passes off as a gas and mixes with the free hydrogen, which passes off through a pipe at the top of the retort into the middle or large retort, used for mixing the gases, the pipe passing down nearly to the bottom of the retort, with an elbow on the pipe forcing the discharge of the gas toward the center of the retort, and directly opposite the end of the pipe for the discharge of the carbon-gas. The other end retort is used for converting hydrocarbon-vapor into a fixed gas. The retort is constructed in the same way as the one for making hydrogen-gas, being constructed of cast-iron, with four lugs cast on the side, which are supported by the brick wall, and is heated from the furnace below, the same as the retort for making hydrogen. This retort is filled with pieces of pumice-

stone from one to two inches in diameter, which are put in for the purpose of retarding the flow of the vapor and exposing the same to a greater heating-surface. The hydrocarbon-vapor is taken from the generator through the top of the retort nearly to the bottom of the same, which, passing up through the pumice-stone, (or any other substance that may be substituted for retarding the flow of the vapor and giving additional heating-surface,) is converted into a fixed hydrocarbon-gas, which passes out through the top of the retort through a pipe; thence into the middle or large retort for combining the gases, and by a pipe down nearly to the bottom, and by an elbow turned toward the center of the same and directly opposite the pipe discharging the hydrogen, thus making a perfect mixture of the gases. The middle or large retort is constructed in the same way as the other two, only larger, and is heated in the same way as the other two, and is used for mixing the two gases, and has an outlet consisting of a large pipe to conduct the gas already made to any point desired.

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 retorts for the making of the gases are constructed of cast-iron, with four lugs or braces to enable them to be hung perpendicular in the furnace, and with flanges at the top, with cast-iron heads fitted and bolted on, and are slightly oval at the bottom. The furnaces are constructed with a fire-grate of the same size as the bottom of the furnace, with an ash-pit underneath, and is constructed so as the fire will envelop the entire retort nearly to the extreme top, with a chimney in the rear. The two end retorts pass through the brick-work to the outside of the brick-work of the furnace on top, so that the heads can be taken off to get at the inside of the retort, if necessary. The retort for decomposing the steam and making the hydrogen-gas is shown by letter A, Fig. 2. The pipe for introducing the superheated steam into the same is shown by letter B. The cap for distributing the steam on the bottom of the retort is shown by letter C. The lugs or supports of the retort are shown by letters D D D D D. The furnace around the retorts is shown by letters E E E. The ash-pits to the furnaces are shown by letters F F F. Letter G represents the cast-iron head of each retort, bolted to the top of the same. Letter H represents the pipe leading from the hydrogen-retort to the large retort for mixing the gases. Letter I represents the large retort for mixing the gases. Letter J represents the pipe leading from the top of the large retort to the gas-holder. Letter K represents the retort for converting the carbon-vapor into fixed gas. Letter L represents the pipe leading from the vapor-generator to the retort K. Letter M represents the pipe leading from the retort K into the retort I for mixing the gases.

Letter N represents the steam-gage on the pipe L leading into the retort K, which will always show the pressure of the hydrocarbon-vapor. Letter O represents the steam-gage on the pipe b, which shows the pressure of the superheated steam on the retort A.

Suitable stop-cocks and valves should be placed between all the connections, always under the control of the party in charge of the apparatus.

The mode of operating the apparatus is as follows, to wit: The two end or small retorts are charged or filled—the retort A with charcoal, and the retort K with pumice-stone, (or some suitable substitute.) Fire is then placed in the furnaces under the retorts, which are heated to the required degree of heat which is requisite to thoroughly fix the gases; as the furnaces are separate it will be easy to regulate the heat of each retort as required to produce the required result. After the retorts are sufficiently hot to convert the vapors into fixed gas, steam is taken from the boiler, and, after being thoroughly superheated, is taken into the retort A, through the pipe b, and is discharged on the bottom of the retort through the cap C. The steam passing up through the incandescent coal is converted into a free-hydrogen gas by the carbon of the coal taking up the oxygen of the steam, thus freeing the hydrogen and leaving no deposit or oxide, as the combination of the carbon of the coal and the oxygen of the steam form a carbonic oxide, which passes off in the form of a gas with the free hydrogen through the pipe H into the retort I, which is used for mixing the gases. At the same time that steam is taken into the retort A, hydrocarbon-vapor is taken in from an oil-generator through the pipe L into the retort K, which is used for converting the carbon-vapor into a fixed gas, and discharged at the bottom, which rising up through the pumice-stone (or any other substitute used for giving a large heating-surface) is converted into a fixed-carbon gas which passes off through the pipe M into the bottom of the retort I, and is discharged from the same directly opposite the discharge from the pipe H, which discharges the hydrogen-gas from the retort A, thus forming a thorough mixture of the two gases, which are then mixed and heated again in the retort I, and pass out through the stand-pipe J through the condenser to the holder. As the steam which is taken into the retort A through the pipe B can be regulated by a suitable stop-cock, and the carbon-vapor which is taken in through the pipe L into the retort K can also be regulated by a stop-cock, the quality of the gas can always be made of any illuminating power desired, as the carbon will enrich and the hydrogen impoverish.

The steam-gages, as shown on the pipe L and also on the pipe B, will enable the operator to make any combination he wishes, as the whole apparatus is run under pressure. The retort I, which passes above the brick-

work of the furnace, and also all pipes which are exposed to the atmosphere, should be protected by suitable non-conductors.

The steam used for the hydrogen-retort may be supplied from any steam-boiler, and superheated by any ordinary superheater.

The hydrocarbon-vapor used for this process is generated by superheated steam in a tubular generator, and without the application of fire-heat; not more than one barrel of oil being necessary at any one time in a generator capable of generating one hundred barrels per day. The reservoir or supply of oil may be kept at any required distance, even beyond the limits of the largest city, and is brought to the generator by means of a steam-pump.

The generator we prefer to use to accomplish this object is what is known as the Whipple & Dickerson generator by patents reissued March 18, 1873, numbered 5,326 and 5,327.

The special new features in our invention are as follows: By placing the charcoal or other carbonaceous material in an upright retort, and passing the steam through it longitudinally, it is thoroughly decomposed and a large amount of hydrogen is generated, and it is easy to keep any desired depth of coal in the retort. By keeping the retort hot, by setting it in a furnace, it is not chilled by the action of the steam. By superheating to a high degree the chilling action is slight. The retorts may be made of any refractory substance suitable for the purpose. By generating the gases made by the decomposition of steam and that from petroleum or other oleaginous material in separate retorts, and then mixing them, they can always be brought together in the proper proportion so as to produce a gas best adapted for the purpose. The mode of mixing by jetting the two gases against each other thoroughly mixes them, and uniformity of composition

is secured. The result of the three processes is a compound gas made up of hydrogen, carbonic oxide, carbureted hydrogen, and oil gas. Each of these gases gives particular properties to the compound, as is well known, and this improved gas is itself a new article.

Having thus described our invention, what we claim, and wish to secure by Letters Patent, is—

1. The process herein described for producing gas suitable for illumination, the same consisting in generating hydrogen by the decomposition of steam in a retort, and mixing with it a gas produced from petroleum or other oleaginous material produced from petroleum in a separate retort, substantially as shown, for the purpose set forth.

2. The combination of a hydrogen-retort and the oil-gas retort and the mixing-retort, substantially as shown, for the purposes set forth.

3. The hydrogen apparatus composed of an upright retort filled with charcoal or any other carbonaceous substance, a surrounding-furnace, and a steam-distributor, substantially as shown, and for the purposes set forth.

4. The method for mixing the hydrogen gas and the hydrocarbon gas by discharging them into the mixing-retort against each other, substantially as shown, and for the purposes set forth.

5. The compound gas herein described, made by combining the products resulting from the decomposition of steam by means of heated carbon with hydrocarbon gas, each being generated in separate retorts, and then combined, substantially in the manner described.

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