G. H. SMITH.

Hydro Oxygen Light Apparatus.

No. 25,611. Patented Sept. 27, 1859.

Fig. 2

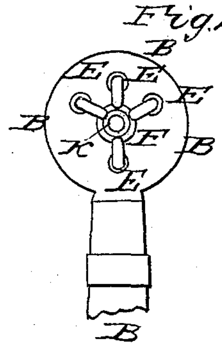
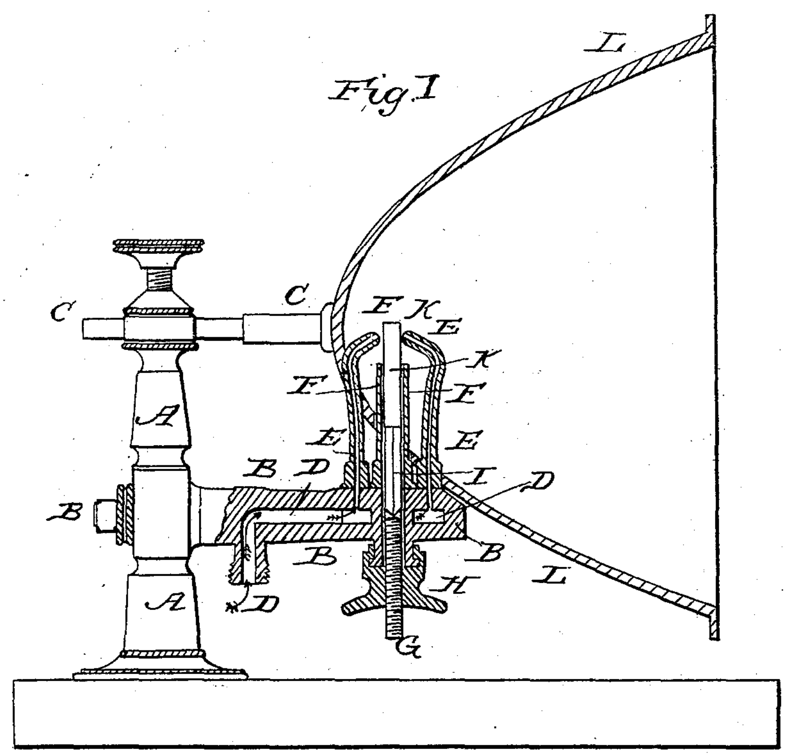


Fig. 1



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UNITED STATES PATENT OFFICE.

GEORGE HAND SMITH, OF ROCHESTER, NEW YORK, ASSIGNOR TO SILAS O. SMITH, OF SAME PLACE.

APPARATUS FOR THE PRODUCTION OF HARE'S HYDRO-OXYGEN LIGHT.

Specification of Letters Patent No. 25,611, dated September 27, 1859.

To all whom it may concern:

Be it known that I, George Hand Smith, of Rochester, in the State of New York, have invented a new and useful Improvement in Lights for Locomotive-Engines, Lighthouses, &c.; and I hereby declare that the following is a full, true, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which are made part hereof, and of which—

Figure I is a vertical section, and Fig. II a top view of the end of the arm B containing the gas-burners or jets, the letters of reference to each part being the same in both drawings.

Lights, in general, are of two classes: first, those arising simply from a flame—no matter how produced—as in candles, ordinary oil and spirit lamps, common gas lights, or Garney's "bride light;" and second those arising from a solid incandescent surface, of which the "Drummond" and electric lights are representatives. In the former of these two classes improvements have been made by throwing a stream of oxygen upon a flame derived from oil or naphthalized gases, &c., or by exposing to combustion ordinary atmospheric air saturated with hydro-carbons. In the second class little if any improvement has been made upon the Drummond light, which consisted of a fragment of lime, or similar material, made incandescent under the operation of the oxyhydrogen blowpipe. An attempt was made by Gaudin to combine these two classes by exposing a piece of magnesia, hung on a platina thread, to the impact of a flame arising from the combustion of ether or alcohol, and increased by the addition of oxygen driven into it by the pressure of mercury. These outlines, it is believed, indicate the principle of most—if not all—improved lights known until the present time. None of them, if successful to any extent, have been sufficiently so to be permanently or generally used for any purpose beyond lighting large halls, &c.; and all are subject to great, if not insuperable, objections, among which may be stated the choking of tubes, and the great and expensive amount of combustion of materials, and the difficulty of regulation, of the "bride" class of lights; and the difficulty and expense of producing hydrogen, its dangerously explosive character, and the great weight of machinery required, in the "Drummond" light class. While, in addition to these reasons, the use of any of these improved lights was next to impossible on locomotive engines, owing to the jarring character of their motion and the difficulty of regulating the draft and supply of air to the point of combustion, in any lantern, or lighting apparatus, placed in the very front of an engine moving with great velocity through the air, in all weathers and all directions.

To obviate these difficulties, and to supply an intense light, equally fitted for stationary use, or for service on locomotive engines, and other bodies, moving irregularly, at high rates of speed, and in entire disregard of atmospheric circumstances, has been my object; and this I claim to have done as follows:—

From a sufficient support, A, of any form or character, I project the arms B and C. The arm B contains within it the supply pipe D, by which the combined gases (presently specified) are fed to the burners E E, &c.

F is a hollow tube or barrel (which I usually make about half an inch in diameter), at the bottom of which is a plunger I worked by a nut H and screw G, and so elevated or lowered. Upon this plunger and within the barrel F is placed a "radiator" K, of lime or magnesia of any size and shape required to fit the barrel F easily. I prefer to use a cylinder an inch and a half long by about seven-sixteenths of an inch in diameter. The burners E E, &c., are tubes, of capillary orifice—much less than the bore of the tube—springing vertically from the end of the arm B, which end is made circular (as shown in the drawings, Fig. II.), and through its interior the supply pipe D is led; with this supply pipe the burners E E, &c., communicate, and they are made of such a height that their upper ends which contain the orifice of discharge, and which are bent inward and upward, at an obtuse angle, toward a common center (at which center the radiator K is placed) shall be a little above the top of the barrel F. These burners E E, &c., I arrange as follows: If the circumference of the circular end of the arm B is divided into eighths, three burners are placed on the front side thereof so that they occupy about one quarter of its circumference—being not over one eighth of such circumference apart from each other, and a fourth burner is placed diametrically opposite the middle one of the other three.

L L is a reflector which may be of any shape required; it is perforated below in order to admit the top of the barrel F, and the burners E E, &c.

I mix either oxygen, or ordinary atmospheric air, with carbureted hydrogen (as supplied from any local gas works) in such proportions as may be desired, but I prefer to use them in proportions varying between equality, on the one hand, and two fifths of the former with three fifths of the latter on the other hand. This mixing may be effected either by inclosing the gases in the same receiver, in the proportions desired, or by keeping them in separate receivers (which may be inclosed together) proportioned as required, and producing the mixture by allowing the gases to flow into the same pipe—which latter method I prefer. In either case the gases are condensed into the receiver before use until a sufficient amount of them is obtained, within the limits of the receiver or receivers, to supply the light for the time required and to insure the necessary flow.

In the course of the pipe through which the combined gases flow from the receiver, and before they reach the burners E E, &c., as above described, I place a gas regulator to govern their discharge.

The receiver for the gases may be of any shape or material fitted for the purpose; for use on locomotive engines it should be of metal, in order properly to resist the jarring motion, and, as condensed gases are used, it may be quite small.

The charging and condensation may be effected, in movable lights, by means of a force pump to be attached and detached at pleasure; in fixed lights, by hydrostatic pressure in ordinary gasometers, or by direct pressure on elastic bags.

The operation of my improvement is as follows: The combined gases flowing under heavy pressure, as described, and after being started through an ordinary stop cock, have their flow properly governed by passing through the gas regulator; they then enter the supply pipe D, and are fed to the burners E E, &c. The orifices of these burners, however, being, as described, considerably less in diameter than the tubes which they discharge, a re-acting pressure is here produced, by which—in combination with the gas regulator—a uniform flow, of much greater rapidity, force and volume than the normal discharge of the orifices, is permanently secured. From the burners E E, &c., the combined gases (then in combustion) impinge upon the radiator K, which, under their operation becomes incandescent and intensely luminous. By the arrangement of the burners E E, &c., as before described, three strong jets of the combined gases are thrown on the radiator K, producing intense light at their neighboring and almost co-inciding points of impact, in front where it is most valuable, while the rear jet secures the incandescence, and even consumption, of the entire top of the radiator at the same time—a point of vital importance. Any other arrangement of the jets will either produce less light for the same consumption of the gases—or will consume much more gas for the same amount of light produced.

The advantages of this light, produced and operated as described, I assert to be these: 1. For the explosive hydrogen of the oxyhydrogen light—a gas which is notoriously expensive to obtain, dangerous to use, and requiring great chemical skill properly to supply,—it substitutes carbureted-hydrogen, which is cheap, easily and abundantly obtainable in almost every town of any size, always easily and expeditiously made, and entirely safe in manufacture and use as daily demonstrated. 2. Ordinary atmospheric air may be substituted for oxygen. 3. By means of condensation and consequent pressure, it on the one hand (by proper regulating machinery as described) secures an unvarying flow, of great power and volume from small orifices, and on the other hand reduces the weight and bulk of necessary machinery far below anything heretofore known in lights produced by incandescent surfaces. 4. No jarring motion is capable of affecting either the steady flow of the gases or the fixed position of the radiator. 5. It requires no regulation of draft or supply of exterior air, but may be inclosed in a draft-proof lantern, or behind a draft-proof lens; the combined gases supplying all that is necessary for its entire combustive operation; and so is entirely independent of atmospheric circumstances, or the rapidity and direction in which it may be driven. 6. By the arrangement of the burners as described the greatest possible amount of light is produced in proportion to the gas expended. 7. It consumes less of the incandescent mass than any other process of obtaining light from such an object. 8. It regulates itself and requires no trimming, &c., while in use.

The production of light from an incandescent surface, under the operation of one or more gases in combustion, is not new or claimed by me.

What I do claim is:—

1. The use of carbureted hydrogen gas in combination with atmospheric air or oxygen gas, in proportions desired, operating, under condensation, through a proper regulator, and discharging through jets of minute orifice, upon—and rendering incandescent—

any proper radiating material of any form, being independent of any atmospheric circumstances or situation,—in the manner and through the means and machinery substantially as hereinbefore described.

2. The arrangement of four jets or burners for directing the impact of gases on incandescent surfaces, such burners having minute orifices pointing to a common center, three of them placed so that their orifices of discharge shall be within, or nearly within one quarter of the circumference of a circle drawn through them from the center to which they point (being not more than one eighth of such circumference distant from each other), and the orifice of the fourth being diametrically opposite in such circle to the middle orifice of the other three, substantially as before described.

GEORGE HAND SMITH.

Witnesses:
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