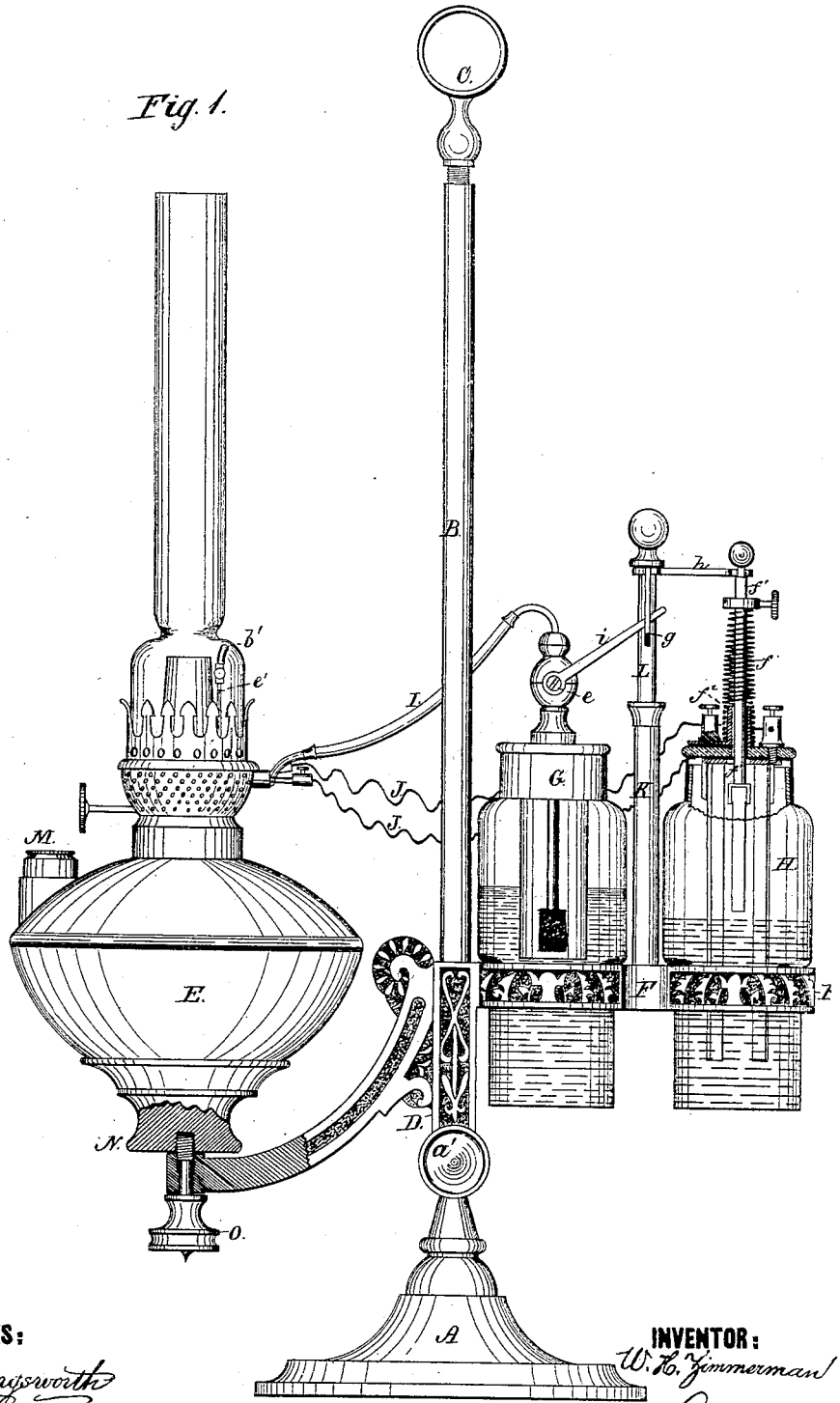
2 Sheets—Sheet 1.

W. H. ZIMMERMAN.

ELECTRIC LIGHTING APPARATUS FOR LAMPS.

No. 188,220. Patented March 6, 1877.

Fig. 1.



WITNESSES:

W. W. Hollingsworth

Edw. W. Byrn

INVENTOR:

W. H. Zimmerman

BY

Munn & Co.

ATTORNEYS.

2 Sheets—Sheet 2.

W. H. ZIMMERMAN.

ELECTRIC LIGHTING APPARATUS FOR LAMPS.

No. 188,220. Patented March 6, 1877.

Fig. 2.

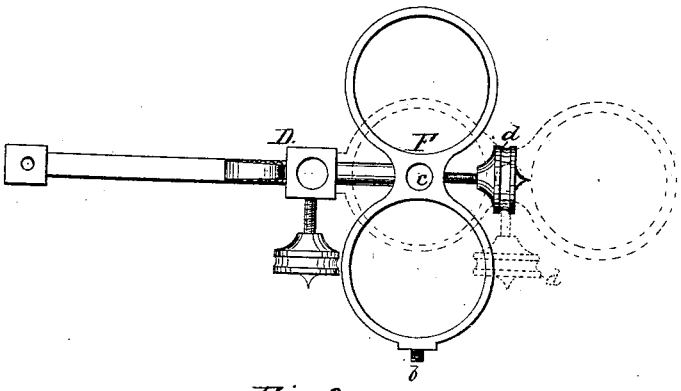


Fig. 3.

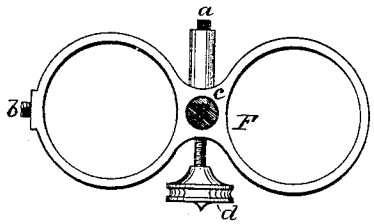


Fig. 4.

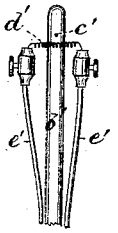
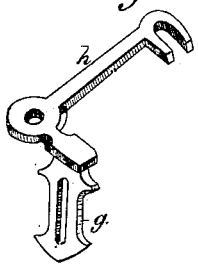


Fig. 5.



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W. W. Hollingsworth

Edw. C. Byrn.

INVENTOR:

W. H. Zimmerman

BY

Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM H. ZIMMERMAN, OF CHESTERTOWN, MARYLAND.

IMPROVEMENT IN ELECTRIC LIGHTING APPARATUS FOR LAMPS.

Specification forming part of Letters Patent No. **188,220**, dated March 6, 1877; application filed January 17, 1877.

To all whom it may concern:

Be it known that I, WILLIAM H. ZIMMERMAN, of Chestertown, in the county of Kent and State of Maryland, have invented a new and Improved Self-Lighting Lamp; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a side elevation with parts in section. Fig. 2 is a detail plan view of the bracket and twin socket, showing modified arrangement of latter. Fig. 3 is a detail plan view, showing a further modification of the arrangement of the socket. Fig. 4, a detail of the electrodes of the burner; Fig. 5, a detail in perspective of the coupling-device for simultaneously bringing into operation both the battery and gas-generator.

My invention relates to a novel construction of self-lighting lamps, based upon the general principle of the employment of a hydrogen-gas generator, together with a galvanic battery, in which the battery-current heats a platinum wire red hot to ignite the jet of hydrogen, the flame of which latter impinges against and ignites the wick of the lamp.

In the so-called hydro-electric lamp, for which a patent was granted me March 9, 1875, I have found a number of defects and objections to its practical adoption, which exist as follows: First, the forming of the gas-generating apparatus into the supporting-base or pedestal makes it liable to fracture when suddenly placed upon any hard surface, and this breakage involves not only the spilling of the acid and its attendant destruction of goods, but also involves the upsetting and possible explosion of the lamp; secondly, the communication between the gas-generator and lamp-burner being through the standard, the vertical adjustment of the lamp is limited; and, thirdly, in filling the gas-generator with its materials the upper portion of the apparatus must be held in the hand by a second party, inasmuch as it has no supporting-base, and the adherence of the acid to the bell-jar and the presence of oil in the lamp renders it unsafe to lay the same down.

My present invention is intended to obviate these objections by an entirely novel construction and arrangement; and it consists mainly in locating the gas-generator and the battery in twin supporting-sockets attached to the brachial slide carrying the lamp, whereby the various vessels to be filled are rendered capable of independent removability and support in upright position while being filled. The invention also consists in the means for simultaneously bringing into operation both the battery and the gas-generator, as hereinafter more fully described.

In the drawing, A represents the pedestal or base, made of cast-iron, covered with sheet-brass, and of considerable weight, to preserve the equilibrium of the apparatus by keeping the center of gravity well down and near the point of support. This pedestal is provided with a vertical standard, B, having a detachable ring-handle, C, at the top, by means of which the lamp is transported. Upon this standard is adjusted, by means of set-screw *a'*, the brachial slide D, which slide is made with a prolonged bearing or socket, and supports the lamp E. F is the twin socket, one portion of which encompasses and supports the detachable gas-generator cell G and the other the detachable battery-cell H, both of which cells are formed with supporting-shoulders. This twin socket is provided with screw-stems *a* and *b*, which permit its attachment to the brachial slide carrying the lamp, either in the position shown in Fig. 1 or that shown in Fig. 2. This said twin socket is also provided with a perforation, *c*, and set-screw *d*, which permits it to be placed directly upon the standard, as shown in Fig. 3, or, if needs be, upon a gas-bracket or the collar of an ordinary lamp, the perforation *c* in this latter case being correspondingly enlarged and made to fit the said collar.

The hydrogen-gas generator G is of a well-known pattern, being that ordinarily employed in the "Doebereiner lamp," and consisting simply of a glass cell partly filled with dilute sulphuric acid, and an internal inverted glass bell-jar, having suspended in it a quantity of zinc, and having an outlet communication at the top through a valve or cock, *e*. As the hydrogen gas is generated by the action of the sulphuric acid and zinc, the press-

ure of gas in the bell-jar forces the liquid out of contact of the zinc, to discontinue its generation. As the gas is allowed to escape through cock *e* the liquid rises to the zinc and the generation of gas is commenced again, which apparatus, it will be seen, supplies for my purpose a constant and permanent source of gas.

The battery-cell H is of the "Grenet" type, in which the exciting-fluid is a mixture of bichromate of potash and sulphuric acid, and the elements are two stationary carbon-plates and an adjustable zinc plate, attached to a sliding stem habitually held up by a spiral spring, *f*, and plunged at will into the fluid to excite the current. In the use of a battery for the purpose shown in my invention it is very essential (for the benefit of unskilled persons,) that the battery should never fail to act, and as this form of battery is liable to become inoperative from a lack of perfect contact between the zinc and its electrodes, growing out of the corrosions and incrustations which accumulate between the slide-rod f^1 of the zinc and the sleeve f^2, in which it moves, I provide a means for remedying this and rendering the battery more permanent and better adapted to my purpose. The improvement consists in fastening the lower end of the spiral spring to the sleeve f^2, connected with the electrode of the zinc element, and fastening the upper end of the spiral spring directly to the slide-rod f^1. As shown, connection is made with said rod by an adjustable collar, but the spiral spring may be soldered directly to said rod. Now, if insulation of the current occurs between the slide-rod f^1 and the inner periphery of the sleeve f^2 the current passes up the slide-rod, down the spiral spring, and through the sleeve to the electrode.

The gas-generator is connected through a rubber pipe or hose, I, with a jet stem or nozzle, b', near the lamp-wick and adjacent to the jet-orifice c'; but below the same, and out of contact with the jet when burning, is arranged a coiled platinum wire, d', (see Fig. 4,) connecting two electrodes, e' e', located in the lamp-burner, which electrodes are well insulated and connected through wires J J with the electrodes of the battery. In locating the platinum wire below the escape-orifice for the gas, and using a coil instead of a straight piece, I secure important results. In locating the wire in the burning jet of gas, I have found that the combined effect of the current and ignited jet would fuse the same and break the connection, while, if the wire be placed below the jet it will not at all times ignite the gas. Taking advantage, however, of the rapid ascent of heated air, the concentrated heating-surface of a spiral, and the easy ignition of hydrogen gas, I find that by locating a close spiral below the orifice I secure a sufficient concentration of heat to ignite the gas without the objectionable liability of fusing the wire, incident to its location directly in the burning jet. This arrangement also I have determined from experiment to be more sensitive to the influences of the combined powers, and requires a lower temperature, thereby availing myself for a longer time of the declining powers of the battery.

To open the valve of the gas-generator and start the current simultaneously, a special set of devices are provided, which will now be described. A tubular guide-standard, K, is located in the twin socket between the two cells, and contains a slide-rod, L. Attached to this slide-rod at the top is a pendant slotted piece, *g*, and a radial forked arm, *h*. In the slot of piece *g* rests loosely the lever *i* that is attached to and operates the valve or cock *e* of the gas-generator, while the forked arm *h* grasps loosely the upper portion of the slide-rod f^1 of the battery. The two slide-rods f^1 and L, with the lever *i*, are habitually held up by the spring *f*, but when the slide L is depressed by means of the terminal knob, it simultaneously depresses slide-rod f^1 and lever *i*, at once starting the battery-current and opening the gas-supply, which produces the combined effect of rendering the platinum wire red hot, igniting the escaping jet of hydrogen, and, through the latter, the wick of the lamp.

In filling the gas-generator and battery, this may be effected through holes and filling-cups, arranged in the cap-pieces, or they may be removed from their sockets by disconnecting the hose and wires and throwing the lever *i* out of the slotted piece, (when removing the generator,) and by simply twisting the rod L axially to remove the fork of its radial arm from the slide-rod f^1, when removing the battery-cell.

In filling the lamp proper, this may be effected through a filler-cap, M, but the lamp is also provided with a specially-constructed broad basic support, N, upon which it may be supported in upright position when removed from the bracket to be filled or cleansed. In securing the lamp to the bracket its basic support N is provided with a screw-threaded socket, adapted to receive a binding-screw, O, which swivels in suspended position beneath the extremity of the bracket, and whose threaded stem enters the socket of the support N to secure it. By making this screw to swivel, it can never be lost or displaced, and is made to occupy a suspended position, as shown, which is the most convenient for manipulation.

Thus it will be seen, in the new form of lamp herein described, I have obviated the objection to the glass pedestal as forming the gas-generator, securing immunity from the bad effects attending its breakage, and also an adjustment of the whole apparatus integrally throughout the whole length of the standard. I also render the parts quickly, easily, and independently detachable, for separate filling, cleansing, or repairs, and especially by means of the twin sockets as combined with a lamp,

I secure a greater number of combinations for the lamp, correspondingly extending the scope of its utility.

What I claim is—

1. The twin socket for containing the battery and gas-generating cell, in combination with the said cells, and a lamp or its equivalent, as described, provided with connections, substantially as shown and described.

2. The combination, with the pedestal and standard, of the brachial slide, carrying the lamp, and the twin socket carrying the battery and gas-generating cells, and connected with said brachial slide, substantially as and for the purpose described.

3. The slide L, having slotted piece and forked arm, in combination with slide-rod f^1, having spring f, and the lever i operating the valve e, substantially as and for the purpose described.

4. The guide-standard K and movable slide-rod L, arranged centrally upon the twin socket, between the gas-generator and the battery, in combination with said twin socket, and with the valve of the gas-generator and the movable element of the battery, substantially as and for the purpose described.

WM. H. ZIMMERMAN.

Witnesses:

J. W. HINES,

GEO. B. WESTCOTT, Jr.