# W. F. C. McCARTY.
## Electric-Lamp.

**No. 220,982.** **Patented Oct. 28, 1879.**

*Fig. 1.*

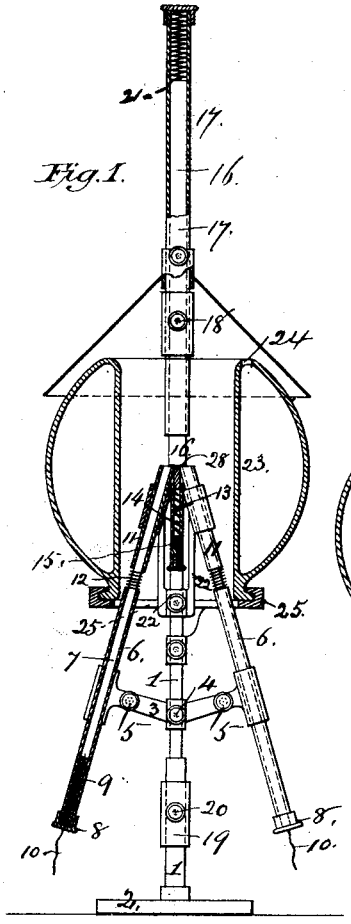



*Fig. 3.*

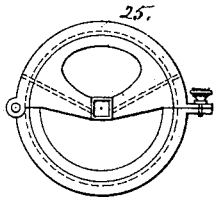



*Fig. 4.*

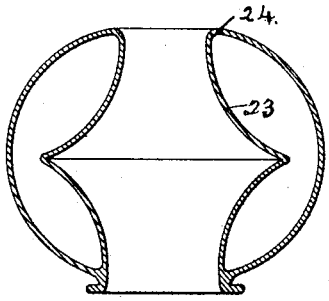



*Fig. 5.*

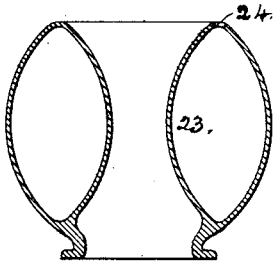
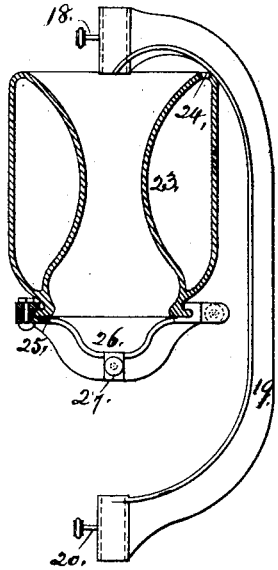



*Fig. 2.*

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ELECTRIC LAMPS.

Specification forming part of Letters Patent No. **220,982**, dated October 28, 1879; application filed March 17, 1879.

*To all whom it may concern:*

Be it known that I, WILLIAM FITZ-CHARLES McCARTY, of New York city, State of New York, temporarily residing in Paris, France, have invented certain new and useful Improvements in the Production of Electric Light, as well as in the materials and mechanism employed for that purpose; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention consists, substantially, in the following, namely: first, in connecting two long composition candles severally to the two poles of a battery combined with a calcium stick, as set forth hereinafter, whereby they may be moved toward a common center as they are consumed or worn off; second, in combining with the composition sticks or candles asbestus tubes; and, thirdly, in combining with the candles or carbon sticks a calcium stick and a certain metallic alloy, so disposed that the ends of the candles may abut against the end of the calcium stick; and in certain details, hereinafter specified.

The object of this invention is to overcome the serious difficulties and inconveniences which the electric light in its present state of imperfection still offers, and which are the principal obstacles to its introduction into general use. Among these difficulties the first is the necessity of renewing the burning parts after a comparatively very short time of actual service, which not only requires hourly attention on the part of the user, and the keeping on hand of a considerable quantity of stock, but which in cases where a great number of lights are kept burning for any length of time—for instance, where large factories or the streets of a city are lighted up by electricity—is connected with great waste of time of workmen or employés, and therefore with great expense. These losses I avoid or greatly reduce by a peculiar arrangement of the burning parts, which permits me to introduce such parts into the apparatus in much greater lengths than usual, and to dispose proper springs in such manner that the separate pieces, as they wear or burn off, are constantly pushed in contact with each other at the proper place until only a comparatively small fragment of each is left, which fragments, being removed before introducing new long pieces, may be preserved, and, when a great number is collected, worked up again into long pieces.

The electric light produced by the different apparatus now in actual use or proposed has, without exception, a bluish hue, which not only greatly impairs its effectiveness for all ordinary purposes, but renders its application for certain special uses impracticable. I have found by experiments that by exposing certain chemicals to the action of the heat produced by the ordinary electric light—that is to say, by burning such chemicals, or at least bringing them to a white heat together with the carbon—a perfectly white light, exhibiting not the slightest hue of color whatever, can be produced. The application of these chemicals is effected also in such manner that the ends, as they wear off, are constantly pushed home in the proper position by suitably-placed springs.

It is a well-known fact that the light produced by electricity is of such intensity as would, if exposed to the human eye without being softened or reduced in brilliancy, be extremely dangerous to the latter. For this reason globes of ground glass or of opaque glass have been used; but the effect of these is to prevent a certain quantity of the rays from passing through, whereby the effectiveness of the light is accordingly diminished—that is to say, a certain quantity of the light produced is utterly lost in the effort of making it useful and practicable, which, obviously, is equivalent to a corresponding loss of material and power expended. My experiments have shown that by employing hollow globes filled with water or other translucent fluid the electric light, when looking at it, is greatly softened, and in no way injurious or even disagreeable to the eyes, while all the rays of the light pass freely through such globes and become effective in illuminating the surrounding objects, even in a higher degree than if the rays would strike such objects directly without having passed through my globe.

By giving different shapes to the walls of these globes I am enabled to collect the light and throw it all in a certain direction. For instance, I can throw all the light out horizontally at the height at which the apparatus is placed, or I can throw it in the shape of a cone upward or downward, &c.

The accompanying drawings form a part of this specification, and represent what I consider the best means for carrying out my invention.

Figure 1 is a front elevation of my entire apparatus. Fig. 2 is a lateral elevation, partly in section, showing the bracket which supports one of the materials for producing the light, and another bracket for supporting the globe, the globe itself being represented of different shape from that shown in Fig. 1. Fig. 3 is a plan of the bracket which supports the globe. Figs. 4 and 5 represent still different shapes, which, for certain cases, I propose to give to my improved globes.

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

1 is a stand, which supports all the different parts of my apparatus. It is formed with a bed-plate, 2, which may be secured to a lamp-post, or placed on any other convenient support. For certain purposes—for instance, when the light is to be used in houses—I propose to give to this bed-plate, as also to the other parts of my apparatus, a more or less ornamental appearance; but I have here represented the parts as of simple and strong construction.

3 is a double bracket capable of sliding up and down on the square part of the stand 1, and, when once adjusted in proper position, held firmly by a pinching-screw, 4. The two arms of this bracket, extending in opposite directions, and preferably a little upward, serve to support the principal material for producing the light—two rods or candles of a composition of carbon, platinum, iridium, and magnesium. Their ends are equipped with short tubes converging upward at an angle of about thirty degrees; but these tubes, as well as their supporting-arms, down to nearly the point where they emerge from the center-piece of the bracket, which slides on the stand 1, are split, and, being made of elastic material, allow the introduction of hard-rubber tubes 6 into the short tubes forming part of the bracket. Two pinching-screws, 5, serve to clamp these rubber tubes 6, after they have been adjusted at the proper height, between the split tubes by drawing the two parts of each arm firmly together.

The rubber tubes 6 inclose the two candles 7 7, composed of carbon and other materials, as above stated. They are closed at their lower ends by screw-cups 8, also preferably made of hard rubber, which serve as abutments for spiral springs 9, placed in the lower part of each rubber tube, for the purpose of pushing the two sticks or candles of composition constantly upward.

A small hole formed in each cup 8 admits the conducting-wires 10 from the battery, one of which is attached to each of the composition candles 7. These wires 10 should be of sufficient length to admit of their being drawn farther inward into the rubber tube 6, when the springs 9 push the composition candles upward as they burn off.

To protect the upper free ends of the composition candles, I surround each with a tube of asbestus, 11, which is held at the proper elevation by a spring, 12, abutting against the lower end of this asbestus tube 11 on one side and against the upper end of the rubber tube 6 on the other. These springs not only serve to keep the asbestus tubes in place, but to push them farther up if their upper ends should, by the effects of the heat, become brittle and wear or break off.

The effect of the arrangement thus far described is, that the electric current, passing from one composition candle to the other, heats the ends of these candles to a white heat, whereby the ordinary electric light is produced, while the peculiar disposition of the parts by which they are approached to each other at an angle instead of from opposite directions permits the introduction and use of much longer candles than has heretofore been practicable.

The light resulting from the burning of these candles is purified and rendered perfectly white by exposing to its action a stick of chemically pure calcium, 16, descending vertically from above, and a piece, 28, composed of an alloy of platinum and iridium, supported on a short piece of asbestus, 13, the top of which is hollowed out so as to form a small cup, as represented. A tube, 14, screwed on the top of the stand 1, serves to support and guide the asbestus piece 13, which, in case it should gradually wear or break off at its upper end by the effects of the heat, is pushed upward to the desired level by the action of a spring, 15, inclosed in the tube 14, and acting on the lower end of the asbestus piece 13. The calcium is prepared in the shape of a long rod or stick, 16, and is inclosed in a tube, 17, held adjustably by a pinching-screw, 18, in the upper end of the bent arm 19, the lower end of which slides on the stand 1, and is held in position thereon by the pinching-screw 20. A spiral spring, 21, placed in the tube 17, and abutting against the cap screwed on the top of said tube, presses the calcium stick 16 constantly downward in contact with the composition candles 7 as it wears or burns off. The position of all the parts must be so arranged, and the force of the different springs so calculated, that the ends of the asbestus covering-tubes 11, when the springs are properly adjusted, may be constantly in contact and flush with the asbestus piece 13, and that their interior edges, as well as the ends of the composition candles 7, abut against the end of the calcium stick 16. In order to more strongly hold the parts in this position, I provide an-

other adjustable bracket, 22, on the stand 1, carrying two short sections of pipe, in which the asbestus tubes 11 are securely guided.

The hollow globe 23, filled with water through a hole, 24, formed in the top, which may be subsequently closed by any suitable means, is supported on the ring 25, which is made in halves, hinged together and closed by means of a pinching-screw, Figs. 2 and 3. One half of this ring, which may be termed the "stationary half," is formed in one piece with the two-armed bracket 26, which latter is also adjustable on the stand 1 by means of a set-screw, 27.

Although I have shown only four different shapes of my globe, it is evident that its form may be varied in wide limits in order to produce different effects. These effects may even be varied by adjusting a single globe at different levels respectively to the light.

Many modifications may be made in the details without departing from the objects of my invention. The stand 1 may be made round with a groove, in which the pinching-screws operate, instead of square. In some cases the bracket which forms the guides for the asbestus tubes may be dispensed with; or it may be formed in one piece with the principal bracket 3. Springs acting by contraction may be employed instead of those shown, which act by expansion, especially as regards the springs 9. To effect this the lower ends of the composition candles 7 could be placed in cups having two short arms, to which the lower ends of the contracting springs would be attached, while their upper ends would be fastened to hoops formed on the split tubes of the bracket 3. In this case it will be seen that preferably two springs are to be used for each composition candle.

Where there exists any danger that the water in the hollow globes might freeze, I can fill them with alcohol, ether, or other non-freezing fluid.

To produce various effects of color, the globes are filled with fluid of one or of different colors.

I claim as my invention—

1. The two long composition candles connected severally to the two poles of a battery, in combination with the calcium stick 16, and with the alloy of iridium and platinum, substantially as described, whereby they may all move forward toward one center as they burn or wear off, substantially as and for the purposes specified.

2. In combination with the composition candles or sticks of an electric-light apparatus, asbestus tubes surrounding and protecting the upper free ends of the candles, substantially as and for the purposes described.

3. In an electric-light apparatus, the combination of two composition candles or carbon sticks converging toward each other at their ends, a calcium stick, 16, and an alloy of platinum and iridium, 28, relatively disposed as shown and described, whereby the ends of the candles abut against the end of the calcium stick, substantially as shown, and for the purpose set forth.

In witness whereof I have hereunto set my hand this 28th day of January, 1879, in the presence of two subscribing witnesses.

W. F. C. McCARTY.

Witnesses:
ROBT. M. HOOPER,
A. H. GENTNER.