(No Model.) 2 Sheets—Sheet 1.

# S. P. PARMLY.

## ELECTRIC ARC LAMP.

No. 433,908. Patented Aug. 5, 1890.

*Fig. 1.*

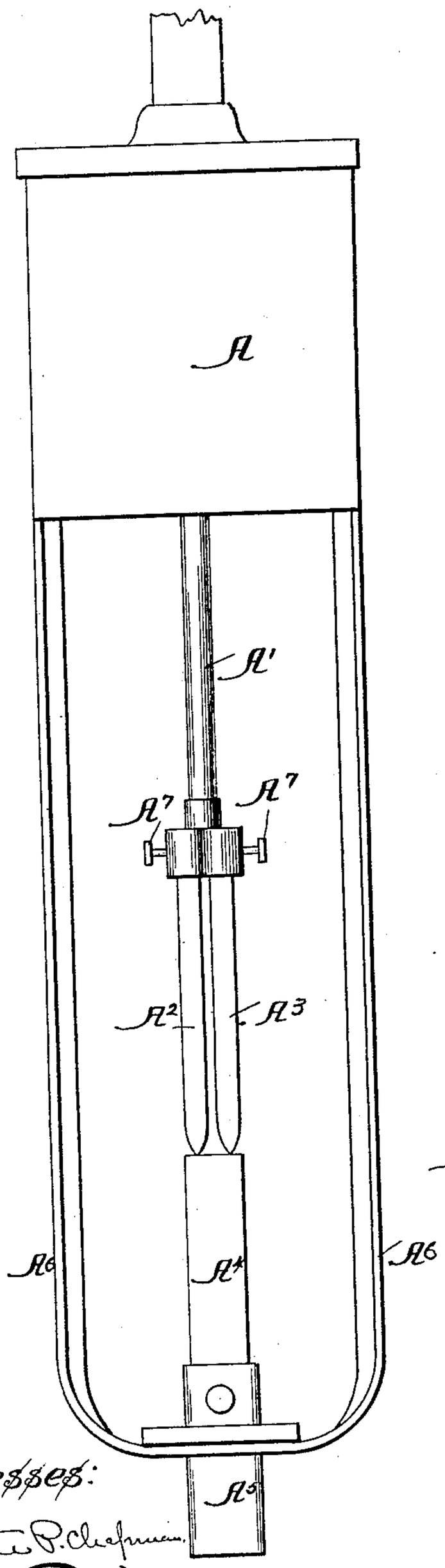
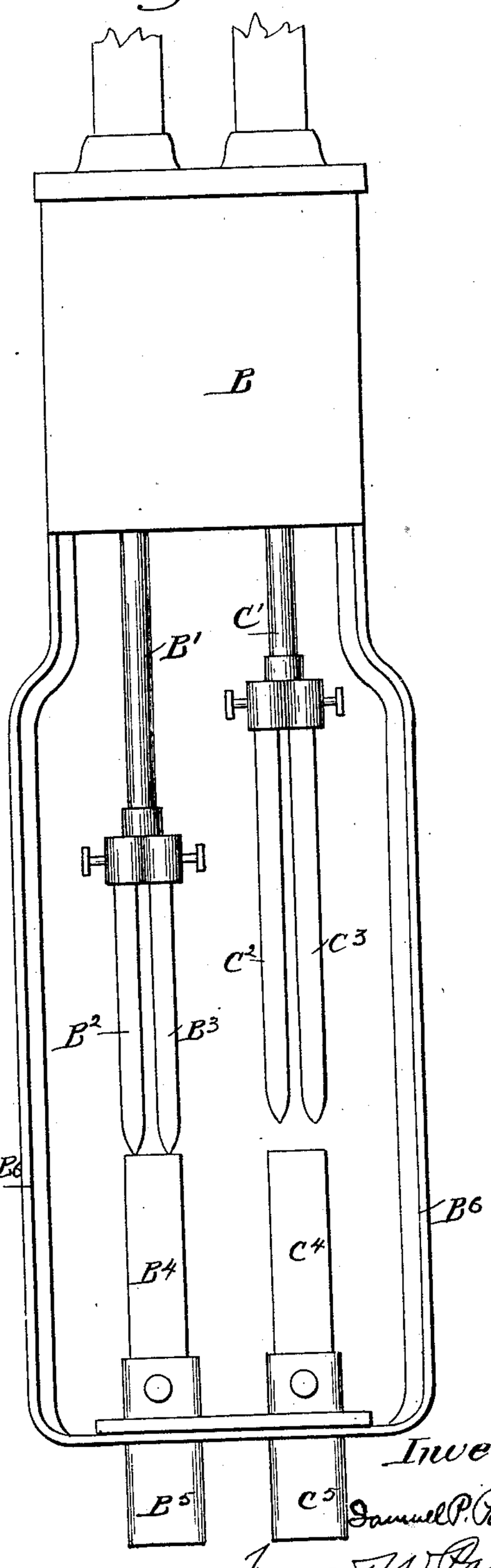



*Fig. 2.*

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(No Model.) 2 Sheets—Sheet 2.

# S. P. PARMLY.

## ELECTRIC ARC LAMP.

No. 433,908. Patented Aug. 5, 1890.

Fig. 3.

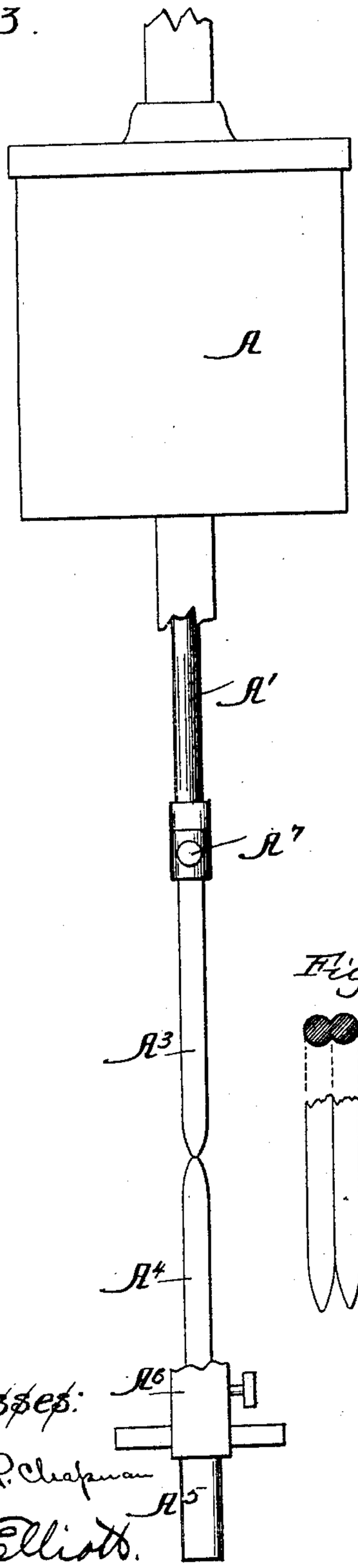



Fig. 4.

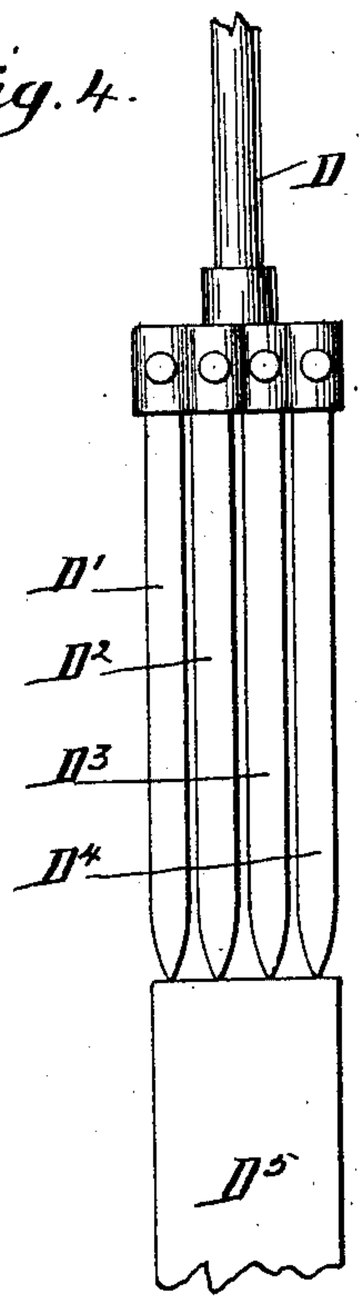



Fig. 7



Fig. 5.

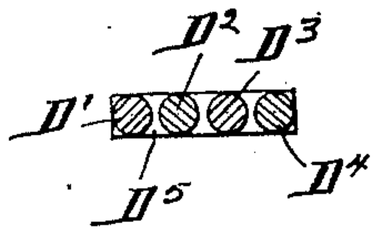
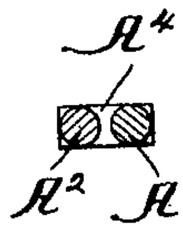



Fig. 6.

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# UNITED STATES PATENT OFFICE.

SAMUEL P. PARMLY, OF CHICAGO, ILLINOIS.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 433,908, dated August 5, 1890.

Application filed May 6, 1890. Serial No. 350,773. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL P. PARMLY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric-Arc Lamps, of which the following is a full, clear, and exact specification.

My invention relates to electric-arc lamps, and has for its object to provide a lamp which shall be capable of burning for a considerable period—as, for example, longer than a lamp having a single pair of carbons.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of a single lamp. Fig. 2 is a side view of a double lamp. Fig. 3 is a side view of a single lamp at right angles to the view shown in Fig. 1. Fig. 4 is a detail of a modification; Fig. 5, a horizontal section through the same. Fig. 6 is a section through the upper carbons of Fig. 1. Fig. 7 is a modification showing an electrode composed of carbon pencils closely related or joined.

Like parts are indicated by the same letter in all the figures.

A is the case, which contains the regulating mechanism shown in Figs. 1 and 2.

A′ is the carbon rod.

$A^2$ $A^3$ are the two upper carbons, secured to said carbon rod by the set-screws $A^7$ $A^7$ and opposed to the lower sheet-carbon $A^4$, supported in the holder $A^5$. $A^6$ $A^6$ are the portions of the frame.

B is the case, which contains the regulating mechanism of the double lamp; B′ C′, carbon rods; $B^2$ $B^3$, the two upper carbons secured to rod B′, and $C^2$ $C^3$ two upper carbons secured to rod C′.

$B^4$ $C^4$ are the respective lower sheet-carbons, $B^5$ $C^5$ their holders, and $B^6$ $B^6$ the supporting-frame.

D is the carbon rod of the modified form, which has secured to it the multiple upper carbons D′ $D^2$ $D^3$ $D^4$, opposed to which is the enlarged lower carbon $D^5$. The lower carbon is made in sheet form, having one diameter substantially the same as that of the single upper carbon and its other diameter substantially the same as the distance between the outer edges of the opposed upper carbons. Of course these proportions may vary considerably; but what I have shown is the preferred form. I may also round the corners of the lower carbons, as indicated in Fig. 3; but substantially this would result from the process of burning. I have also contemplated placing the upper carbons in actual contact with each other, or even rolling them out, so that they will be connected by a short rib, or so that the sides of the upper carbons would be corrugated, as it were, as shown in Fig. 7; but the result would be practically the same, and hence I consider such a carbon substantially the same as what I have shown. This would be true at least in respect to certain features of the lamp. Any sort of regulating mechanism can of course be used, and I do not dwell upon those matters, as they are immaterial to my invention.

The use and operation of my invention are as follows: Referring to the lamps shown in Figs. 1 and 3, when the lamp is out of operation the two upper carbons would normally rest upon the lower carbon or in contact therewith. When the current is applied, the regulating or lifting mechanism in the case A raises the carbon rod A′ and both carbons $A^2$ and $A^3$. Thereupon an arc will be established between one of said carbons $A^2$ and $A^3$ and the lower carbon $A^4$. I have found by experimenting that this lamp will form its arc on a lower voltage than in the case of a lamp similar in all other respects, except that the carbon $A^4$ is divided into two carbons similar to the upper pair. I also find that in the process of burning the carbon $A^2$, if it should happen to be the first to establish the arc, will induce the formation of a sort of cone upon the opposed surface of the carbon $A^4$, and the adjacent portions of such carbon will scale away. After a time in the process of feeding and burning the carbon $A^3$ will come in contact with the opposed portion of the carbon $A^4$, whereupon the arc will be extinguished on the carbon $A^2$ and established on the carbon $A^3$. A similar cone will now form on the carbon $A^4$, and in this manner the arc will shift at intervals of a few minutes from cone to cone of the lower carbon $A^4$. The lower carbon $A^4$, being of the size and shape indicated in Figs. 1, 2, 3, and 6, will be kept warm or hot, and hence when

the arc shifts from one cone to the other, or from one of the upper carbons to the other, the shifting takes place with very little noise, and it is not necessary for the lower carbon to be reheated, as would be the case were two distinct carbons substituted for the carbon $A^4$. It is thus part of the object of my invention, while having distinct carbons above, or at the pair upon which the current of electricity is received, or at one electrode, to have a single large carbon below, or at the other electrode, which will thus freely receive the current, so as to form an arc at a low voltage, and will also remain constantly heated throughout its upper portion, so as to avoid the noise and unsteadiness of the light incident to the shifting of the arc. It is also part of the purpose of my invention to have the lower carbon, or one electrode, so constructed and of such size and shape as will cause the formation of the cones above referred to in opposition to the points of the upper carbons. I find that these cones are best formed when the parts have the proportions indicated. I have also discovered by experiments that if both the upper and lower carbons should be made of sheets of carbon presenting parallel edges the arc shifts from one point to another with great rapidity and regularity, and I find that by use of two carbons above the arc is localized, as it were, for a definite and considerable period as to the carbon $A^4$. In this manner I am able to provide a lamp which will burn twice as long as if but one of the two upper carbons were employed, and will do so with a lower voltage and with a comparative fixedness of light and without most of the disadvantages incident to an alteration of the arc.

I can of course apply my invention in like manner to a lamp having two carbon rods, in which event I have two sets of triple carbons. I can also apply more than two carbons above, as illustrated in Figs. 4 and 5, where quadruple carbons are shown; but here the advantages which I have above enumerated as appertaining to my invention are to a certain degree abandoned, though the length of burning of the lamp is increased.

For many purposes it is immaterial which electrode is provided with the single carbon; hence I do not wish to be limited as to their position; but it is essential in my device that one electrode be of sheet form with substantially the same transverse diameter at all points, while the opposed electrode is composed substantially of two or more pencils.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. A multiple-carbon lamp one of whose electrodes is composed of a single strip or sheet and the other of two or more distinct carbon pencils having a greater or less resistance between them.

2. A multiple-carbon lamp whose electrodes are composed one of a single strip or sheet and the other of two or more distinct and separate carbon pencils.

3. A multiple-carbon lamp whose electrodes are composed one of a single sheet or strip and the other of two distinct and separated carbon pencils.

4. A multiple-carbon lamp having two or more electrodes composed each of a single sheet or strip and two or more opposed electrodes composed each of two or more pencils.

5. A multiple-carbon lamp whose negative electrode is composed of a thin strip or sheet and whose positive electrode is composed of two or more pencils, the strip having one diameter substantially equal to the diameter of each of the pencils and another diameter substantially equal to the distance between the outside edges of the outer carbon pencils.

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