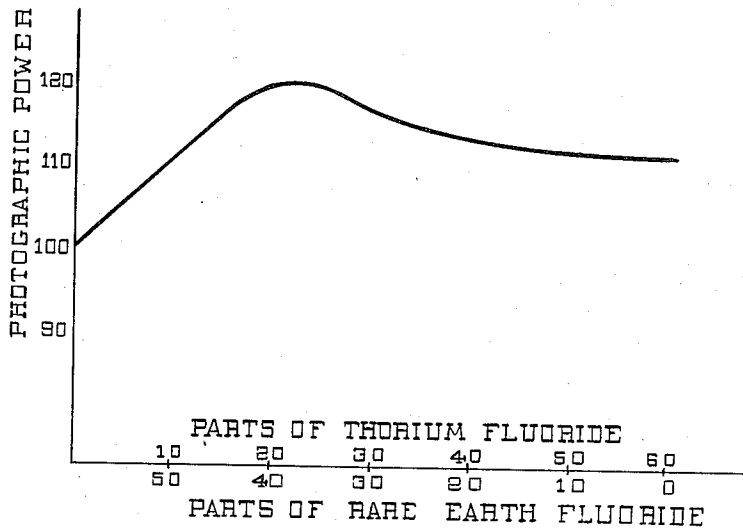


W. R. MOTT.
ARC LIGHT ELECTRODE.
APPLICATION FILED JUNE 13, 1914.

1,173,370.

Patented Feb. 29, 1916.



WITNESSES:

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WILLIAM R. MOTT, OF LAKEWOOD, OHIO, ASSIGNOR TO NATIONAL CARBON COMPANY,
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ARC-LIGHT ELECTRODE.

1,173,370.

Specification of Letters Patent.

Patented Feb. 29, 1916.

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To all whom it may concern:

Be it known that I, WILLIAM R. MOTT, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Arc-Light Electrodes, of which the following is a full, clear, and exact description.

My invention relates to arc light electrodes of the flaming type, in which certain salts are incorporated to increase the candle power of the arc itself. Many different salts and other chemical compounds have been proposed or used for this purpose, the particular combination depending on the result to be attained.

The fluorids of the so-called rare earths are especially valuable as flaming materials where a white arc is desired, such as in photographic and photo-engraving work. On experimenting with many different combinations with such fluorids, I have found that the compounds of thorium have a marked effect on the luminosity, color and actinic property of the arc when used in combination with the rare earth fluorids in certain proportions.

Thorium compounds, especially the oxids, fluorids and oxy-fluorids, are of extremely non-volatile character, and inasmuch as such materials are non-conducting when cold, they have been considered to be of little use in arc electrodes since the insulating buttons of slag on the electrode ends prevent the starting of the arc after the same have cooled sufficiently to be non-conducting. I have found that this slagging difficulty of thorium compounds can be entirely overcome by combining them with the rare earth fluorids up to a certain ratio. Above this ratio, the slagging difficulties are manifest at once, and an electrode having more than this percentage of a thorium compound, is of very little value.

I have found that a thorium compound or compounds when used in conjunction with rare earth fluorids up to a certain percentage of the fluorids also greatly increases the candle power of the arc and intensifies its actinic property. Above this ratio, further increase of the thorium compound decreases the candle power. It is very fortunate that the limiting ratio as far as candle power is concerned is substantially identical with that relating to the slagging diffi-

culty, so that the whiteness, candle power and actinic power of the arc can be greatly increased by the use of thorium compounds up to a certain ratio without encountering any slagging difficulties, such difficulties only appearing when the ratio of thorium content to fluorid content is such as to cause a decrease in candle power.

The particular electrodes with which the fluorids and thorium compounds have been used are of the carbon type in which the carbon forms the conducting body of the electrode, although it would be possible to use other conducting bodies if desired. For all purposes, however, carbon is the best conducting body at present known.

The table below gives the data of electrodes containing varying amounts of rare earth fluorid and thorium fluorid, the efficiency of the various combinations being shown by the rating in average photographic power, and the slagging tendency is indicated at the bottom of each column.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	80
Rare earth fluorid.	60	50	40	30	20	10	0	
Thorium fluorid...	0	10	20	30	40	50	60	
Core black	40	40	40	40	40	40	40	
Average photo-graphic power ..	100	110	120	115	112	115	110	
Points.....	Clean	Clean	Clean	Fair	Slag	Slag	Slag	85

The figure of the drawing also shows the effects of varying amounts of the two materials, the curve being plotted from the data of the above table. This curve shows that maximum photographic power is reached when the thorium content is not quite equal to the rare earth fluorid content. By referring to the table, it will also be seen that no slagging trouble is found up to the point where the two materials are used in about equal proportions.

The thorium content should therefore always be approximately equal to or less than the rare earth fluorid content.

While I prefer to use thorium fluorid, oxy-fluorid, or oxid with rare earth fluorids, it is also permissible to use other compounds such as the nitrate or metallic thorium itself. The fluorid is to be preferred over the oxid on account of the very extreme non-volatile character of the latter which has a tendency to increase slagging difficulties. Metallic thorium has a tendency to react with water to produce hydrogen and

thorium oxid and for this reason, it is not as good a constituent as the compounds mentioned.

5 The rare earth fluorids are fluorids of such elements as occur in the "Welsbach" residue after the extraction of the thorium. The most common of these elements are cerium, lanthium, neodymium, praseodymium, yttrium, and ytterbium.

10 The preceding compounds can be used in either cored, solid or other form of electrode for use with either alternating or direct current. The data in the preceding table is taken from tests with cored carbons, but is given merely by way of example.

15 Having described my invention, what I claim is:

1. An arc lamp electrode containing rare

earth fluorids, a less quantity of thorium material and a conducting body.

2. An arc lamp electrode containing 6 parts of rare earth fluorids, 4 parts or less thorium material and a conducting body. 20

3. An arc lamp electrode containing 6 parts rare earth fluorids, 4 parts or less of thorium fluorid and the conducting body mixed therewith. 25

4. An arc lamp electrode containing 6 to $9\frac{1}{2}$ parts rare-earth fluorids, 4 to $\frac{1}{2}$ parts thorium material and a conducting body. 30

In testimony whereof, I hereunto affix my signature.

WILLIAM R. MOTT.

Witnesses:

ARTHUR S. BEMIS,
H. G. GROVER.