

No. 828,544.

PATENTED AUG. 14, 1906.

F. J. GERARD.  
ELECTRODE FOR ARC LIGHTS.  
APPLICATION FILED JUNE 9, 1903.

CONTAINING AN ALLOY OF MAGNESIUM AND ANOTHER METAL.

Witnesses

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# UNITED STATES PATENT OFFICE.

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## ELECTRODE FOR ARC-LIGHTS.

No. 828,544.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed June 9, 1903. Serial No. 160,760.

*To all whom it may concern:*

Be it known that I, FREDERIC JULIUS GERARD, of 54 Delancey street, London, England, have invented certain new and useful Improvements in Electrodes for Arc-Lights; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The accompanying drawing shows an elevation of the electrode.

This invention relates to improvements in the composition of electrodes for use in arc-lamps, whereby in proportion to the expenditure of electric energy there will be an increase in the brilliance of the light emitted and a greater uniformity in its intensity. These advantageous effects are derived by the use of magnesium in the composition of the electrodes, which, while yielding the brilliant white light due to the intense incandescence of its oxid in the process of burning, is introduced under such conditions as to cause its natural high rate of combustion to be restrained to conform with the rate of combustion of the other substances of which the electrode is composed and result in a slow uniform consumption, avoiding the accumulation of incrustation.

I am aware that metallic magnesium and chemical compounds containing magnesium have previously been used mixed with carbon and other substances in the composition of electrodes for arc-lamps and that it has been proposed to electrolytically deposit a coating of magnesium and aluminium or alloys thereof on such electrodes; but hitherto the magnesium has been so associated or so unassociated that it could and always did take advantage of its superior affinity for oxygen and burn more rapidly than its companion material, resulting in too high a rate of combustion and considerable fluctuations of light due to accumulations of those other substances. According to my invention I am able to avoid this either by introducing the magnesium in the form of an alloy with one or more other metals or as a mixture of substances so selected and assembled as to require a metallic alloy containing magnesium to be produced by the combined effect of electricity and heat on those substances immediately preceding its combustion in the

electric arc. The former method is under ordinary circumstances the preferable one, and the metal which appears most suitable to combine with magnesium to form the alloy is aluminium. The latter metal has a relatively low rate of combustion, and thus acts as a restrainer to the magnesium, precluding it from burning quickly. The greater the proportion of magnesium the greater will be the rate of combustion, and vice versa. Hence it will be easy to adjust the proportions to obtain the most advantageous rate. About half and half gives a good result. The alloy is preferably introduced into the electrode in the form of a finely-divided metallic powder intimately mixed with the carbon and other materials of the electrode, for thereby the electrode will be rendered more conductive and more uniform in its conductivity, thus effecting a steadier illumination.

Inasmuch as metallic magnesium can be derived by the reduction of magnesium compounds suitably associated with other substances by means of electric agency and heat, it is possible to form the alloy in the electrode at the instant prior to combustion, and thus achieve the result previously described of restraining the rate of combustion of the magnesium. If, for example, chlorid of magnesium is intimately mixed with powdered metallic aluminium and the mixture worked up with carbon in forming an electrode, the nascent magnesium resulting from the reduction of chlorid will at the temperature in the neighborhood of the electric arc before getting into contact with oxygen readily alloy with the aluminium by its side.

It will be possible to effect the formation of the alloy by suitable mixtures of the magnesium compound with compounds of other metals not in the metallic state; but in such a case the benefit of the increased conductivity of the electrode derivable from the admixture of metallic powder will be absent, so that the other substances introduced to form the alloy with magnesium should preferably be in the form of metallic powder, while the magnesium substance, except in the form of an alloy, should not be metallic.

Uniformity of action will be insured by the use of a minute proportion of a salt of one of the rare earths, preferably cerium nitrate. This substance appears to act in such a way as to prevent incrustations being formed on the



electrodes, which otherwise after long intervals may be liable to occur from an accumulation of the oxids of the metals. The effect of the presence of the cerium nitrate is to cause  
5 the oxids to be carried off as powder.

I claim—

1. An electrode for arc-lights comprising an intimate mixture of carbon with an alloy consisting of magnesium and another metal.
- 10 2. An electrode for arc-lights comprising an intimate mixture of carbon with an alloy consisting of magnesium and aluminium.
3. An electrode for arc-lights comprising an intimate mixture of carbon with a small  
15 percentage of a salt of a rare earth and an alloy consisting of magnesium and another metal.

4. An electrode for arc-lights comprising an intimate mixture of carbon with a small percentage of cerium nitrate and an alloy consisting of magnesium and another metal. 20

5. An electrode for arc-lights comprising an intimate mixture of carbon with a small percentage of cerium nitrate and an alloy consisting of magnesium and aluminium.

In testimony whereof I have hereunto set  
my hand in the presence of two subscribing  
witnesses. 25

FREDERIC JULIUS GERARD.

Witnesses:

THOMAS ALFRED HEARSON,  
WALTER J. SKERTEN.