No. 679,877. Patented Aug. 6, 1901.

H. BREMER.

ELECTRODE FOR ARC LAMPS.

(Application filed Nov. 13, 1899.)

(No Model.)

Fig. 2

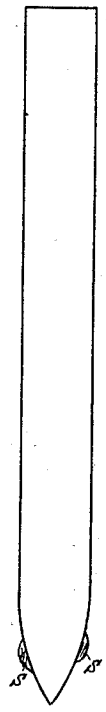


Fig. 3



Fig. 4

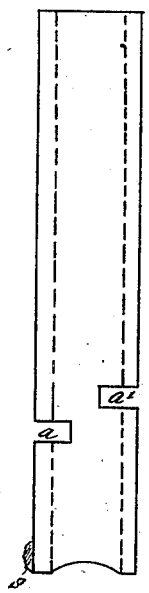


Fig. 5

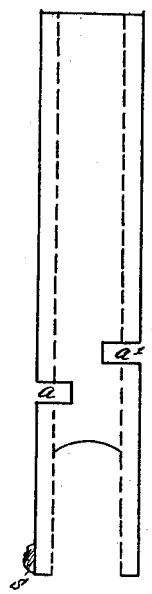




Fig. 1a

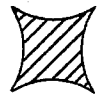


Fig. 1b

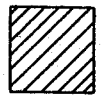


Fig. 1c



Fig. 1d



Fig. 1e

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UNITED STATES PATENT OFFICE.

HUGO BREMER, OF NEHEIM, GERMANY.

ELECTRODE FOR ARC-LAMPS.

SPECIFICATION forming part of Letters Patent No. 679,877, dated August 6, 1901.

Application filed November 13, 1899. Serial No. 736,896. (No model.)

To all whom it may concern:

Be it known that I, HUGO BREMER, a subject of the German Emperor, residing at Neheim-on-the-Ruhr, in the Province of Westphalia, Germany, have invented an Improved Electrode for Arc-Lamps, of which the following is a full and clear specification, such as will enable others skilled in the art of this manufacture to make and use my invention, reference being had to the accompanying drawings and to the letters of reference marked thereon.

This invention refers to electrodes for arc-lamps, consisting of a mixture of pure carbon or carbon-powder and metallic salts. The extra yield of light thus obtained is not confined to the application of few materials, but, on the contrary, a large number of metals or salts of metals or metalloids—for instance, calcium, magnesia, magnesium, strontium, glass, fluor-spar, or mixtures thereof—will form vapors which are brought to a state of brilliant incandescence by the heat generated by the combustion of the carbon pencils. The extra yield of light will increase with the percentage of the addition of above-mentioned substances, while the tendency to flickering of the luminous arc will be reduced by the application of a somewhat high percentage. Disturbing influences standing in the way of the application of metallic salts are constituted, first, by the scorified secretions formed by the metallic salts, and, secondly, by the circumstance that if the percentage of metallic salts is excessively increased, the percentage of carbon being reduced accordingly, the heating effect produced by the combustion of the carbon is greatly reduced, so that the metallic vapors are not completely brought to incandescence. The scorified secretions, however, are chiefly formed at the margin of the carbon pencils in those parts where they are not vaporized by the heat of the small intensely-luminous points from which the luminous arc issues. They will sooner or later form an incombustible coating, which will eventually smother the luminous arc.

Now the principle on which the present invention is based consists, essentially, in causing the otherwise solid scoria which is formed by the luminous metallic vapors under the influence of the electric arc to be softened or liquefied by a so-called "flux," thus causing them to drip off periodically. Such fluxes are formed, for instance, by boron and fluorin. If a sufficient quantity of such substances is suitably added to the respective salts of metals or metalloids in a proportion of not less than one per cent. of the total weight, or more, according to the height of percentage of the addition of metalloids, as mentioned above, which make the arc very luminous compared with the arc of the ordinary carbons, it will be found that the secretions instead of forming a hard granular scoria will assume a soft liquid character and can be still further influenced and caused to drip off with as little disadvantage as possible by any one of the arrangements to be described hereinafter. In preparing the electrodes care should be taken to prevent the carbon pencils (which under ordinary circumstances are generally calculated to generate the highest possible degree of heat during their combustion) from being heated to such a degree as to cause the fluxes, which in most instances will be vaporized at a comparatively inferior temperature, to be expelled prematurely from the carbon pencil. An electrode thus impregnated with metallic salts, &c., by mixing the carbon-powder with the additions and burning them in the known manner, may be treated so as to cause the light to assume any desired tint. Thus, for instance, I have found that a yellowish tint is best imparted to the light of the luminous arc by adding to the composition some fluorin, bromin, or iodin. Fluorin in particular, if admixed with the carbon compound in conjunction with more than twice its quantity of calcium or calcic salts, will yield a light of a pleasant yellowish tint which, if desired, may be made of a more whitish tinge by adding some magnesia. The easiest way to add the fluorin and boron is to bring it in connection with other metal salts, as cryolite or fluor calcium, or to mix the pure carbon with fluor carbonite. In each case the fluor conjunctions are thoroughly mixed with the carbon compound. The means adopted in order to remove the drops of liquefied scoria formed on

such an electrode without interfering with the light will be seen from the figures shown in the annexed drawings.

On the ordinary round carbon pencils, Figure 2, the scoria will collect in the form of little clots at the lower extremity, and the latter being tapered these clots will frequently glide down toward the incandesent point, as shown in Fig 3, when they will interfere considerably with the light, both while it is burning and at the time of relighting. This evil is remedied by providing the carbon pencil with ribs. In this case the drops of scoria *s* will have a tendency to collect at the ribs, as shown in Fig. 4, and will then drip off straight downward, so that the luminous arc will continue to burn uninterruptedly in the center of the pencil end. If desired, notches or grooves *a a'*, placed transversely to these ribs, may also be made on the carbon pencils. (See Figs. 4 and 5.) It will be seen that if the carbon pencil is further consumed, as shown in Fig. 5, the rib, together with the drops of scoria adhering to it, must drop off with absolute certainty. If only two such ribs are provided, these will not in any way impair the emission of light, because these ribs may be placed in the same plane with the conducting-rods of the lower-pencil holders and as, on the whole, the formation of the long arc is much impeded by a great area of emission. Consequently any carbon pencil shaped so as to have sharp edges, Figs. 1^a to 1^f, if impregnated with a high percentage of salts of metals or metalloids will afford these advantages, because even with an inferior strength of the electric current an area free from any scoria will always remain in the center, thus insuring steady burning, while the scoria will always accumulate at the sharp edges and drip off from these at intervals.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An electrode for arc-lamps composed of pure coal and of ten to seventy per cent. of metallic salts or metalloids as calcium, magnesium, glass, fluor-spar or the like in combination with an addition of a high quantity of boron and fluorin for the purpose described and set forth.

2. An electrode for arc-lamps composed of pure coal and of ten to seventy per cent. of metallic salts or metalloids as calcium, magnesium, glass, fluor-spar or the like in combination with an addition of boron and fluorin in such a quantity, that said chemicals, forming a flux, during the combustion are not expelled prematurely from the electrode for the purpose described and set forth.

3. An electrode for arc-lamps composed of pure coal and of ten to seventy per cent. of metallic salts or metalloids as calcium, magnesium, glass, fluor-spar or the like in combination with an addition of a high quantity of boron and fluorin and a further quantity of twenty-five per cent. of fluorin, bromin or iodin for the purpose described and set forth.

4. An electrode for arc-lamps composed of pure coal and of ten to seventy per cent. of metallic salts or metalloids as calcium, magnesium, glass, fluor-spar or the like in combination with an addition of a high quantity of boron and fluorin such carbon being provided with ribs so as to receive a sharply-edged section for the purpose as described and shown in the drawings.

5. An electrode for arc-lamps composed of pure coal and of ten to seventy per cent. of metallic salts or metalloids as calcium, magnesium, glass, fluor-spar or the like in combination with an addition of a high quantity of boron and fluorin such carbon being provided with grooves so as to receive a sharply-edged section for the purpose as described and shown in the drawings.

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Witnesses:
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