

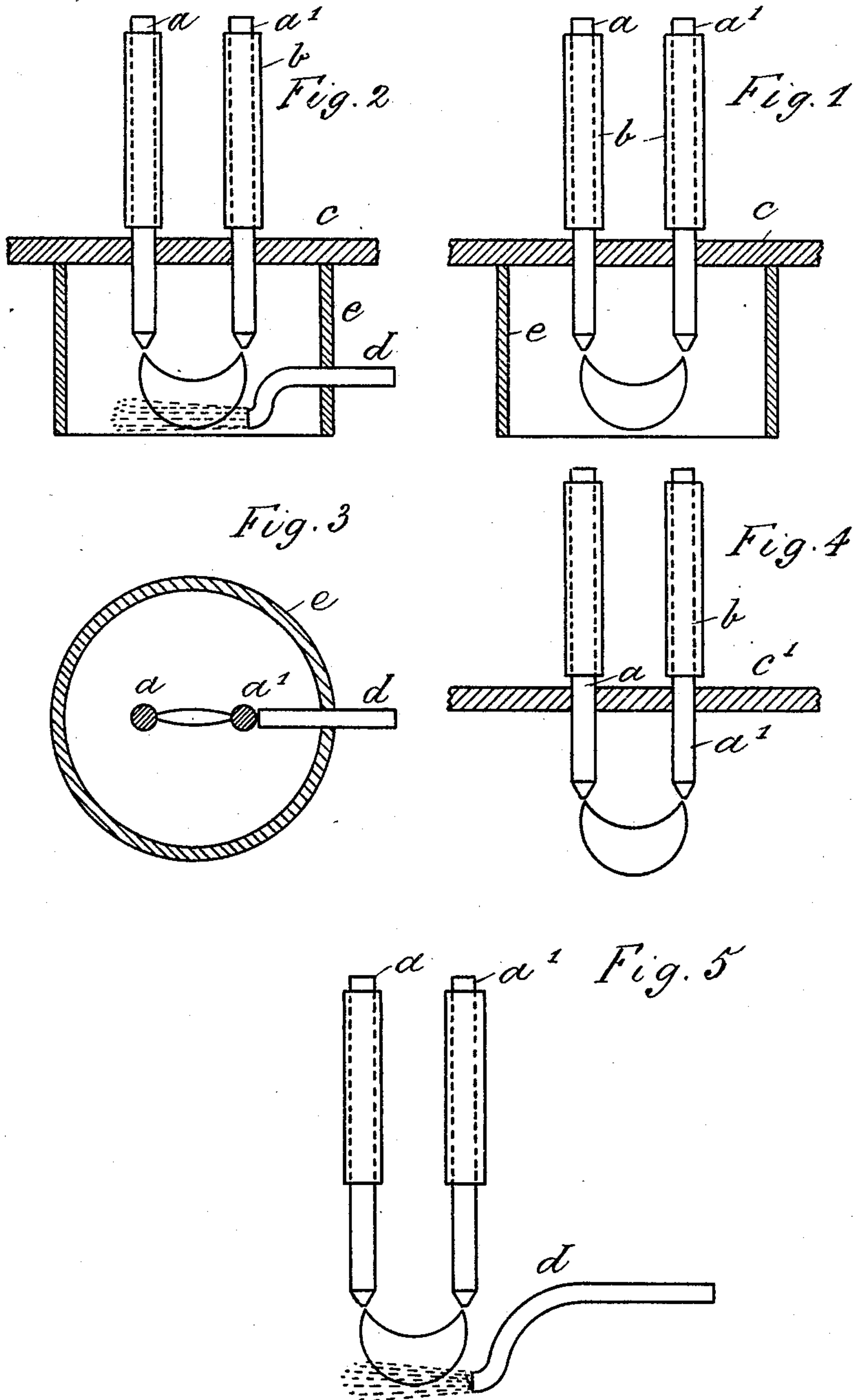
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Patented Apr. 15, 1902.

H. BREMER.
ELECTRIC ARC LAMP.

(Application filed Sept. 26, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

HUGO BREMER, OF NEHEIM, GERMANY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 697,439, dated April 15, 1902.

Application filed September 26, 1900. Serial No. 31,193. (No model.)

To all whom it may concern:

Be it known that I, HUGO BREMER, a subject of the Emperor of Germany, residing at Neheim-on-the-Ruhr, in the Province of Westphalia, Germany, have invented a new and useful Improvement in Electric-Arc Lamps, of which the following is a specification.

In electric-arc lamps many devices have been proposed to prolong the life of the electrodes, which, as is well known, is shortened by the air-currents flowing around the carbons. The most effective structure has been found in arranging a chamber or cylindrical body around the pencil ends, which prevents access of air to the said ends and in such a manner secures a longer life of the carbons. The use of such a chamber with ordinary carbon is objectionable owing to the fact that it decreases the light emission, and while it raises the temperature of the luminous arc no means are provided by which this increase of temperature is utilized. Even the arc will be less luminous the more the temperature around it rises.

A great improvement has been realized in arc-lamps arranged as above by providing them with carbon pencils containing an addition of metallic salts or such substances as have a higher temperature of combustion or volatilization than carbon itself. Such carbon pencils will in any case cause a highly-luminous arc; but the temperature of incandescence and the power of emission of light possessed by the substances will be intensified in proportion to the heat generated by the combustion of carbon. Seeing now that such reflectors materially increase the temperature around the burning carbon points, it is just in the case of arc-lamps of this kind that a materially-improved effect is obtained by the application of the carbon pencils just referred to. Consequently while with ordinary carbon pencils the reflectors will cause a disadvantage as regards the yield of light, on account of the higher temperature or reduced luminosity of the arc, with the use of the aforesaid special carbon pencils the very cause thereof is utilized for realizing an improvement.

In arc-lamps described as my invention—that is, having carbon pencils containing an

addition of metallic salts—said pencils are placed downwardly, pointing parallel or converging, and inclosed at their points by a chamber, above described. This combination presents the great advantage that the arc can be projected downward in a crescent-shaped or fan-like form, its color being rendered more uniform and homogeneous owing to the circumstance that the light, so to speak, is seething in metallic vapors. At the same time the temperature around the luminous points is increased, and consequently an extraordinarily intensified luminous effect is produced in the case of carbon pencils impregnated with metallic salt which are placed with their points directed downward. The crescent-shaped or fan-like formation of the arc, which of course entails an increase of its area, and consequently an increased luminous effect, can be obtained with ease and certainty by the arrangement of an electromagnet energized by the current of the lamp and the magnetic field of which acts on the arc, either attracting or repelling it and projecting it outward, so as to impart to it the above-mentioned shape. On the other hand, in the case of arc-lamps in which a magnetic field or solenoid is arranged for the purpose of regulating the resistance of the arc itself in accordance with the requirements of steady burning or for the purpose of deflecting it in a certain direction it is particularly advantageous to use carbon pencils containing an addition of metallic salts or such substances as will yield a luminous arc, because in this case the deflection of the arc involved by regulating or directing the arc causes an enlargement of the area of the arc which if the arc itself is luminous must at the same time entail an increased luminous effect.

The arrangement described above of carbon pencils impregnated with metallic salts may also be applied without further modification for alternating-current arc-lamps. It is a well-known fact that a great disadvantage of these lamps is that nearly one-half of the light emitted by the incandescent carbon points is projected upward and can only be thrown downward with a certain loss by means of a reflector. This is mainly due

to the fact that ninety per cent. of the emitted light emanates from the crater-surfaces, and as the lower one of these emits just as much light as the upper one the above-mentioned effect results.

A modification of the direction in which the light is emitted in alternating-current lamps can be obtained by adding substances to the carbon pencils which will render the arc luminous, thus giving a less preponderant proportion to the light emitted by the crater-surfaces. A gain in the radiation of light is more especially realized in the horizontal direction, which is of particular value for some purposes, while, on the other hand, the radiation of light in an upward direction and with it the coefficient of loss is reduced. Experiments have also shown that it is thereby rendered possible to work alternating-current lamps with a higher voltage than is practicable in the case of ordinary electrodes. When applying a higher voltage and, accordingly, a greater distance between the carbon points, correspondingly more light is obtained, the arc being luminous, while if ordinary carbon pencils are used no increase of light is obtained notwithstanding the increased distance between the carbon points, as the arc is not luminous.

On the accompanying drawings, Figure 1 shows a construction having an air-case. Fig. 2 is a similar construction in connection with a magnet. Fig. 3 is a horizontal section of Fig. 2. Fig. 4 is a device having a reflector-plate. Fig. 5 is a device without case.

Referring to the drawings, the reference-letters *a a'*, Fig. 1, designate a pair of carbons being placed downwardly-pointing and parallel to each other. As described above, these pencils contain a high addition—for instance, twenty to seventy per cent.—of metallic salts, as calcium fluor and the like, which renders the voltaic arc very luminous and elastic, the carbons being fitted in tubes *b* or other suitable holders projecting through a plate *c*, and their points are surrounded by a hollow casing *e*. This casing, which may be of any form, forms a chamber around the points and prevents to a certain degree admission of air to the voltaic arc, so that the latter, which consists of the burning metal particles, is kept in its high illuminating state. Nearly the same effect may be obtained by the construction shown in Fig. 4, where a plate *c'* of any form or an equivalent forms an agent by which in some way air is prevented from rising or coming from above,

so that again the arc is kept highly incandescent.

Figs. 2 and 3 show a device constructed as Fig. 1 in connection with a magnetic field. For this purpose a magnet *d* or a solenoid may be arranged in the casing, as shown, which produces its lines of force in such a manner that the arc becomes considerably enlarged, which may be easily done according to its elasticity.

Fig. 5 shows a construction in which the casing is dispensed with and which consists only of the downwardly-pointing carbon pencils and a magnet. It has been found that the arc when being submitted to the lines of force of the magnetic field was also greatly enlarged, assuming the shape of a knife-blade, the matter contained in the arc and consisting of a large number of exploding particles being thus spread asunder and equally exposed to the influence of air, so that the color gets more homogeneous, and also the calm of the arc is considerably increased.

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

1. In an electric-arc lamp, search-light, &c., the combination of a pair of downwardly-pointed parallel or converging carbon pencils containing a high percentage of metallic salts and a chamber surrounding the carbon ends for the purpose described and set forth.

2. In an electric-arc lamp, search-light, &c., the combination of a pair of downwardly-pointed parallel or converging carbons containing a high percentage of metallic salts a chamber inclosing the carbon ends and a magnetic field arranged near the arc for the purpose described and set forth.

3. In an electric-arc lamp, search-light, &c., the combination of a pair of downwardly-pointed parallel or converging carbons containing a high percentage of metallic salts and a reflecting agent arranged above the luminous arc to prevent upward movement of air for the purpose described and set forth.

4. In an electric-arc lamp the combination of a pair of downwardly-pointed parallel or converging carbons containing a high percentage of such metallic salts which give to the arc a high illuminating power and a magnetic field arranged near the arc for the purpose described and set forth.

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Witnesses:

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