(No Model.)

J. S. KELSO, Jr.

INCANDESCING ELECTRIC LAMP.

No. 273,366. Patented Mar. 6, 1883.

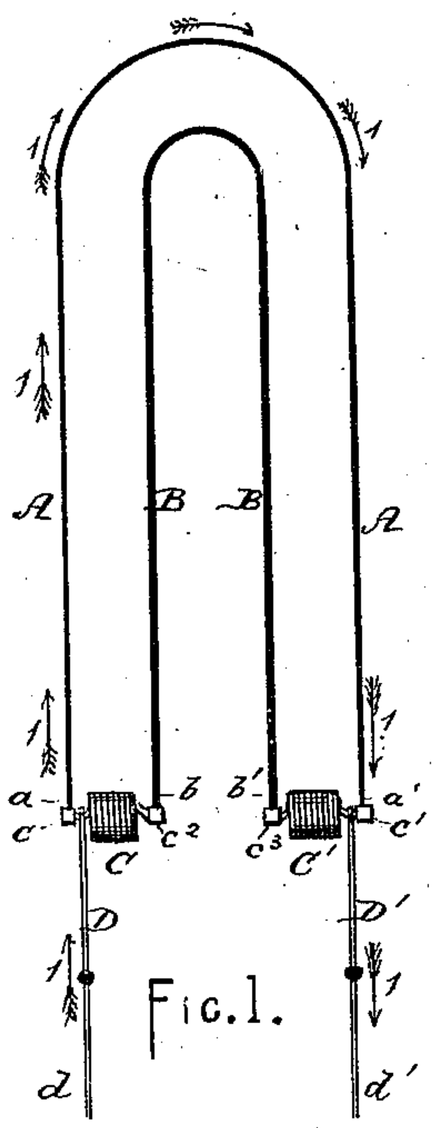

Fig. 1.

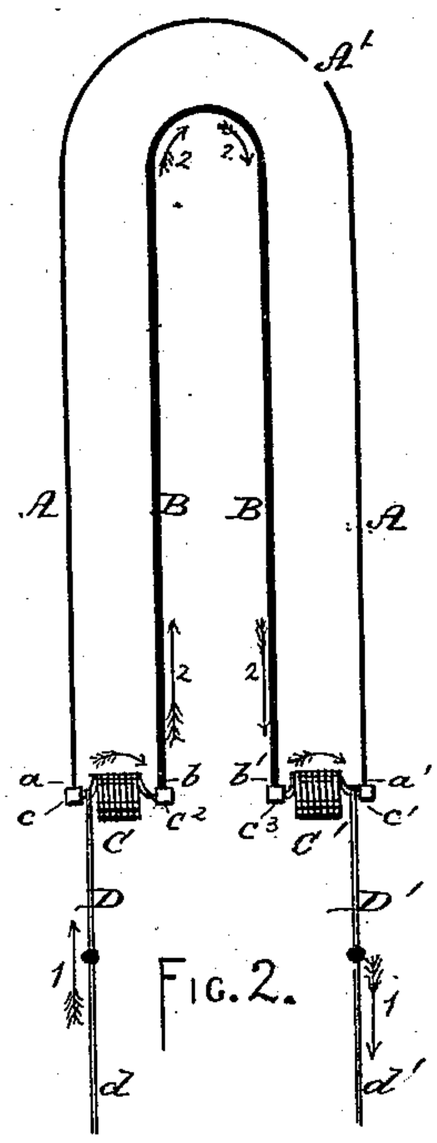

Fig. 2.

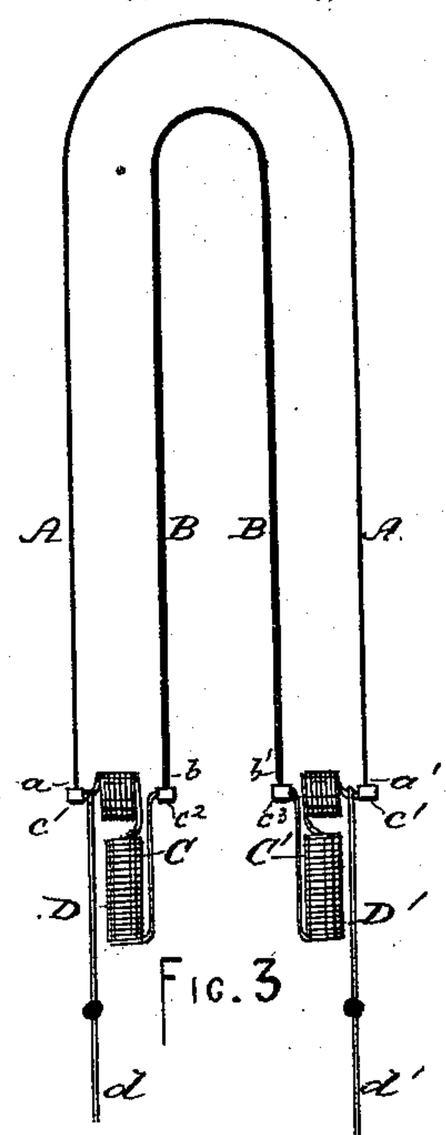

Fig. 3

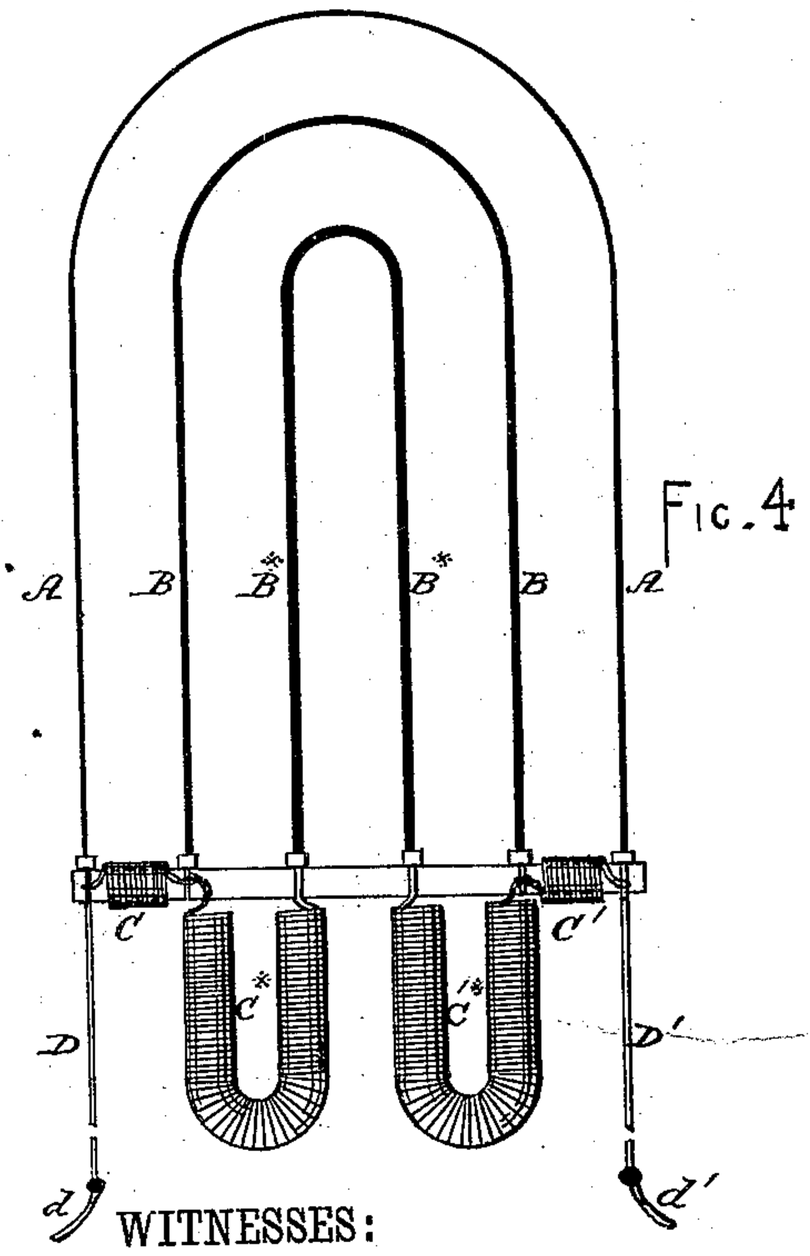

Fig. 4

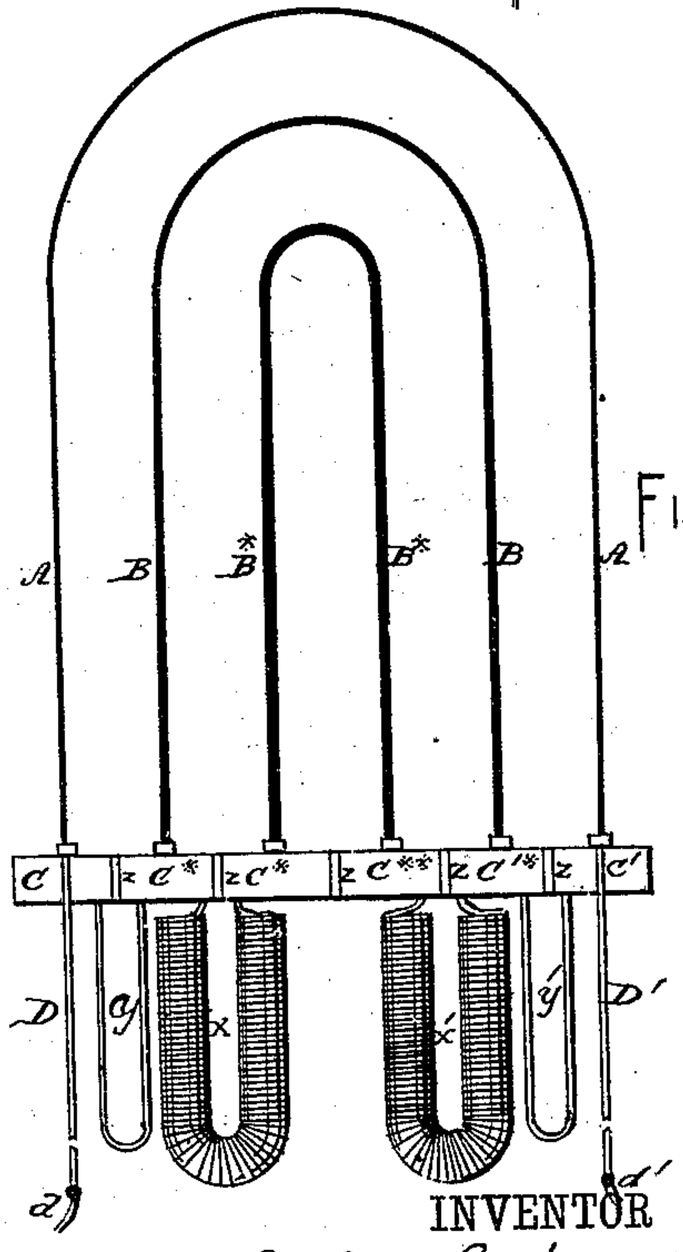

Fig. 5.

WITNESSES:

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JOHN S. KELSO, JR., OF STAMFORD, CONNECTICUT.

INCANDESCING ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 273,366, dated March 6, 1883.

Application filed October 11, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. KELSO, Jr., a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented new and useful Improvements in Electric Lamps, of which the following is a specification.

My invention relates to improvements in the manufacture of that class of electric lamps in which an electric current is caused to pass through and heat a carbon fiber or filament forming part of the circuit, and which carbon fiber or filament is inclosed in a glass tube or globe from which the air is exhausted, so as to form a vacuum; or the tube or globe is filled with an artificial atmosphere.

My invention consists in so arranging two or more carbon fibers or filaments or their equivalents upon a support, either divided or insulated centrally. The carbons or filaments are mounted in such manner that so long as the main or first carbon remains perfect that carbon alone shall become incandescent; but immediately the said first or main carbon or filament breaks or fails the current shall be automatically and instantaneously caused to pass through and cause another carbon, carbon fiber or filament to become incandescent. Any number of carbons may be brought into operation in succession.

Carbons or carbon filaments arranged according to my invention may be employed in any desired form or construction of incandescent lamp and in any known systems of incandescent lighting by electricity.

The accompanying drawings form part of this specification and illustrate what I consider the best means of carrying out my invention.

Figure 1 is a side view of a pair of carbons or filaments mounted upon a base or support according to my invention. Fig. 2 is a similar side view, showing the main or first carbon broken and the current passing through a secondary carbon. Fig. 3 is a side view, showing a slight modification of my invention. Fig. 4 is a similar view, representing three carbons or carbon filaments mounted and arranged to act in succession. Fig. 5 is a modification of Fig. 4.

In each of the views similar letters of reference are employed to indicate corresponding parts wherever they occur.

A represents the main carbon or filament, and B a secondary carbon or filament, of which there may be any desired number adapted for consecutive operation as the prior carbons or filaments become broken or fail. The opposite ends, *a a'*, of the carbon A are supported in sockets or clamps *c c'*, formed on or affixed to the opposite ends of a divided support, which is by preference formed of bent wire arranged in two parts or sections, C C', which are supported respectively by wires D D', formed by preference of platinum, and sealed or otherwise supported in the globe or tube of the lamp. The wires D D' are connected in the ordinary manner, by wires *d d'*, with an electric apparatus. The opposite ends, *b b'*, of the carbon or filament B are supported in sockets or clamps c^2 c^3, formed on or affixed respectively to the inner ends of the wires forming the divided support C C'. The divided support in the present instance is supposed to be formed of German-silver wire, a sufficient length of which is coiled up, as shown, to form the sections C C', to insure that said sections C C' shall have a greater resistance to the passage of electricity, when heated by the passage of a current of electricity therethrough, than the resistance offered by the carbon or filament A when heated and rendered incandescent by the passage of the said current.

The end *a* of the carbon A is mounted on the section C in a position such that there shall be a direct line of current from the wires *d* D, in the direction of the arrows 1 1, directly across the half-support C, and thence up through the carbon A and around to the point *c'*, when it will cross the section C' and be conducted away by the wires D' *d'* so long as the carbon A remains perfect, as shown in Fig. 1; but immediately the carbon A breaks, as represented at A' in Fig. 2, the current, no longer being able to pass the point A', will be diverted and pass immediately and automatically from the wires *d* D along the wire of the coil forming the section C in the direction of the arrows 2 2 in Fig. 2, and thence up and through the carbon B, thereby rendering it incandescent. The current will then pass through the wire of the coil forming the section C' and out by the wires D' *d'*, as before.

The wires forming the sections of the divided support must be provided with an in-

sulated coating or covering, as will be well understood.

In Fig. 3 I have shown a slight modification in the arrangement of the coils forming the sections of the divided support C C′; but in other respects the description given in respect of Figs. 1 and 2 will apply to this figure.

Fig. 4 is an illustration of my invention, in which three carbons, A, B, and B*, are employed, mounted upon a support formed in four sections, C C′ C* C′*, each composed of a coil of wire, the coil of wire of the sections C and C′ being of a resistance similar to the resistance of the sections C C′ in Figs. 1 and 2, while the sections C* C′* should be formed of a coil of wire of a length sufficient to offer a greater resistance, by preference double that of the sections C C′, the object being to prevent the current passing to and rendering the carbon B* incandescent until both of the carbons A and B have broken. This may be effected by dropping the coils of the section C* C′*, as shown, or by coiling a greater quantity of wire into the sections C* C′*, or by reducing the diameter of the wire.

In arranging a series of carbons, A B B*, upon a divided support, C C′ C* C′*, I prefer to arrange the resistance of the sections in such relation to the resistance of the carbon connected with the respective pairs of sections that the said respective pairs of sections, when heated, shall have a resistance greater than the resistance of the preceding carbon. In proportion as the resistance of the pairs of sections C C′ C* C′* is increased the resistance of the carbons B B* is decreased. This is effected, by preference, by increasing the diameter of the cross-section of the carbon. This arrangement of the resistance of the carbons enables me to obtain a uniform amount of light from the respective carbons.

Fig. 5 shows a modification of my invention in which the support for the carbons is formed of a series of sections, C C′ C* C′* C** C′**, insulated one from the other, as shown at *z z*, the sections C and C* and C′ and C′*, respectively, being connected together by a bent wire or coil, Y Y′, while the sections C* C** and C′* and C′** are connected by an elongated coil, X X′, as shown. In other respects the construction and operation of the device is similar to that shown and described in relation to the previous figures.

In fitting up a lamp according to my invention care must be taken to ascertain by means of the galvanometer the resistance of the direct or first carbons, and of the successive carbons in relation to the resistance of the sections of the support by which they are carried.

Having thus described my invention, I would have it understood that I do not claim, broadly, the arrangement of two or more carbons or filaments or their equivalents on a support within the globe or tube of an electric lamp; but

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

1. In an electric lamp, the combination of two or more carbons, carbon filaments, or their equivalents upon a divided or insulated support, the resistance of the divided or insulated support, when heated, being greater than the resistance of the first or primary carbon, substantially as and for the purpose described.

2. In an electric lamp, two or more carbons supported on the opposite ends of the sections of a divided or insulated support, C C′, having a resistance greater than that of the exterior or primary carbon, substantially as shown and described.

3. In an electric lamp, the combination of two or more carbons or light-giving bodies, arranged within a globe or tube, in connection with a divided or insulated support, C C′, the sections of which have a resistance, when heated, higher than the resistance of one of the carbons or light-giving bodies with which it is connected, substantially as and for the purpose described.

4. In an electric lamp, the combination of two or more carbons or light-giving bodies, arranged within a globe or tube, in connection with a divided or insulated support, the sections of which are connected together in pairs by wires or equivalent conductors, having a resistance, when heated, higher than the resistance of one of the carbons or light-giving bodies supported or connected with the said pairs of sections of the divided or insulated support, substantially as and for the purpose described.

In witness whereof I have hereunto set my hand this 13th day of September, 1882.

JOHN S. KELSO, JR.

Witnesses:
WM. HUTCHISON,
W. COLBORNE BROOKES.