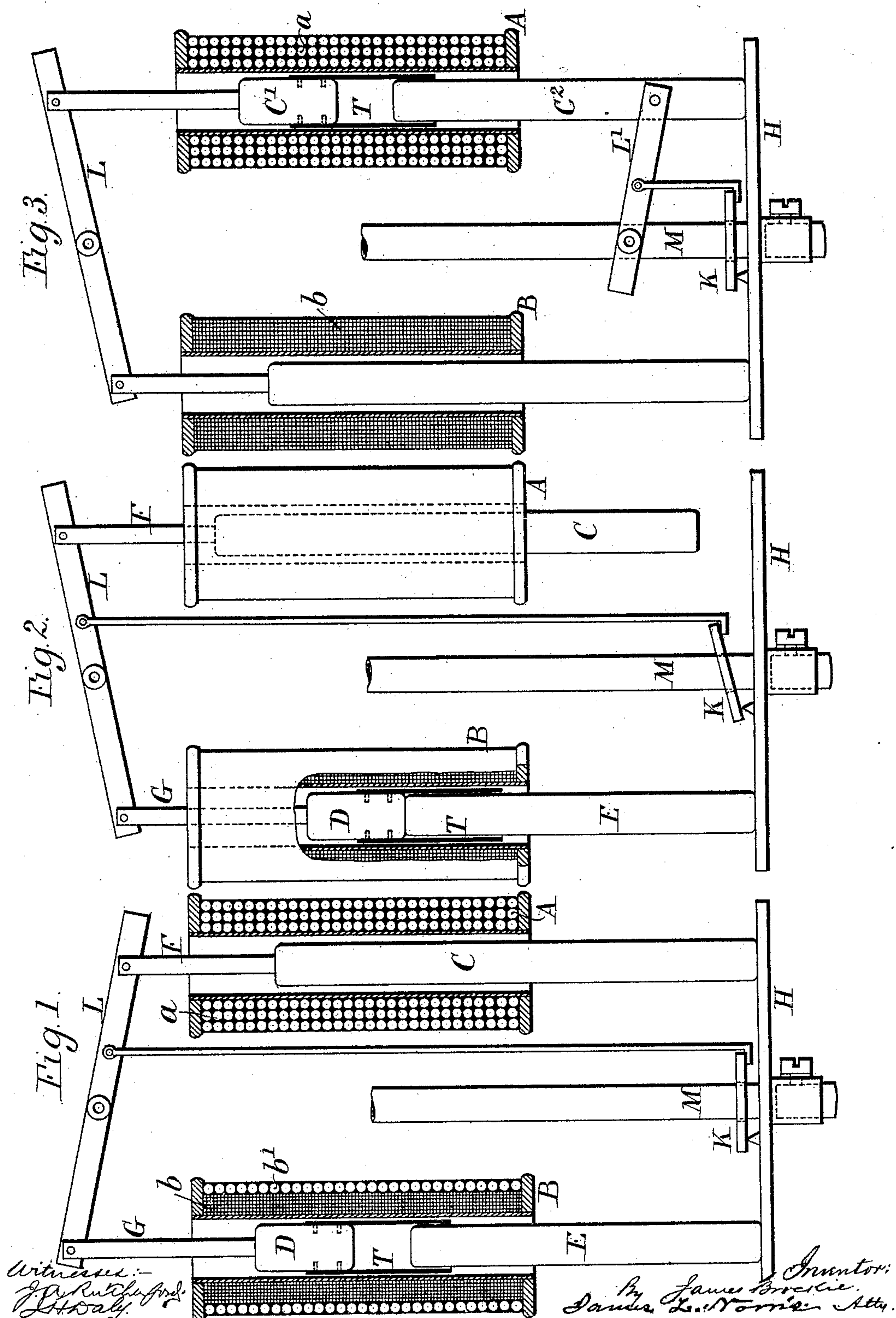


J. BROCKIE.
ELECTRIC ARC LAMP.

No. 486,757.

Patented Nov. 22, 1892.



UNITED STATES PATENT OFFICE.

JAMES BROCKIE, OF LONDON, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 486,757, dated November 22, 1892.

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To all whom it may concern:

Be it known that I, JAMES BROCKIE, a citizen of England, residing at 65 South Road, Camberwell, London, in the county of Surrey, England, have invented a certain new and useful Improvement in the Regulating Mechanism of Electric-Arc Lamps, of which the following is a specification.

My invention relates to improved mechanism for effecting by means of a pair of solenoids automatic control of the clutch or other feeding device of an electric-arc lamp, as I shall describe, referring to the accompanying drawings, illustrating diagrammatically the arrangement of solenoids which I adopt for this purpose.

Figure 1 is a diagram showing the condition of the parts when inert, the lamp being out of circuit. Fig. 2 shows the condition when the arc is struck. Fig. 3 shows a modification.

A is a solenoid having its coil in the lamp-circuit, this coil requiring to have comparatively few convolutions *a* of coarse wire, because when it has to separate the carbons for striking the arc it is aided by part of the core of B, which is a solenoid having its coil *b* of fine wire in a shunt to the lamp-circuit. This solenoid may, however, have several convolutions *b'* of coarse wire in the lamp-circuit along with those of A, these convolutions being wound or connected so as to give to the solenoid the same polarity as that given by the shunt-coil. The core C of the solenoid A is linked by a non-magnetic rod F to one end of a lever L. The core of the solenoid B is made in two parts D and E, which together make up the same length as C, but only the upper part D is linked to the lever L by a non-magnetic rod G. A thin non-magnetic tube T may be fixed on either D or E to serve as a guide to keep the two parts of the core in line with one another.

The lever L is connected to any suitable clutch or other known feed mechanism by which the carbons are moved apart, brought near together, and advanced as they are consumed, this feed mechanism being controlled by the operation of the solenoids A and B. As an example, I have shown in Figs. 1 and 2 a known form of clutch consisting of a washer K, surrounding the carbon M, leaving

it free when the washer is horizontal, as in Fig. 1, but gripping it when it is canted to an inclination, as in Fig. 2.

When the lamp is not in circuit, the two solenoids are inert and the cores C and E rest on a base H or on suitable stops, as shown in Fig. 1. When the lamp is put in circuit, the core C is attracted upward, and the part core D is attracted downward, both conspiring to raise the right end of the lever L, and thus to cant and raise the washer K, as shown in Fig. 2, causing separation of the carbons and striking the arc. By the same movement the part core D meets the part E, and both being magnetized they adhere together, and then operate as one core acting on the lever L, in conjunction with the core C, so as to determine the separation or approach of the carbons. When the carbons are too near, the solenoid A exerts greater power to raise C than B does to raise D and E, and consequently the lever L is moved toward the attitude shown in Fig. 2, causing separation of the carbons. When the carbons are too far apart, B exerts greater power to raise D and E than A does to raise C. Consequently the lever L is moved toward the attitude shown in Fig. 1, allowing approach and feed of the carbons.

According to the modification shown in Fig. 3, the core of B is undivided; but the core of A has its upper part C' separated from the lower part C², which is linked to a lever L' to control the feed mechanism, the lever L merely acting as the connection of the two cores. With this arrangement when the lamp is out of circuit and the solenoids inert the parts are as shown in Fig. 3. When the lamp is put in circuit the core C² is attracted upward, moving L', and so causing the arc to be struck. At the same time C' is attracted downward, and when it meets C² the two parts adhere together as one core, operating with the core of B, as above described with reference to Figs 1 and 2.

By dividing the core of the shunt-solenoid as I have described I am enabled to employ a comparatively-weak solenoid in the lamp-circuit for the following reasons. In the act of striking the arc, which usually demands considerable effort, the main solenoid, being aided by the other conspiring with it, has to

exert less effort, and afterward when the divided core becomes virtually undivided by the attraction of its parts the two cores act conjointly to effect the slight upward movements of the upper carbon when it slips a little too far down in the act of feeding. The use of a comparatively-weak solenoid in the lamp-circuit is of great advantage in rendering the lamp less sensitive to variations of current. The sensitiveness is further reduced by the winding of the shunt-coil with a few convolutions which are in the lamp-circuit, because when the strength of the main current increases, increasing the force of the main solenoid, it adds, also, to the force resulting from those convolutions of the shunt-solenoid, this force acting in opposition to that of the main solenoid.

Having thus described the nature of my invention and the best means I know of carrying it out in practice, I claim—

1. In the regulating mechanism of an electric-arc lamp, the combination of two solenoids, the one having a coil of coarse wire in the lamp-circuit and an integral core linked to one arm of a lever, the other having a coil of fine wire in a shunt to the lamp-circuit and a divided core, part of which is linked to the opposite arm of the said lever, which lever is linked to the carbon-feeding device, substantially as and for the purpose set forth.

2. In the regulating mechanism of an electric-arc lamp, the combination of two solen-

oids, the one having its coil of coarse wire in the lamp-circuit and an integral core linked to one arm of a lever, the other having a coil of fine wire in a shunt to the lamp-circuit, along with a few convolutions of coarse wire in the lamp-circuit, and having a divided core part of which is linked to the opposite arm of the said lever, which lever is linked to the carbon-feeding device, substantially as and for the purpose set forth.

3. In the regulating mechanism for an electric-arc lamp, the combination of two solenoids, the one having its coil in the lamp-circuit and a divided core part of which is linked to the carbon-feeding device and part to one arm of a lever, the other having its coil in a shunt to the lamp-circuit and an integral core linked to the opposite arm of the said lever, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 21st day of July, A. D. 1891.

JAMES BROCKIE.

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