(No Model.) 2 Sheets—Sheet 1.

J. E. LOCKWOOD.

APPARATUS FOR TREATING CARBON CONDUCTORS.

No. 266,703. Patented Oct. 31, 1882.

Fig. 1.

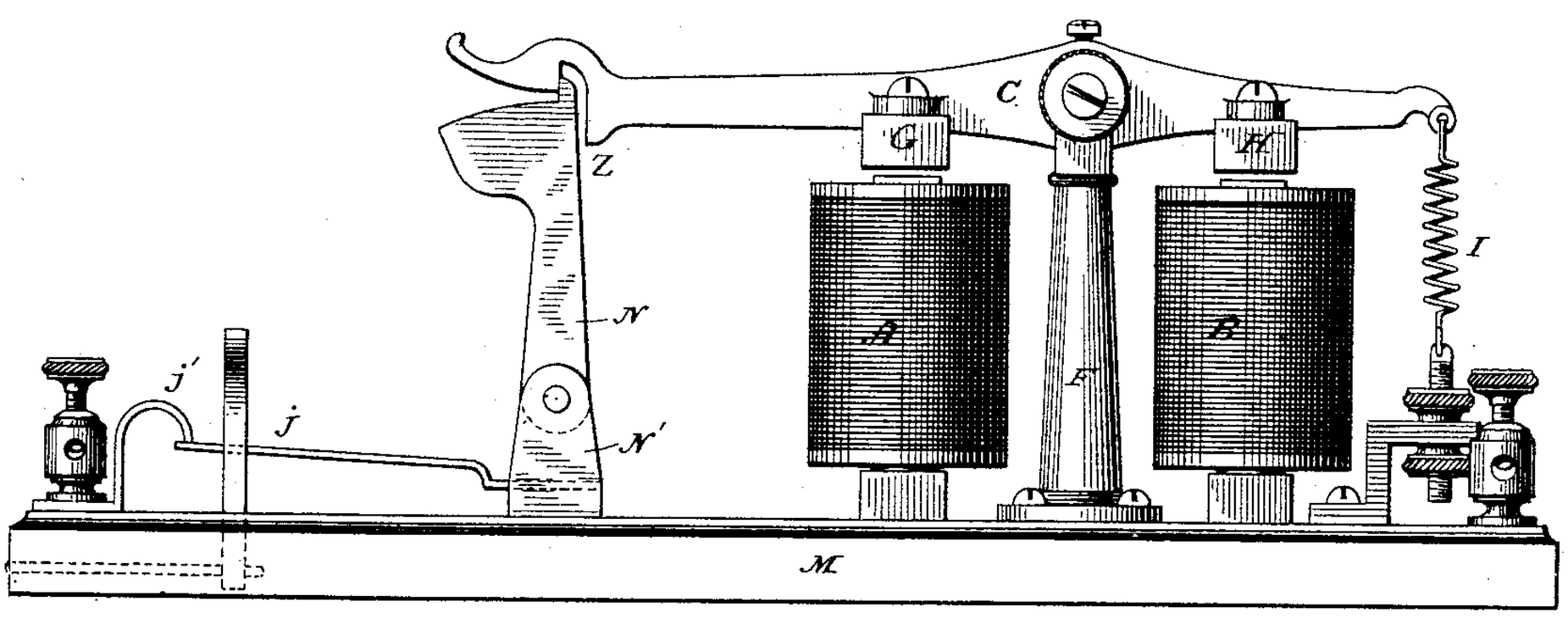
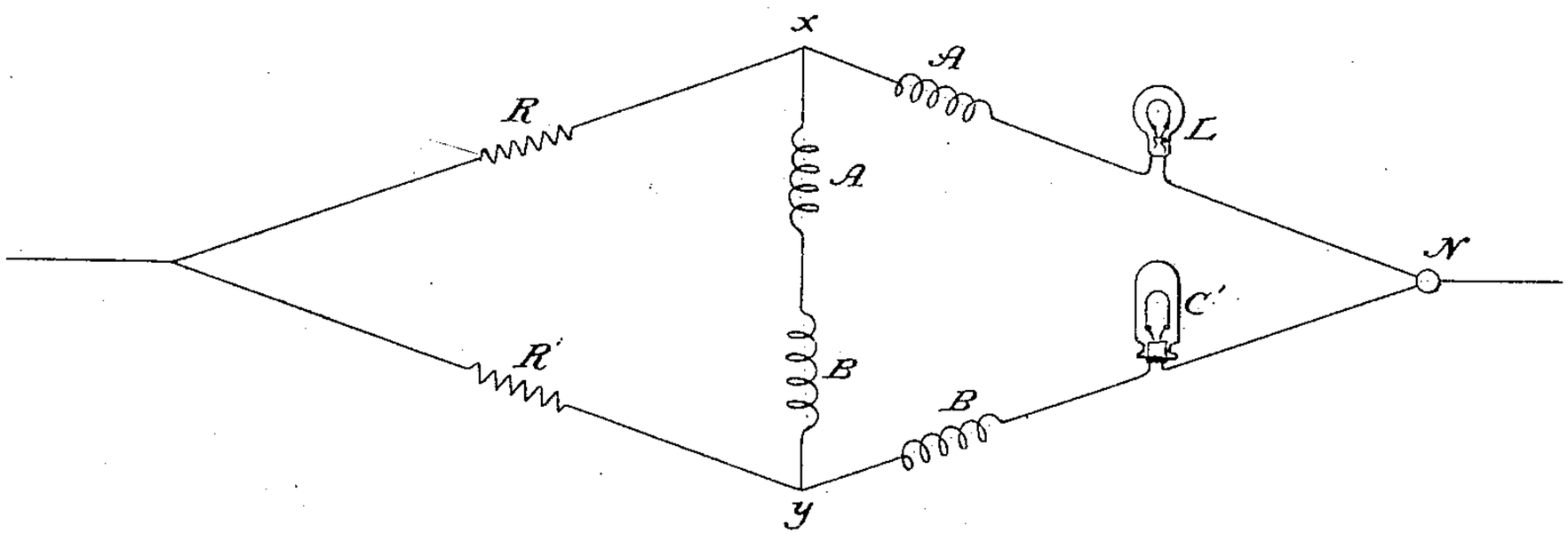


Fig. 2.



Attest:
R. F. Barnes.
W. Frisby

Inventor:
Joseph E. Lockwood.
By Parker W. Page
atty.

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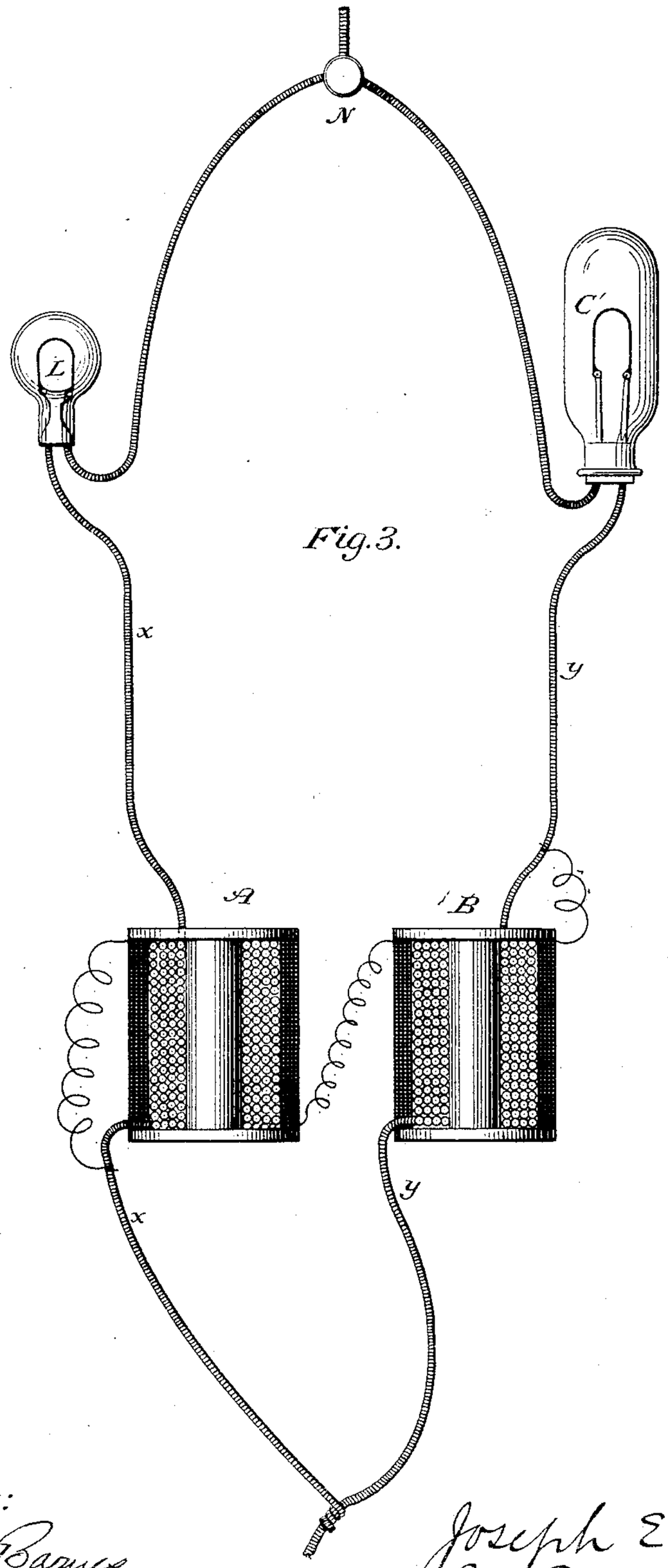

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOSEPH E. LOCKWOOD, OF PARIS, FRANCE, ASSIGNOR TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

APPARATUS FOR TREATING CARBON CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 266,703, dated October 31, 1882.

Application filed March 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH E. LOCKWOOD, a citizen of the United States, at present residing at Paris, in the Republic of France, have invented certain new and useful Improvements in Apparatus for Treating Carbon Conductors, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

My invention comprises an apparatus for bringing to a predetermined standard of electrical resistance carbon conductors designed for any purpose whatever, though it is especially applicable to the treatment of the conductors designed for use in incandescent lamps. It is well known that the strips of carbon produced by carbonizing blanks of fibrous material vary greatly in electrical resistance, for which reason it has been usual to heat them in a vapor of carbon-bearing gas until by the dissociation of the carbon and its deposition on the strips the resistances of the latter are brought down to a fixed standard. To determine when this point has been reached, a lamp of standard resistance, included in a branch of the same circuit with the carbon under treatment, has been employed, and the amount of deposit determined by a photometric comparison of the luminosity of the two. An automatic means of stopping the flow of current at the instant when the carbon under treatment has reached the desired standard is also in use, and consists in an electro-magnet in circuit with the carbon to be treated, and a circuit-breaking mechanism arranged to be actuated by the adjustable armature of the said magnet, and to thereby break the circuit when the resistance of the carbon has reached the desired standard. In this apparatus the strength of the current alone is the principal factor in determining the standard, and it is evident, as it acts against a fixed force—the adjusted retractible force of the armature—that the requisite certainty and delicacy of action are not assured.

My invention is an improvement on this method; and it consists in an arrangement of circuits and magnets, in combination with the tripping mechanism and carbon to be treated, whereby the reduction of resistance of the carbon is determined by comparison with a standard resistance without regard to the strength of the current flowing. This will be understood by reference to the accompanying drawings, where—

Figure 1 represents the apparatus employed by me in fixing the resistance of the carbons; Fig. 2, a diagrammatic illustration of the circuits and relative distribution of the several devices connected therewith. Fig. 3 is a diagram illustrating more in detail the nature of several parts of the apparatus.

The apparatus illustrated in Fig. 1 is substantially the same in many respects as that now in use, and consists of a base, M, a standard, F, to which a suitable lever, C, is pivoted, a weighted arm, N, hinged to standard N′ and adapted to be held in a vertical position by a catch, Z, a contact-spring, J, and bearing-stop J′. It differs from the others, however, in having two armatures, G H, instead of one, and two sets of magnets, A B, the coils of which are composed partly of coarse wire and partly of fine. The coarse wire forms two branches of the same circuit, in each of which one of the magnets is included, the direction of winding being the same in both. The fine wire forms a bridge between the two branches of the circuit, and is wound about magnet A in an opposite direction to that of the coil of coarse wire, but about the magnet B in the same direction.

Referring to Figs. 2 and 3, the application of this apparatus in my method will be seen. Between two main conductors from a suitable source of current any desired number of cross-circuits are formed, each one of which is divided in two branches, X Y. A resistance of twenty-five ohms, more or less, is included in each of the branches. These resistances should be of such kind as not to heat or vary, and for this purpose may be composed of No. 18 copper wire. They are designated by R R′. Branch X forms the coarse-wire coils of magnet A, and contains a resistance, L, which, by preference, is a standard lamp. Branch Y forms the coarse-wire coils of magnet B, and contains the devices for treating the carbons C′. The two branches are brought together, as shown, and are both interrupted by the cir-

cuit-breaker N. Between the two branches is a bridge of fine wire, which passes around the core of magnets A in an opposite direction to that of its coils of coarse wire, then around magnet B in the same direction as the coils of coarse wire.

From the above it is evident that if the branch Y offers a higher resistance to the current than branch X, and this will be the case until the carbon has been treated for the required length of time, the current will pass in the fine-wire bridge from Y to X. Magnet A will thus be the stronger, as it is energized by the current passing in the branch X, as well as by that which passes through the bridge. The magnet B at this time is energized by the current passing in branch Y, which is less than that in branch X; but the current in the fine wire is passing in a direction to neutralize this effect. The armature-lever will therefore be tilted to the side of A, and will so remain until the carbon under treatment has attained the requisite degree of electrical resistance—that is, has reached the same resistance as lamp L. When this takes place the current ceases to flow in the bridge as before, and a light spring, I, now draws the lever over to the side of B.

If so desired, the spring may be dispensed with, as the least reduction in resistance of branch Y, due to a further deposit of carbon, after the two branches balance, causes the current to flow in the fine wire from X to Y. This weakens magnet A and strengthens magnet B. The lever C is in consequence drawn over, the circuit-breaker tripped, and the circuit through both branches instantly interrupted. The carbon is thus cut out of circuit the instant it has acquired the desired degree of resistance, this being effected by the relative distribution of current between the two branches, one of which contains a standard resistance, the other the carbon to be treated.

Modifications of the specific arrangement described, which are within the scope of my invention, will be well understood by those familiar with this subject. In all cases the object to be attained is to determine the resistance of the carbons under treatment by the relative distribution of current between two branches of the same circuit, one of which includes a standard resistance, the other the carbon to be treated.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a branched or divided circuit, of an electro-magnet and standard resistance included in one branch, an electro-magnet and carbon to be treated included in the other branch, a circuit of high resistance joining the two branches and passing in opposite directions around the said magnets, an armature-lever and armature connected therewith, and a circuit-interrupting mechanism, these parts being arranged in the manner and for the purposes herein set forth.

2. An apparatus for use in the electrical treatment of carbon conductors, consisting in a pivoted armature-lever and circuit-interrupting mechanism operated thereby, in combination with electro-magnets the coils of which are composed of coils of coarse wire, wound in the same direction and constituting branches of the same circuit, and coils of finer wire wound in opposite directions in the two magnets and constituting a bridge between the said branches of the circuit, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 17th day of February, 1882.

JOS. E. LOCKWOOD.

Witnesses:
WILLIAM H. TUCKER,
ROBT. M. HOOPER.