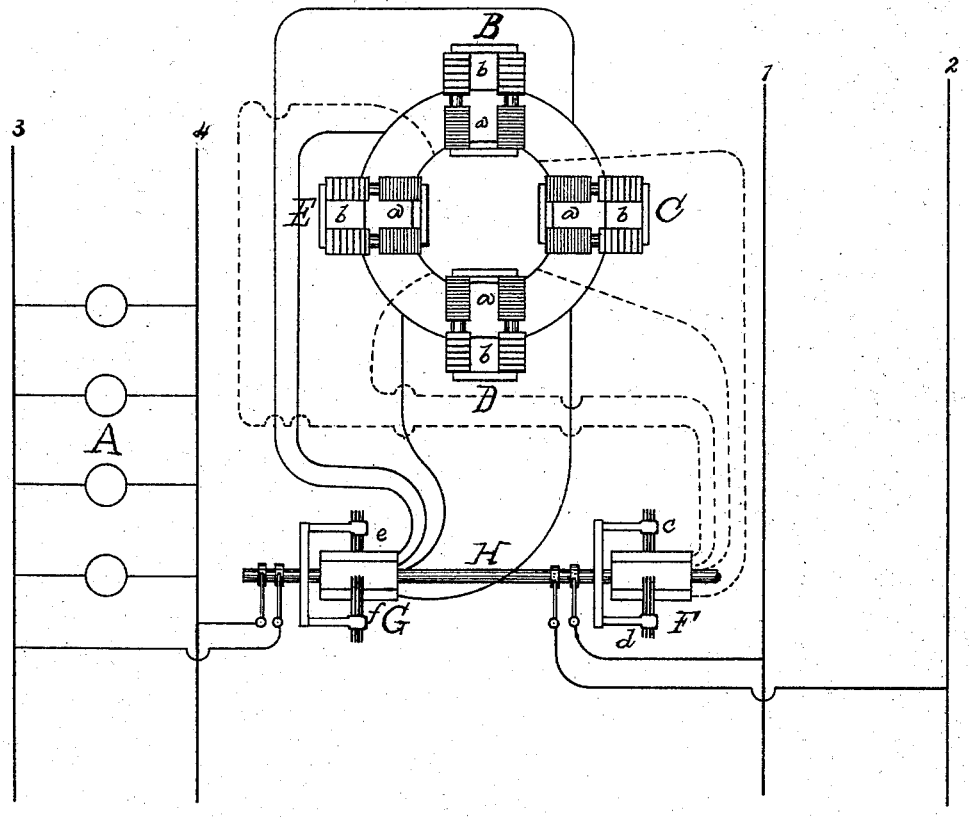
(No Model.) 2 Sheets—Sheet 1.

T. A. EDISON.

APPARATUS FOR TRANSLATING ELECTRIC CURRENTS FROM HIGH TO LOW TENSION.

No. 278,418. Patented May 29, 1883.

Fig. 1.



WITNESSES:

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H. W. Seeley

INVENTOR:

Thomas A. Edison,

By Rich'd A. Dyer,

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(No Model.) 2 Sheets—Sheet 2.

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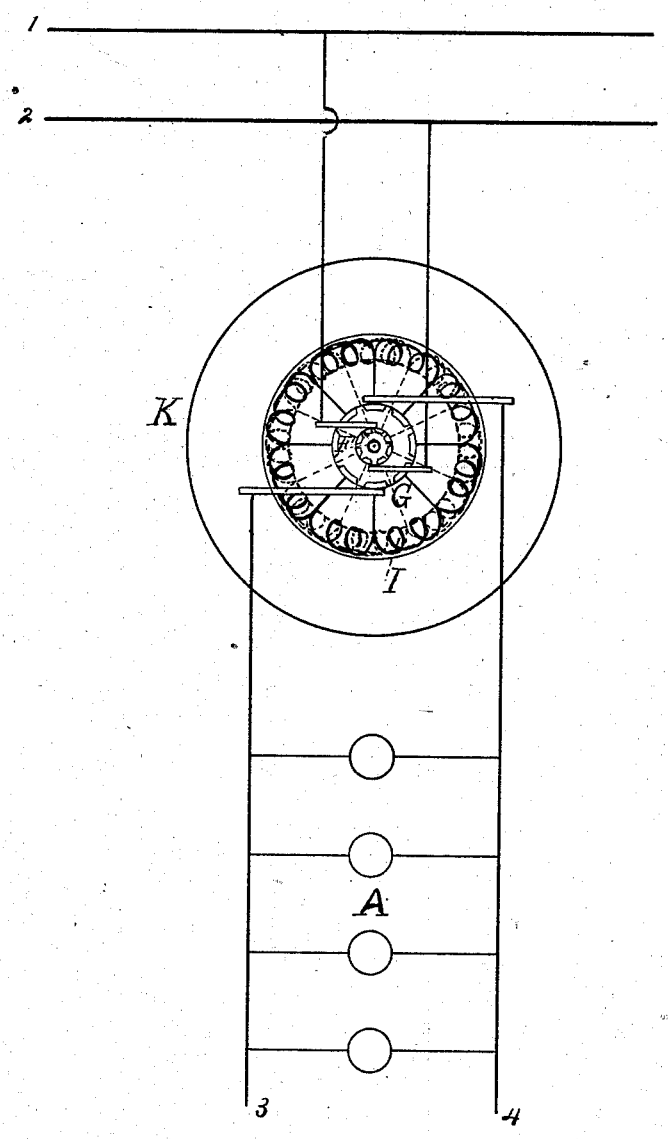
Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

APPARATUS FOR TRANSLATING ELECTRIC CURRENTS FROM HIGH TO LOW TENSION.

SPECIFICATION forming part of Letters Patent No. 278,418, dated May 29, 1883.

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

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Systems of Electric Lighting, (Case No. 463;) and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to produce simple and efficient means for reducing the tension of a continuous current flowing in a main circuit, and supplying consumption-circuits with a continuous current of lower tension, whereby a large saving can be made in the investment for conductors by using small main conductors, and obviating excessive loss of energy by the use of a current of high tension in the main circuit, while lamps, motors, or other translating devices requiring a continuous current can be supplied, and by the use of a current of lower tension in the consumption-circuit the translating devices can be placed in separate multiple-arc circuits and made independently controllable.

The object is accomplished by the use of induction apparatus located between the main circuit and the translating devices and transforming a continuous current of high tension into a continuous current of lower tension by the employment of a magnetic core or cores having two sets of wire coils, one of high resistance connected with the main circuit, and one of lower resistance connected with the consumption-circuit, the connections of the main and consumption circuits with their respective sets of coils being changed or advanced simultaneously, so that the inductive action of the magnetic core or cores will cause current to flow in the consumption-circuit always in the same direction.

In carrying out the invention a number of magnetic cores are preferably employed, which cores are preferably arranged in pairs to form horseshoe-magnets and have plates closed upon their poles. These magnetic cores are wound with two sets of wire placed on different portions of the cores or coiled one upon the other on the same portions of the cores. One set of coils is of high resistance, while the other set is of lower resistance, and each set of coils is connected in a closed circuit independent of the circuit of the other set. The closed circuit of each set of coils is connected with the bars or plates of a stationary commutator-cylinder at points between the pairs of magnetic cores, there being a bar on each commutator-cylinder for each pair of magnetic cores. Upon each commutator-cylinder travels a pair of commutator brushes or springs. These commutator-brushes are mounted upon a common shaft, which is revolved by any suitable means, an electromotor being used for the purpose, or a spring or weight actuated mechanism. The brushes traveling on the commutator-cylinder connected with the coils of high resistance are connected with the main circuit, while the brushes traveling on the commutator connected with the coils of low resistance are connected with the consumption-circuit. The current in the fine-wire or high-resistance coils flows from one commutator-brush to the other in two directions, one-half the pairs of cores having their coils receive current in one direction, while the other half of the cores have their coils receive current in the opposite direction. Now, the revolution or the commutator-brushes will cause the pairs of magnetic cores to have the connections of their coils reversed two at a time, thus causing a reversal of magnetic polarity. This change in magnetic polarity induces a current of lower tension in the coarse or low-resistance coils, the connections with which being advanced simultaneously with those of the fine-wire coils, the induced current is made a continuous current, or a current flowing in one direction. The action may perhaps be better illustrated by considering the points at which the current flows into and leaves the closed circuit of the fine-wire coils as in the neutral line. This is advanced by the revolution of the commutator-brushes, and the opposite pairs of magnetic cores are crossed by the line simultaneously. The same result would be produced if the magnetic cores were mounted upon a shaft and revolved with the commutator-cylinders, the commutator-brushes being held stationary.

Instead of using a number of double-wound magnetic cores, a single annular core can be used, similar to a Gramme ring, the annular core being provided with two sets of continuously-wound wire coils, one of high resistance and the other of low resistance, connected at intervals to the bars of separate commutator-cylinders.

The coils of high resistance are connected through the commutator and brushes with the main circuit, while the coils of low resistance are similarly connected with the consumption-circuit. The double-wound ring and the commutator-cylinders may be revolved, and the commutator brushes or springs held stationary; or the commutator-brushes may be revolved together and the ring and cylinders held stationary. The double-wound ring is perferably surrounded by a ring of iron to carry the magnetism between the ends of the neutral line.

The foregoing will be better understood from the drawings, in which Figure 1 is a view, partly diagrammatic, of the preferred form of the apparatus; and Fig. 2, a similar view of a modified form of the same.

1 2 are the conductors of the main circuit, having a continuous high-tension current supplied by one or more dynamo or magneto-electric machines, while 3 4 are the main conductors of the house or consumption circuit, requiring a continuous current of lower tension, and provided with lamps, motors, or other translating devices, A, located in multiple-arc circuits and independently controllable. B, C, D, and E, are pairs of magnetic cores having fine-wire or high-resistance coils *a* and coarse-wire or low-resistance coils *b*. These coils are connected together in two closed circuits connected at points between the pairs of magnetic cores with the bars of separate commutator-cylinders F G. Two sets of commutator-brushes, *c d* and *e f*, are mounted upon a common shaft, H, and revolved together. The brushes *c d* are in a multiple-arc circuit from the conductors 1 2 of the main circuit, while the brushes *e f* are connected with the conductors 3 4 of the consumption-circuit. The shaft H may be revolved by an electromotor or in any other suitable way, as by a spring or weight actuated mechanism.

It will be understood that each house-circuit will be connected with the main circuit through induction apparatus, all the connections being independent multiple-arc connections.

Instead of the separate pairs of magnetic cores, a single annular core, I, can be used. (Shown in dotted lines in Fig. 2.) This core is wound with two sets of wire coils, each being continuous, like the winding of a Gramme ring, one set of high resistance (shown in dotted lines) connected with bars of commutator-cylinder F, the brushes or springs on which are connected with the conductors 1 2 of the main circuit, and the other set of low resistance (shown in full lines) connected with the bars of commutator-cylinder G, the brushes or springs on which are connected with the consumption-circuit 3 4.

The double-wound ring I and the commutator-cylinders F G may be revolved, or they may be held stationary and the commutator-brushes be revolved. An iron ring, K, is preferably placed outside of the double-wound ring I, to carry the magnetism between the ends of the neutral line.

In my Patent No. 265,786, dated October 10, 1882, is shown a series of combined motors and generators, the motors being placed in the main circuit and the generator-coils supplying translation-circuits with currents of reduced tension. Therefore I do not herein claim a system of this character.

What I claim is—

1. The combination, with a main circuit having a continuous current of high tension, of a consumption-circuit of low tension, provided with translating devices arranged in multiple arc, and an intermediate induction apparatus for reducing the tension of the current, substantially as set forth.

2. The combination, with a main circuit having a continuous current of high tension, of a consumption-circuit, an intermediate double-wound magnetic core or cores, and commutators for simultaneously changing or advancing the connections of the circuits with the windings of such core or cores, substantially as set forth.

3. The combination, with the main and consumption circuits, of a magnetic core or cores, provided with two sets of coils, one of high and one of low resistance, connected in separate closed circuits, and two commutators, one connecting the high-resistance coils at intervals with the main circuit and one connecting the low-resistance coils at intervals with the consumption-circuit, the connections of the main and consumption circuits being changed or advanced simultaneously, substantially as set forth.

4. The combination, with the main and consumption circuits, of the double-wound stationary core or cores, the stationary commutator-cylinders connected at intervals with the windings of such core or cores, and the simultaneously-revolving commutator brushes or springs connected with the main and consumption circuits, substantially as set forth.

5. The combination, with the main and consumption circuits, of the double-wound core or cores, the commutator-cylinders, and the exterior iron ring, substantially as set forth.

This specification signed and witnessed this 7th day of July, 1882.

THOMAS A. EDISON.

Witnesses:

RICHD. N. DYER,

EDWARD H. PYATT.