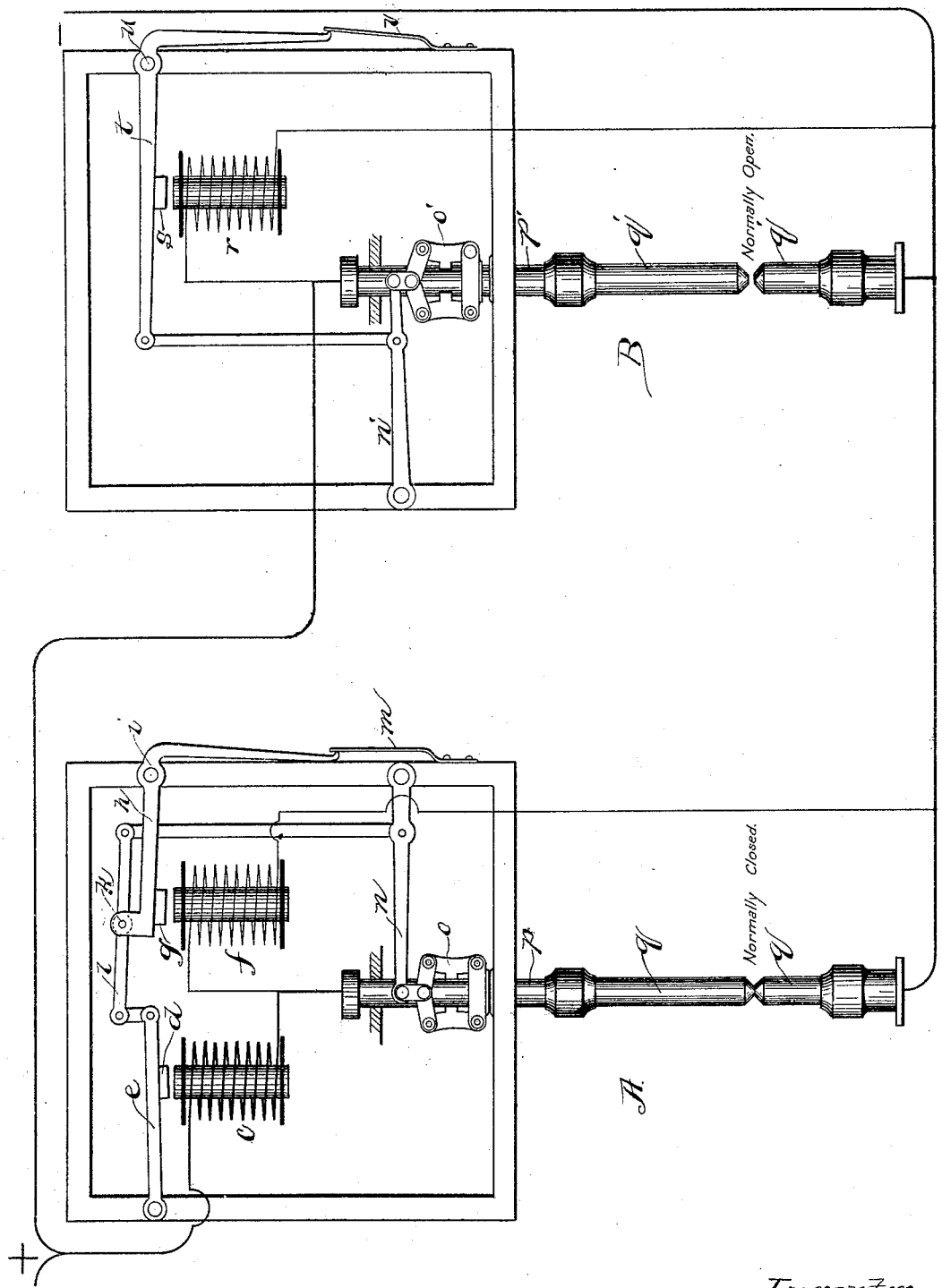
(No Model.)

C. E. SCRIBNER.

DUPLEX ARC LAMP.

No. 512,401. Patented Jan. 9, 1894.



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DUPLEX ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 512,401, dated January 9, 1894.

Application filed May 1, 1891. Renewed May 9, 1893. Serial No. 473,603. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Duplex Arc Lamps (Case No. 261,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to duplex arc lamps; its object is to provide circuits and mechanism whereby two separate arc lamps connected to the same circuit may be caused to burn successively.

My invention comprises two arc lamps having separate and independent regulating mechanisms, connected one in a normally open and the other in a normally closed branch circuit between two supply mains, and mechanism in that lamp situated in the normally open circuit which operates to close that circuit to form the arc between the carbons included in the circuit and to regulate the arc, when the resistance of the arc in the first lamp is slightly increased.

My invention may be generally described as follows: I provide in the normally closed branch circuit an ordinary single carbon arc lamp, whose carbons are allowed to rest together when the lamp is idle; and in the normally open branch circuit, a special single carbon lamp, whose carbons are maintained in separated relation when the lamp is idle, by a spring which acts upon the regulating mechanism of the lamp, and holds the clutch clamped upon the carbon rod, and the carbons apart as stated. When the lamps are in operation, however, this spring is opposed in its action by an electro-magnet in shunt of the carbons of both lamps, which tends to cause an approach of the carbons of its lamp. A current entering the lamps, traverses that lamp whose circuit is complete; the magnets of the lamp are energized, the carbons are separated, and an arc forms and is regulated in the usual manner, until the carbons are consumed. When the resistance of the arc becomes sufficient a current of such strength passes through the electro-magnet of the second lamp as to cause it to bring the carbons of that lamp together. The arc of the first lamp is shunted out; the electro-magnet of the second lamp also loses its current and allows the carbons to separate and form the second arc. The regulating system now assumes a position of equilibrium in which the effort of the spring to separate the carbons still further is balanced by the effort of the electro-magnet in shunt of the arc to bring them together, and the arc of the second lamp is continually adjusted to a constant resistance.

My invention will be more clearly understood by reference to the accompanying drawings, which is illustrative thereof.

In the drawings I have shown two arc lamps, A and B, connected to supply mains in accordance with my invention. The lamp A at the left of the drawings is substantially the same as that described in my Patent No. 415,571; I will therefore describe its construction but briefly.

An electro-magnet *c* included in circuit with the carbons of the lamp is adapted to act apon an armature *d* attached to a lever *e* pivoted to the lamp frame. A second electro-magnet *f* of high resistance and connected in shunt of the carbons is adapted to act upon an armature *g* attached to a bell crank lever *h;* this lever *h* is pivoted at its angle *i* to the frame of the lamp. That arm of lever *h* which carries the armature *g* is furnished with lugs and a pivot *k* which serves as a fulcrum upon which rocking lever *l* may turn. The longer arm of lever *h* is pressed toward the frame of the lamp by a spring *m* which thus acts to maintain armature *g* at a slight distance from the pole of magnet *f*. One end of rocking lever *l* is linked to the armature lever *e*, and the other end to the lifting lever *n*. The lever *n* is pivoted at one end to the frame, and at the other end carries clutch *o*. Vertically through this clutch and adapted to be grasped by it, passes the carbon rod *p* which carries at its lower extremity the carbon *q*, one of the pair *q q*.

Referring now to the lamp B at the right of the drawing. An electro-magnet *r* connected in shunt of both pairs of carbons is adapted to act upon an armature *s*. The armature *s* is attached to a bell crank lever *t* pivoted at

its angle u to the frame of the lamp B. That arm of the lever t which carries the armature s is linked to the lifting lever n', which is pivoted at one end to the frame of the lamp, and carries at its other end the clutch o', through which passes the carbon rod p' carrying carbon q', one of the pair q' q'. The downwardly projecting arm of lever t is pressed toward the frame of the lamp by spring v, with a force sufficient to lift the carbon and carbon rod, and maintain the carbons separated, when the electro-magnet r is not exerting an abnormally great attraction upon its armature.

I will now proceed to describe the operation of two lamps so constructed and connected.

In their idle condition, their mechanisms are in the positions shown. The carbons of lamp A rest together, completing the branch circuit through that lamp. The carbons of lamp B, on the contrary, are held separated, and consequently the branch circuit through that lamp is not complete. A current entering from the positive main traverses the magnet c, carbon rod p, carbons q q, and reaches the negative main. The magnet c is energized by the current through its coils, and it attracts its armature d; the motion of this armature is communicated through the system of levers e, l, n, and their respective connecting links, and operates to lift clutch o; the clutch clamps upon the rod p, which, with its attached carbon q, is raised, and an arc forms between the carbons q q. On account of the introduction of the resistance of the arc into the circuit, a portion of the current now flows through the shunt magnet f, causing it to attract its armature g; if the resistance of the arc is greater than a predetermined amount to which the lamp is adjusted, the armature g approaches the magnet f in opposition to the force of the spring m; the fulcrum of rocking lever l is thus lowered, and hence the clutch and upper carbon q, until equilibrium is established between the pressure of the spring m and the attraction of magnet f for its armature. When the clutch has been lowered until it comes into contact with the base of the lamp frame, its grasp upon the carbon rod p is relaxed slightly and the carbon rod slides down a slight distance, immediately after which the former condition is resumed. This action of lamp A continues until the carbons q q have been so far consumed that the head of the carbon rod p rests upon the top shown; the arc now slowly increases in length and resistance, until the strength of the current flowing through shunt magnet r of lamp B is such as to draw down its armature s in opposition to the pressure of spring v until the carbons q' q' are brought into contact. When this occurs the arc between the carbons of the first lamp is shunted out, and the shunt magnet r is at the same time deprived of its current. The force on the armature s being thus weakened, the carbons are again separated, and an arc is formed between them. At once the current is re-established through the shunt magnet r, and the regulating system assumes a position of equilibrium under the balanced forces of the attraction of the magnet r upon its armature, and the pressure of the spring v. Thereafter regulation of the length of the arc proceeds as described for the first lamp. It will be evident that the spring v must exert a greater opposition to the attraction of the electro-magnet r upon its armature than the spring m exerts in opposition to the attraction of the electro-magnet f for its armature, in order that any slight increase in the resistance of the arc at lamp A may not cause the lamp B to bring its carbons together. In consequence of this different adjustment, an arc at lamp B will be maintained of slightly greater length than at lamp A, but the difference between the two arcs may, with proper adjustments of springs m and v, be made inappreciable.

It is obvious that any other single carbon lamp, whose carbons are allowed to rest in contact when the lamp is idle, could be substituted in my duplex lamp for the form of lamp shown; and, also, that various other arrangements of levers and clutches might be substituted for those shown in the second burning or auxiliary lamp, without departing from the substance of my invention. Hence I do not limit myself to the precise forms shown.

Having thus clearly described my invention and its operation, I claim as new and desire to secure by Letters Patent—

1. In a duplex arc lamp, the combination of a single carbon arc lamp whose carbons rest in contact when the lamp is idle, connected to supply mains, of a second arc lamp provided with mechanism adapted to maintain the carbons separated when the lamp is idle, and with an electro-magnet in shunt of the carbons of both lamps, which acts upon the said mechanism to cause the approach of the carbons toward each other when sufficient current passes through the electro magnet, substantially as and for the purpose specified.

2. In combination, an arc lamp having regulating mechanism which allows the carbons to remain in contact when the lamp is idle, connected between supply mains in a branch circuit which is normally closed through its carbons, and a second arc lamp having regulating mechanism which maintains its carbons separated when the lamp is idle, and provided with an electro-magnet in shunt of the carbons of both lamps, adapted to act upon the regulating mechanism to bring the carbons into contact when sufficient current flows through the electro-magnet, connected to said supply mains in a second branch circuit which is normally open at the point of separation of the two carbons, substantially in the manner and for the purpose specified.

3. In combination, the arc lamp A connected

between supply mains in a branch circuit normally closed through the carbons of the lamp, and the lamp B connected between the same supply mains in a branch circuit normally open at the point of separation of its carbons, provided with the spring *v* acting through levers to keep the carbons separated, and with the electro-magnet *r* in shunt of the carbons of both lamps, acting through levers to close the carbons together in opposition to the spring *v* when sufficient current passes through the magnet *r*, substantially in the manner and for the purpose specified.

4. The combination with two pairs of carbons, of a branch from an electric circuit normally closed through one of the pairs, a parallel branch through the other pair normally open at the point of separation of the members of that pair, an electro-magnet connected with the normally closed circuit adapted to separate the carbons in that circuit when energized, and an electro-magnet in shunt of the carbons in the normally open circuit adapted to bring the carbons of that pair together when it is energized, substantially as described.

In witness whereof I hereunto subscribe my name this 18th day of April, A. D. 1891.

CHARLES E. SCRIBNER.

Witnesses:
ELLA EDLER,
GEORGE P. BARTON.