(No Model.)

L. G. NILSON.

ELECTRIC ARC LAMP.

No. 552,967. Patented Jan. 14, 1896.

Fig. 1.

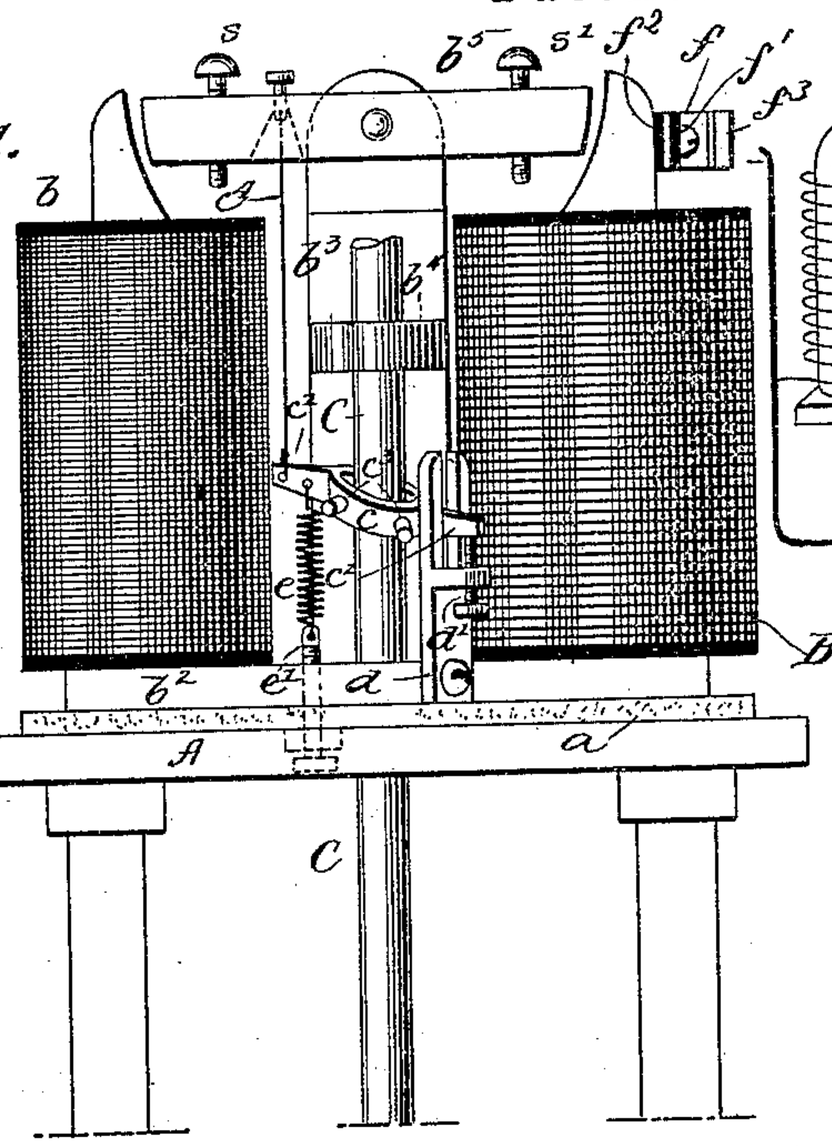


Fig. 10.

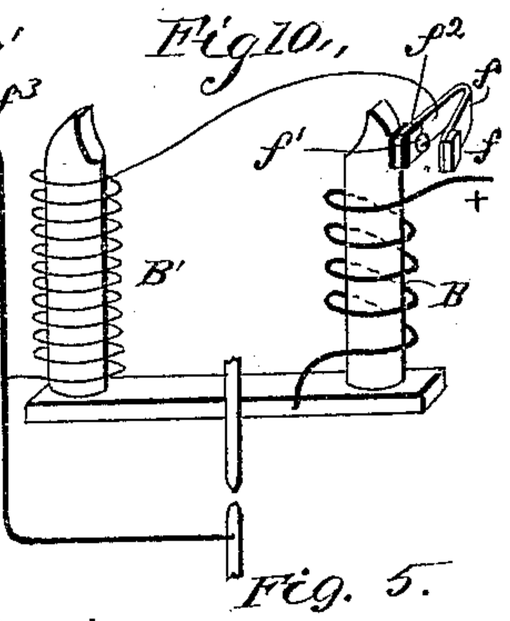


Fig. 5.

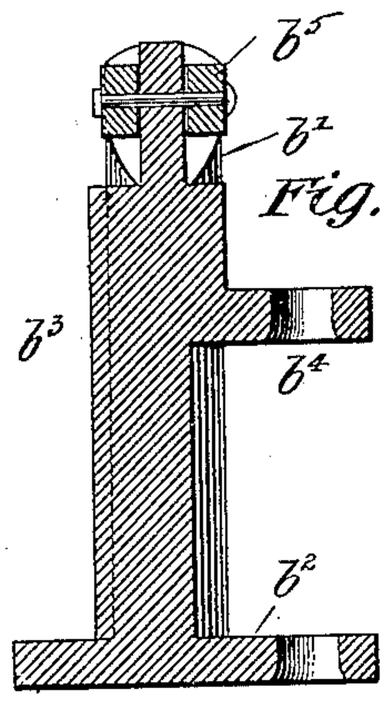


Fig. 3.

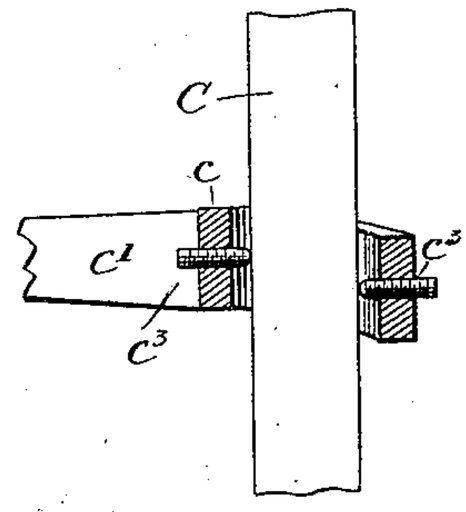
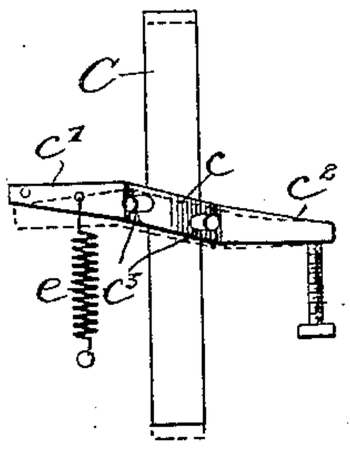
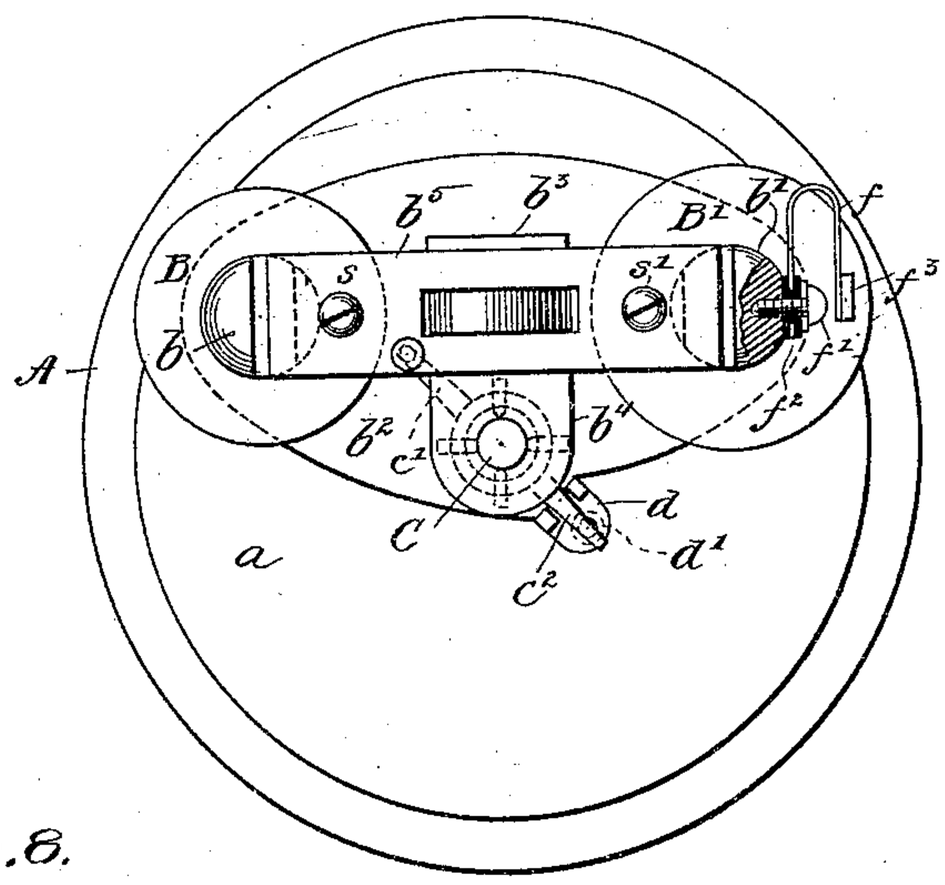


Fig. 6.

Fig. 4.





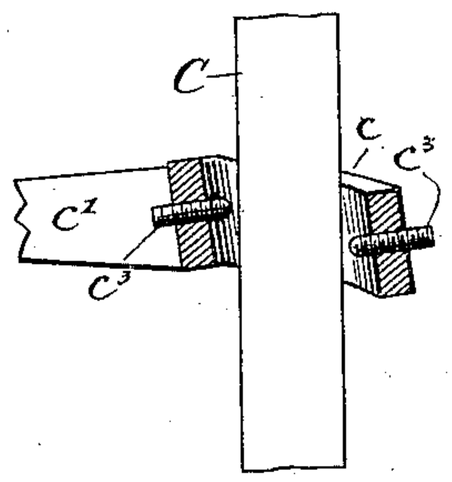


Fig. 8.

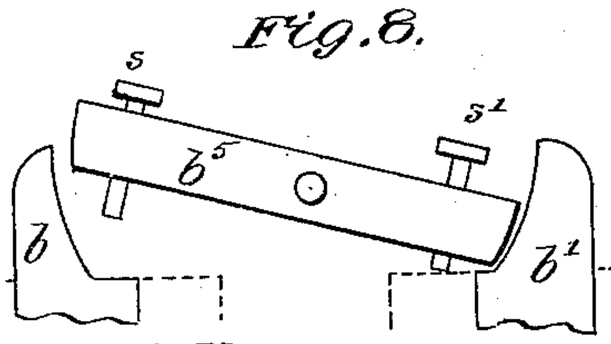


Fig. 7.

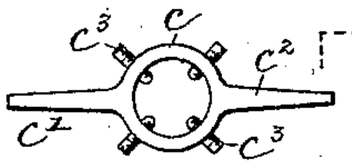
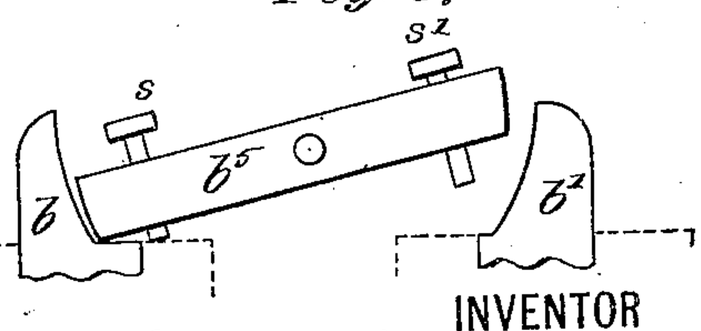


Fig. 9.



WITNESSES:

Frank S. Ober.

C. V. Edwards.

INVENTOR

L. G. Nilson

BY Wm. W. Rosenbaum

ATTORNEY

ANDREW B GRAHAM. PHOTO-LITHO. WASHINGTON. D C.

UNITED STATES PATENT OFFICE.

LARS G. NILSON, OF SIOUX CITY, IOWA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 552,967, dated January 14, 1896.

Application filed July 25, 1893. Serial No. 481,418. (No model.)

To all whom it may concern:

Be it known that I, LARS GUSTAV NILSON, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Arc Lamps, of which the following is a full, clear, and exact description.

My invention relates to arc lamps, its object being to simplify the construction of the feeding mechanism and to produce an efficient positively-operating lamp that is economical to build and is easily kept in repair.

The invention consists of the details of construction hereinafter described and claimed.

Referring to the accompanying drawings, Figure 1 represents a side elevation of the lamp; Fig. 2, a plan of the same; Fig. 3, a vertical section of the magnetic frame, and Figs. 4, 5, 6, and 7 are detailed views of the clutch controlling the carbon-rod. Figs. 8 and 9 are side views of the armature. Fig. 10 is a diagram of the circuits.

Referring to the drawings by letter, A represents a base-plate upon which all of the parts of the lamp are supported.

a is a plate of insulating material interposed between the plate A and the working parts of the lamp.

B and B′ respectively represent single coils of wire connected respectively in series and shunt with the electrodes of the lamp. The coil B surrounds an iron core *b*, and the coil B′ surrounds the iron core *b*′. Both coils are connected at their lower ends with a yoke or cross-plate b^2, which rests directly upon the plate *a* of insulating material. Between the two magnet-cores a post b^3 is located. This has a cross-section about equal to the sum of the cross-sections of the two cores, and it is connected at its lower end with the yoke b^3. This structure, consisting of the yoke, the two cores and the post, is preferably all forged or cast in one piece of magnetic material. The post is provided with an offset or bracket b^4 provided with an opening which serves as a guide for the carbon-rod C. The rod is also guided by another opening in the yoke through which it passes. To the top of the post is pivoted between its extremities an armature b^5, which is common to both magnets. The magnetic structure thus described forms two complete and separate magnetic circuits, both of which pass through the post b^3, one for the series coil and the other for the shunt-coil. This is an important part of my invention, as it adds to the simplicity of the lamp and reduces the cost of construction.

I use in this lamp a modification of the "ring-clutch". It consists of a ring *c* having two radial arms *c*′ c^2 arranged diametrically opposite each other. The ring is somewhat greater in diameter than the rod, and is provided with four radial screws c^3, the inner ends of which are rounded and bear upon the surface of the rod at points about ninety degrees apart. These screws are adjustable. The arm *c*′ is connected with the armature b^5 by a link c^4, the adjustment of the armature being upon the side next to the shunt-magnet. The other arm c^2 of the clutch projects through a slot in a bracket *d* attached to the yoke b^2. This bracket carries a set-screw *d*′, upon the end of which the arm of the clutch rests.

e represents a spiral spring which is attached at one end to the adjustable screw *e*′ and at the other end is attached to the arm *c*′ of the clutch at a point between the end of the link c^4 and the ring. The ring and arms are in slightly-different planes, as clearly shown in Fig. 4, and the ring normally stands oblique to the rod, which it surrounds, but the sides of the ring are substantially parallel to the rod. The armature b^4 is provided with two set-screws *s* and *s*′, one at each end, the purpose of which is to limit the movement of the armature in either direction.

In Fig. 2 I have illustrated a cut-out for a shunt-magnet. It consists of a spring *f* fixed at one end to the pole-piece or head of the series magnet by means of a screw *f*′ passing into the pole-piece. The end of the spring is insulated from the pole-piece and the screw by a bushing of hard rubber or other suitable material f^2. The free end of the screw returns and stands closely adjacent to, but out of contact, with the head of the screw, and it carries a soft iron armature f^3. One end of the coil of the shunt-magnet is connected with the spring *f*. The main circuit of the lamp leads first through the series coil B and thence to the frame of the lamp and upper-carbon rod in the usual manner, and the end of the shunt-circuit controlled by the cut-out joins the

main circuit at the pole-piece of the series magnet, as will be readily understood.

The operation is as follows: When there is no current on, the carbon-rod is free and the carbons are in contact with each other. Upon completing the circuit the series coil becomes energized and attracts the end of the armature. This lifts the arm c' of the clutch and tilts the latter until the points of the screws c^3 grip the rod and lift it, thus establishing the arc. The amount of the lift will be determined by the relative positions of the set-screws s' and d'. The moment the pole-piece of the series magnet becomes magnetized the free end of the spring f, with its armature, will be attracted and pulled against the pole-pieces, thus electrically connecting the end of the shunt-circuit with the main circuit through the core of the magnet and the upper-carbon rod. When this connection is made a small current will flow through the shunt-magnet, which will have a tendency to pull its end of the magnet downward. When the arc is of normal length the armature balances near the middle of its allowed angle of motion, and as the carbon points burn away the shunt-magnet will gain in strength and lower the carbon-rod until the arm c^2 of the clutch touches the end of the screw d' and tilts the clutch, thereby releasing the rod from the grip of the screws and allowing it to feed. This feed will be very delicate and sensitive, as the rod hangs on four points only, and it will never, even if rough or corroded, stick, as is often the case where brake-shoes or plain rings are used. The number of screws or points for gripping the rod need not be four, as any number from three upward may be used with good results. It is also to be understood that the points may be formed as a part of the ring, but I prefer to have them separate and adjustable, as shown. By properly adjusting the screws d' and s and s' and the tension of spring e the lamp may be run without changing the winding of the magnets on most any current. The extreme limit of motion of the armature is a great deal more than is necessary for separating the carbons. Therefore the screws s s' have been provided. As shown in the several figures, the pivot of the armature is to one side of the middle point, and the curvature of the pole-pieces is such that the armature gradually approaches to or recedes from the pole-pieces, so that by adjusting the screws s s' the armature may be set to balance at greatly-different currents. If, for example, it was decided to use a current of high voltage and small ampèrage the screw s on the shunt side would be adjusted to project to a greater distance than the screw s', as shown in Fig. 8, and with a heavy current and low voltage screw s' would be adjusted inward to a greater distance, as shown in Fig. 9.

In my experiments with this lamp I, find that the clutch is much more positive, and slipping is less liable to take place, when the spring e is connected with the clutch at a point between the ring or the carbon-rod and the outer extremity of the arm c' where the link is attached. At this point the spring appears also to make the clutch catch the rod at the earliest possible moment when the arm is lifted.

Having thus described my invention, I claim—

1. In an arc lamp, the combination of a main and a shunt magnet, a back yoke connecting the cores of the same, a post connected with said back yoke, and a single armature common to both magnets pivoted to said post, the said post forming a part of the magnetic circuit of both magnets.

2. In an arc lamp, a single piece of magnetic material provided with two iron cores, a back yoke or plate and a post between the cores, said post being provided with a perforated bracket, and the back yoke being perforated to form guides for the carbon rod.

3. In an arc lamp, a cut-out consisting of a spring mounted contact point mechanically attached to and adapted to make electrical contact with the head or pole piece of a magnet.

4. In an arc lamp, a cut-out consisting of a bent spring attached at one end to a head or pole piece of a magnet, a ring at its opposite end and an armature adapted to make and break electrical contact with the said pole piece of the magnet.

In testimony whereof I subscribe my signature in presence of two witnesses.

L. G. NILSON.

Witnesses:
C. V. EDWARDS,
FRANK S. OBER.