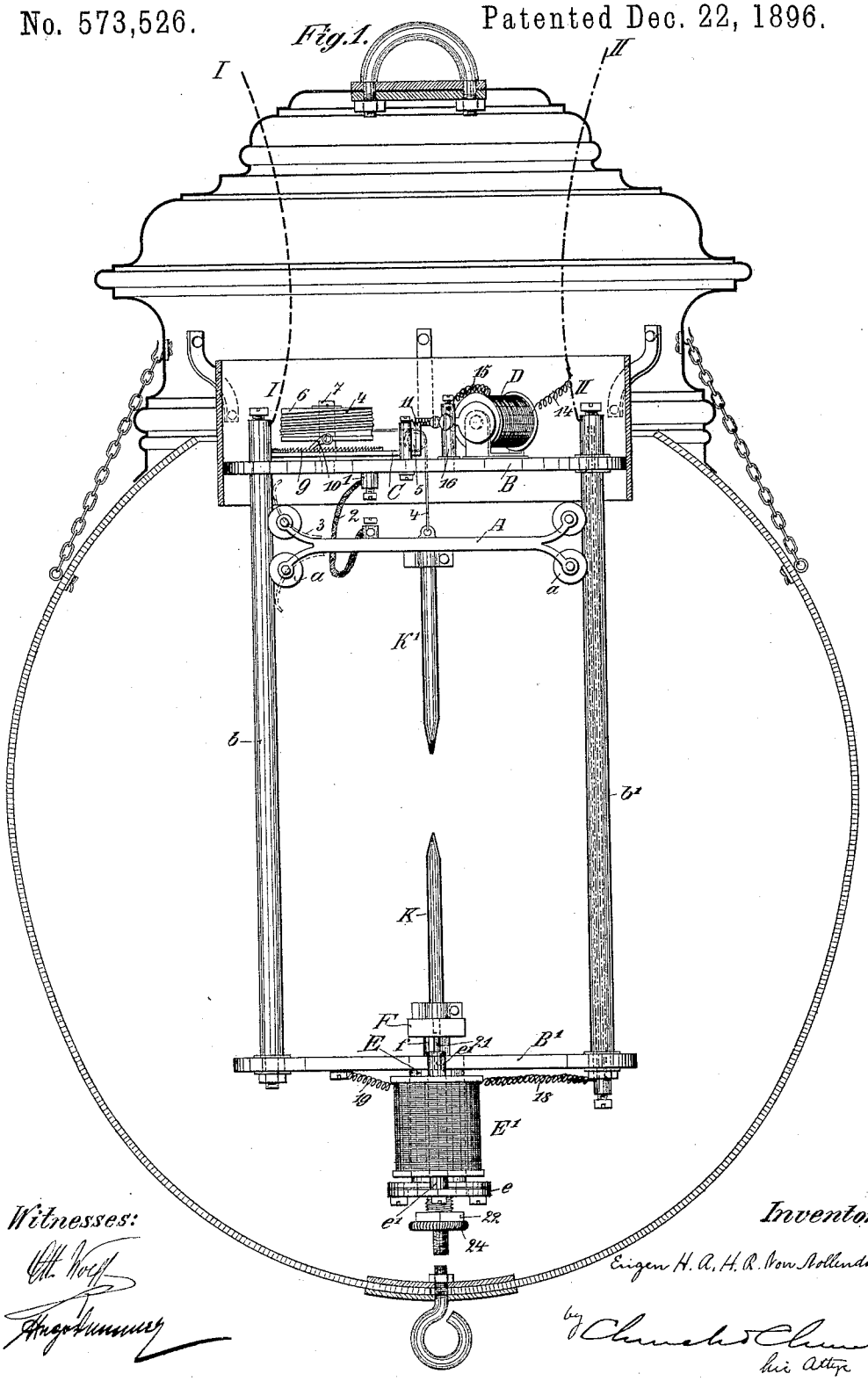
(No Model.) 2 Sheets—Sheet 1.

E. H. A. H. R. VON NOLLENDORF.

ELECTRIC ARC LAMP.

No. 573,526. Patented Dec. 22, 1896.

Fig. 1.



Witnesses:

Inventor:

Eugen H. A. H. R. Von Nollendorf.

by Church & Church
his Attys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

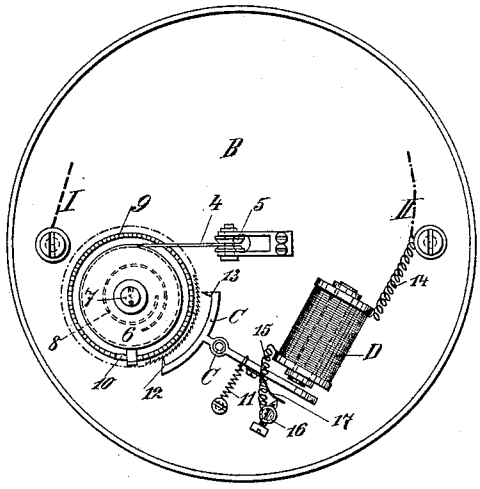


Fig. 3.

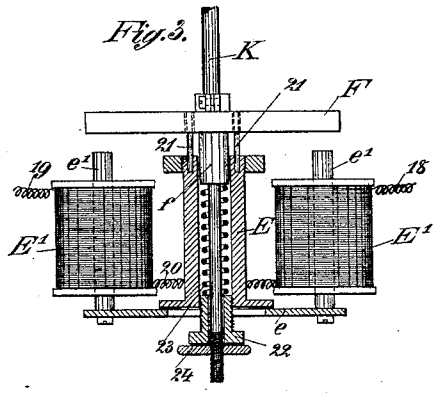
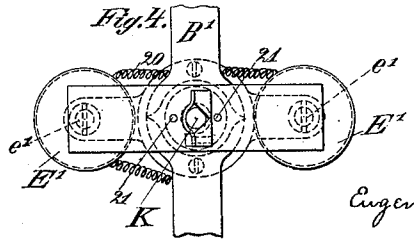


Fig. 4.



Witnesses:

Inventor:
Eugen H. A. H. R. Von Nollendorf

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UNITED STATES PATENT OFFICE.

EUGEN HUGO ARTHUR HEINRICH RITTER VON NOLLENDORF, OF VIENNA, AUSTRIA-HUNGARY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 573,526, dated December 22, 1896.

Application filed April 9, 1896. Serial No. 586,858. (No model.)

To all whom it may concern:

Be it known that I, EUGEN HUGO ARTHUR HEINRICH RITTER VON NOLLENDORF, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a specification.

An arc-lamp constructed according to this invention is distinguished from those used hitherto by its having an extremely simple regulating mechanism which does not necessitate the provision of the tubular upper part which in existing arc-lamps contains the complicated regulating mechanism. The carbon-holder, which has to be automatically adjusted by the regulating mechanism, serves by its weight to drive a simple stop mechanism comprising an escapement-wheel and a pallet or anchor, the latter being operated upon by an electromagnet which is placed in a shunt-circuit.

The invention will be best understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section through the lamp with the regulating mechanism in elevation. Fig. 2 is a plan of the disk supporting that mechanism, and Figs. 3 and 4 are views showing such parts of the arc tension devices as are not shown in Fig. 1.

In the lamp illustrated the lower carbon K is to be considered as stationary, unless it be moved by a device to be described later on for the purpose of producing tension of the arc, while the upper carbon K′ is being adjusted for regulating the light. For this purpose the carbon-holder A for K′ is adjustable on the rods *b b′* by means of rollers *a*, which may be replaced by sliding blocks. The rods *b b′* are secured at their upper ends in the disk B and at their lower ends in the cross-bar B′, and *b* is in electrical connection with the disk B and *b′* is insulated therefrom. The current to the carbon K′ may be led from the main line-wire I through the binding-screw 1 and the conductor 2, which hangs down in a loop and is flexible; but the current may also be collected from the rod *b* by the guide-rollers *a* in contact therewith, in which case it is advisable to also employ springs 3 as sliding contacts, as shown in dotted lines in Fig. 1. The rollers *a*, traveling on the rod *b′*, are preferably made of non-conducting material.

The carbon-holder A is suspended by a cord or equivalent 4, which passes through a hole in the middle of the disk B over a guide-roller and several times round a drum or barrel 6, to which its end is fixed. The barrel 6 turns upon the fixed spindle 7, to which it is connected by a weak spring 8 in such manner as to give tension to this spring when the cord is being unwound. Round the spindle 7 turns also the escapement-wheel 9, the upper side of which is provided with ratchet-teeth. A pawl 10, pivoted to the drum 6, engages with these teeth in such manner that during the unwinding of the cord 4 from the drum and the consequent rotation of the latter the escapement-wheel has to move with the drum.

The weight of the carbon-holder A and carbon K′, acting on the barrel 6 through the cord 4, tends therefore to rotate the barrel and the escapement-wheel in the direction indicated by the arrow in Fig. 2. If these parts were uncontrolled, the carbon K′ would fall onto the carbon K and the spring 8 would be energized. This operation is prevented or regulated in the following manner: A bifurcated lever C, pivoted at *c*, Fig. 2, to the disk B, engages the escapement-teeth of the wheel 9 and essentially corresponds to the pallet or anchor of a watch or similar escapement. When the lever is in its normal position, the tooth 12 engages, under the influence of the spring 11, in the space between the teeth of the wheel 9. When the lever C (which is hereinafter referred to as a pallet) is swung against the influence of the spring 11, the pallet-tooth 12 lets one tooth of the escapement-wheel 9 pass, while the second pallet-tooth 13 engages with the wheel, this tooth 13 in its turn allowing another tooth to pass when the pallet is moved backward by the spring 11. If the teeth are very fine, the carbon-holder A descends to a very slight extent at each swing of the anchor. The long arm of the pallet C constitutes an armature which is attracted by the electromagnet D when the iron core thereof is magnetized by an electric current being passed around it. The coil of this electromagnet (hereinafter referred to as the coil

D) is placed in shunt-circuit between the conductors I and II. A conductor 14 leads from II to the coil D, and from there a conductor 15 leads to an adjustable contact of the binding-screw or terminal 16, insulated from the disk B. In the normal position of the lever C the contact-spring 17 thereof bears against the binding-screw 16, and is therefore in electrical connection with the conductor I through the lever C, pivot *c*, and disk B.

If the current passes through the coil D instead of passing through K′ and K in the shape of an arc, the armature C is attracted by the electromagnet D, the pallet-tooth 12 releases the wheel 9, and the tooth 13 engages it; but at the same time the spring 17 moves out of electrical contact with the binding-screw or terminal 16, the current is interrupted, and the spring 11 begins to act and returns the armature C to its original position. This play continues till the carbons, when starting the lamp, touch each other, and after the lamp is started till the proper distance between the carbons is arrived at. In regular action the current passes, of course, after the arc has been formed, between K′ and K through the rod *b*′ and the conductor II; but between K and *b*′ there are inserted the electromagnetic coils of the device for producing tension in the arc, which device may be described as follows:

From the cross-bar B′ depends a sleeve or socket E. It carries a cross-piece *e*, which, together with the iron cores *e*′ of the coils E′, forms an electromagnet of horseshoe form. The conductors 18 and 19 connect one of the coils with *b*′ and the other with the cross-bar B′, while the coils are connected to each other by a conductor 20. The cross-bar B′ is insulated from the rods *b* and *b*′. The armature of the horseshoe magnet *e*′ *e e*′ is represented by the cross-piece F of the holder for the carbon K, which cross-piece is prevented from turning by pins 21 on the sleeve E. A pin *f* of the cross-piece F slides in the socket E. The metallic contact between the cross-piece F and the pins 21 and the socket E and pin *f* secures efficient electric contact. A spring 23, Fig. 3, the compression or effective strength of which can be regulated by a screw-plug 22, lifts the cross-piece F from *e e*′. A nut 24 on the screw-threaded continuation of the pin *f* limits the upward movement.

The mechanism of the lamp as a whole works in the following manner: At the start the carbons do not touch. Therefore the current passes from the conductor I through B, *c*, C, 17, 16, 15, D, and 14 into II. The armature C is alternately attracted and released and the escapement-wheel 9 and the barrel 6 are rotated, against the influence of the spring 8, by the weight of A and K′. The carbon K′ descends till it touches K. Then the current passes through I, B, 1, 2, A, and the carbons; but at the same time the electromagnet E′ is energized, as the current passes through B′ 19, the two coils E′, wires 20, 18, and rod *b*′ and thence through the conductor II. In consequence the cross-piece or armature F is attracted and the arc strained. Then the lamp is in regular working order. If the distance between the carbons becomes too great, the resistance arising through that causes the current to again pass through the coil D, and the stopping arrangement begins again to play, till the consumption of the carbons is compensated for and the proper distance between the carbons reached.

When the carbons are consumed, the carbon-holder A is raised. Then the spring 8 winds the cord 4 on the barrel 6, the pawl 10 sliding over the teeth of the wheel 9. The stopping arrangement need not therefore be turned backward when replacing old carbons by new ones.

Particular attention is drawn to the fact that in consequence of extreme simplicity of construction nearly all parts of the lamp may be cast, which was impossible in the arc-lamps used hitherto, owing to their complicated regulating mechanism.

Under the term "cord" herein used I include chain or any other flexible connections, these, if metallic, being suitably insulated where necessary.

I claim—

1. In an arc-lamp, the combination with the frame and two carbon-holders thereon, of a drum pivoted on the frame to turn in a horizontal plane, a cord connected to the upper-carbon holder and drum, an escapement-wheel adapted to turn independently of the drum in one direction, means for locking the drum and escapement-wheel together a pallet pivotally mounted on the frame to swing in a horizontal plane, in operative connection with the escapement-wheel, the magnet for operating the pallet and conductors electrically connected with the carbons and magnet; substantially as described.

2. In an arc-lamp the combination with the frame and two carbon-holders therein, a drum pivoted to the frame to turn in a horizontal plane, the escapement-wheel mounted on the pivot of the drum, a cord connected to the upper-carbon holder and drum, an electromagnet mounted on the frame, a pallet or lever with two unequal arms and pivoted to swing in a horizontal plane, the short arm of the lever forming an escapement-pawl and engaging the escapement-wheel, the longer arm of said lever constituting the armature of the magnet, and conductors connected with the carbons and electromagnet; substantially as described.

3. In an arc-lamp the combination with the frame and two carbon-holders therein, a pivot on the frame, the drum on the pivot, a spring connecting the drum and pivot, an escapement-wheel on said pivot, formed with two sets of teeth, a pawl carried by the pivot and engaging one set of teeth of the escapement-

wheel to hold it in operative connection with the drum, a cord connecting the upper-carbon holder and drum, a pallet or lever pivoted on the frame to swing in horizontal plane, having one short and one long arm, the short arm forming an escapement-pawl and engaging the other set of teeth of the escapement and the long arm constituting the magnet-armature, the electromagnet in shunt, and conductors electrically connected with the carbons and magnet; substantially as described.

4. In an arc-lamp the combination with the frame and two carbon-holders movable therein of a pivot on the frame a drum on the pivot a spring connecting the drum and pivot an escapement-wheel in operative connection with the drum a cord connecting the upper-carbon holder and drum a pallet engaging the escapement-wheel an electromagnet operating the pallet an armature on the lower carbon-holder a guide and stop for this armature an electromagnet on the frame and a spring in the guide for moving said armature in respectively opposite directions a nut adjustment for the spring and conductors electrically connected with the carbons and electromagnets.

In witness whereof I have hereto set my hand in the presence of the two subscribing witnesses.

EUGEN HUGO ARTHUR HEINRICH
RITTER VON NOLLENDORF.

Witnesses:
JOHN KAFKE,
ROYNSTAR YOKOF.