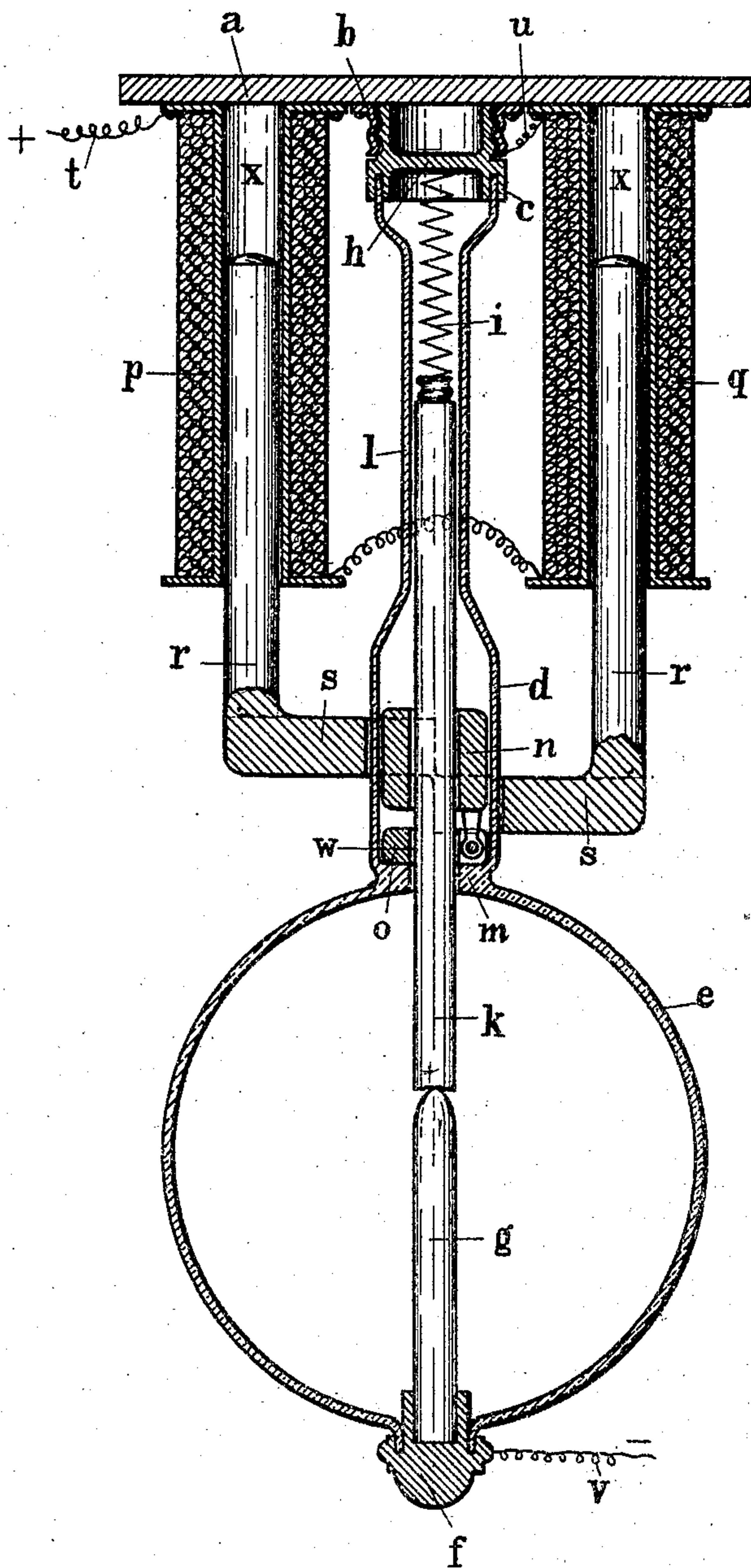


No. 774,836.

PATENTED NOV. 15, 1904.

H. EMONDS.
VACUUM ARC LAMP.
APPLICATION FILED JAN. 30, 1904.

NO MODEL.



Witnesses.
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HUBERT EMONDS, OF AIX-LA-CHAPELLE, GERMANY.

VACUUM ARC-LAMP.

SPECIFICATION forming part of Letters Patent No. 774,836, dated November 15, 1904.

Application filed January 30, 1904. Serial No. 191,395. (No model.)

To all whom it may concern:

Be it known that I, HUBERT EMONDS, electrician, a subject of the King of Prussia, Emperor of Germany, residing at No. 48 Loth-ringerstrasse, Aix-la-Chapelle, in the King-
5 domain of Prussia, Empire of Germany, have in-
vented certain new and useful Improvements
in Vacuum Arc-Lamps with External Air-
Cushioned Carbon-Regulating Devices; and I
10 do hereby declare the following to be a full,
clear, and exact description of the invention,
such as will enable others skilled in the art to
which it appertains to make and use the same.

My present invention relates to arc-lamps,
15 and particularly to that class thereof especially
designed for very lengthy burning periods
and provided with an hermetically-closed
chamber containing a good vacuum, in which
chamber the carbon electrodes, as well as the
20 electromagnetic device for holding the upper
carbon electrode, are suitably arranged. In
this new arc-lamp the solenoids do not influ-
ence the soft-iron core surrounding the upper
carbon electrode within the vertical extension
25 of said closed chamber directly; but instead
of it these solenoids operate an annular pole-
piece surrounding said vertical extension of
the closed chamber, which annular pole-piece
in turn magnetically influences the incased
30 core. By means of this arrangement it is pos-
sible to retard the upward movement of the
annular pole-piece by the aid of air-cushions
in such a manner as to prevent the rupturing
of the arc of light formed upon sending the
35 electric current through the solenoids or elec-
tromagnetic coils.

The accompanying drawing shows a verti-
cal sectional view of the diagrammatically-
represented new arc-lamp.

40 To the mounting *a* is suitably secured the
metallic casing *b*, provided with inside thread
for the reception of the threaded upper part
of the metallic cap *c*, secured to the upper end
of the vertical extension *d* of the chamber *e*.
45 This extension *d* may either form an integral
part of said chamber, as shown here, or it
may be secured thereto in any suitable man-
ner and made of material differing from the
material of the chamber *e*. The bottom of
50 the latter is suitably closed by a plug *f*, sup-

porting the lower carbon electrode *g*. To the
web *h* of the cap *c* is attached the one end
of a helical spring *i*, while the other end there-
of is secured to the upper end of the upper
carbon electrode *k*, guided by the narrow neck 55
l of the vertical extension *d* and by the shoul-
der *m*, formed at the junction of the chamber
e and its vertical extension *d*, in which is ar-
ranged the soft-iron core *n* of annular shape,
surrounding the upper carbon electrode *k*. 60
The core *n* is provided with a clutch *o*, hinged
to the under side thereof for taking hold
of the upper carbon electrode *k* at the op-
portune moment. To the under side of the
mounting *a* are also secured the solenoids or 65
electromagnetic coils *p* and *q*, within which
play the vertical projections *r* of the annu-
lar pole-piece *s*, inclosing the vertical ex-
tension *d* of the chamber *e* directly opposite
to the inclosed core *n* and shaped, as shown, to 70
break the lines of magnetic force. As these
projections *r* act as cores to the electromag-
netic coils, they will draw the annular pole-
piece *s* upward as soon as an electric current
is sent through the lamp, which current upon 75
entering the electromagnetic coil *p* by way
of the wire *t* will flow through this coil *p*,
pass over to the other electromagnetic coil *q*,
thence by way of wire *u* to the metallic cas-
ing *b*, from where it is led, by means of the 80
metallic cap *c* and helical spring *i*, to the up-
per carbon electrode *k* and after bridging
the space between the latter and the lower
carbon electrode and forming the arc of light
will flow through the last-named electrode 85
and thence back to the circuit-line *v*.

As soon as the electric current is sent
through the lamp, as indicated above, the pro-
jections *r* will be magnetized and drawn up-
ward and at the same time influence the soft- 90
iron core *n* in such a manner as to compel it
to execute the same upward motion as the an-
nular pole-piece *s* is forced to make on ac-
count of being connected with said projec-
tions *r*. As soon as the core *n* begins to 95
move upward the clutch *o* thereof will assume
an inclined position, because of being hinged
at one side to the core *n* and having a bore *w*
larger in diameter than the upper carbon
electrode *k*, surrounded by said clutch. As 100

the upward motion of the core *n* continues a part of the upper edge of the bore *w* and also a part of the under edge thereof will take hold of the carbon electrode *k* and lift it
 5 bodily upward, whereby the arc of light is formed. To prevent the rupture of the arc of light by a sudden motion of the upper carbon electrode, the projections *r* are arranged and work within the electromagnetic coils *p*
 10 and *q* in such a manner that between the upper ends of said projections *r* and the under side of the mounting *a* air-cushions *x* are formed capable of energetically retarding the upward motion of said projections *r*, and consequently of the pole-piece *s*. As the soft-iron core *n* surrounds and carries the upper carbon electrode by means of its clutch *o*, it is of course compelled to retard its upward motion too, thereby preventing with absolute
 20 certainty the rupture of the newly-forming arc of light.

As the carbon electrodes of this class of arc-lamps wear off very slowly, because of being arranged within a chamber containing a vacuum,
 25 the position of the upper carbon electrode will change but very slowly on account of the slow combustion of this upper carbon electrode; but as soon as the lower edge of the clutch *o* touches the shoulder *m* of the chamber *e* the clutch *o* will drop the carbon electrode and assume the position shown in the drawing, thus permitting the upper carbon electrode to contact again with the lower carbon electrode and then be quickly elevated
 30 again to its former position in a manner well known.

Upon cutting off the electric current the core *n* will become demagnetized and drop, whereby the upper carbon electrode and the
 40 clutch *o* will become disengaged, as described above, thus permitting the contact of the carbon electrodes with each other. The raising of the upper carbon electrode will take place in the manner described before as soon as the
 45 electric current is admitted again to the electromagnetic coils.

I do not desire to limit myself to the precise construction and arrangement of parts shown, as it is obvious that various modifica-

tions may be made without departing from 50 the spirit of my invention.

I claim—

1. In an arc-lamp, the combination of an inclosing chamber for the upper and lower electrodes, an armature and clutch mechanism for 55 the upper electrode in said inclosing chamber, and electromagnetic means comprising a movable pole-piece held in proximity to an inclosing chamber including an armature and clutch mechanism, as and for the purpose described. 60

2. In an arc-lamp, an inclosing chamber for the electrodes, an armature and clutch mechanism for one of said electrodes within said chamber, and electromagnetic means without said chamber comprising a solenoid having a 65 movable pole-piece for actuating said clutch mechanism, as and for the purpose described.

3. In an arc-lamp in combination, a closed chamber containing the electrodes, an extension on said chamber acting as a guide for the 70 upper carbon, and a carrier for the clutch mechanism, a solenoid, a movable core therefor, provided with an extension constituting a movable pole-piece in proximity to the extension of the inclosing chamber, a soft-iron 75 armature guided in said extension, and moving with the movable pole-piece, and a clutch carried by said armature, as and for the purpose described.

4. In a vacuum arc-lamp, a closed chamber 80 containing the electrodes, a clutch for one of said electrodes, an armature connected to said clutch and guided within the said closed chamber, electromagnetic means without said chamber comprising a movable pole-piece for actuating the clutch-armature, and moved responsively to changes in the lamp-circuit, and means for retarding the movement of the movable pole-piece, as and for the purpose described. 90

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUBERT EMONDS.

Witnesses:

HENRY QUADFLIEG,
 E. M. BRUNDAGE.