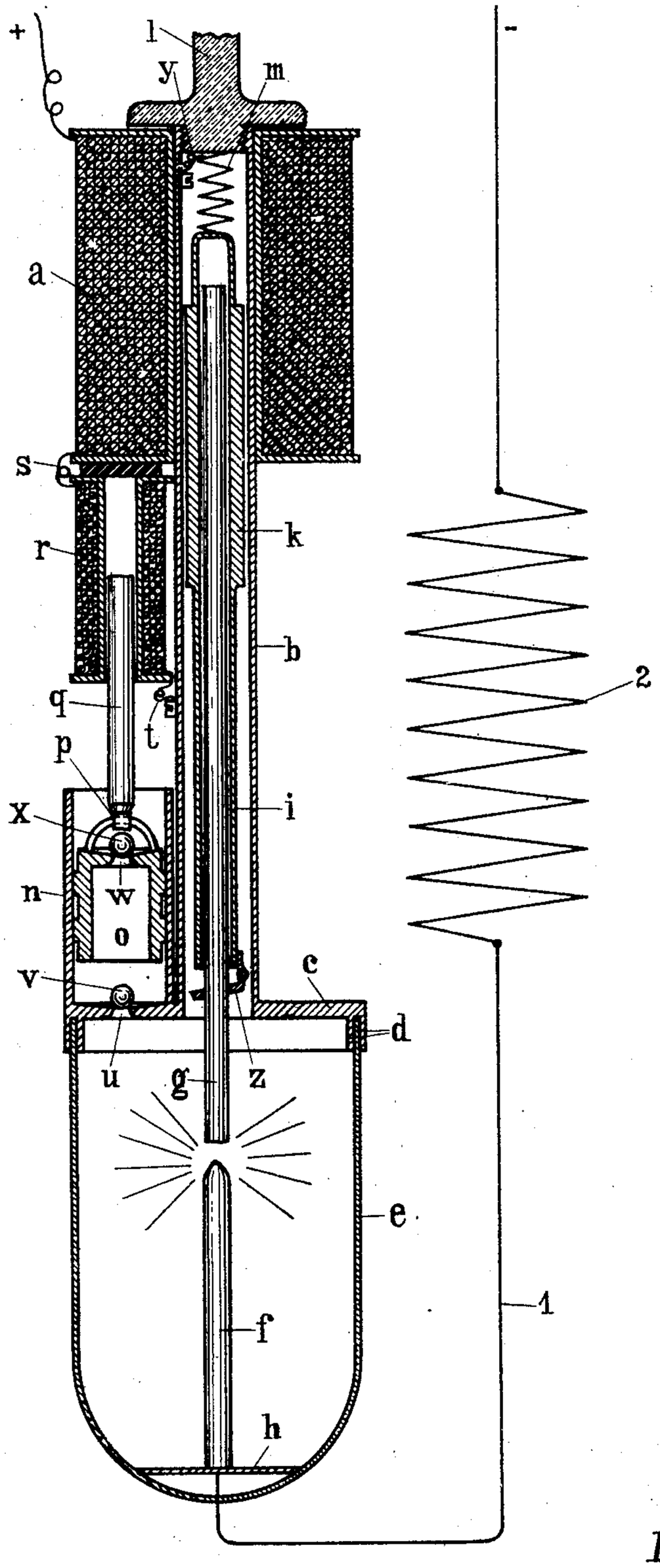
No. 745,427. PATENTED DEC. 1, 1903.

H. EMONDS.

ELECTRIC ARC LAMP.

APPLICATION FILED MAY 14, 1903.

NO MODEL.



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No. 745,427. Patented December 1, 1903.

UNITED STATES PATENT OFFICE.

HUBERT EMONDS, OF AIX-LA-CHAPELLE, GERMANY, ASSIGNOR TO BRÜSSEL-AACHENER GLAS-MANUFACTUR LEYMANNS & KEIM, OF AIX-LA-CHAPELLE, GERMANY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 745,427, dated December 1, 1903.

Application filed May 14, 1903. Serial No. 157,062. (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 48 Lothringerstrasse, Aix-la-Chapelle, in the Kingdom of Prussia, Empire of Germany, have invented certain new and useful Improvements in Arc-Lamps with Oxygen-Pumps; and I 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, and particularly to that class of arc-lamps especially designed for very lengthy burning periods.

One of the objects of my invention is to provide means wherewith to effectually remove the superfluous oxygen usually accumulating in the glass casing surrounding the carbons during a time of disuse, whose presence retards the formation of the arc of light and causes the flickering of the latter when formed.

Another object of the invention is to provide means to prevent the breaking of said glass casing in case an explosion of the accumulated gases should take place when sending the electric current through the lamp.

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

In arc-lamps especially designed for very lengthy burning periods superfluous oxygen will accumulate in the glass casing surrounding their carbons on account of the imperfections in the construction of their fittings, which, being manufactured in large quantities, are not as effectually excluding the air as desirable. When under these conditions the arc-lamp is connected with a circuit, the arc of light will soon be interrupted on account of the expansion of the heated oscillating air in said glass casing, thus causing the flickering of the light. The explosions spoken of above are another great drawback to this class of lamps as at present constructed and are caused by the ignition of the gases which usually are accumulating during a prolonged disuse of such lamps and which when taking place are with rare exceptions destroying the glass casing surrounding the carbons. To avoid all these drawbacks, the following construction is made use of.

An electromagnetic coil *a* is connected with the tube *b*, carrying on its lower end a disk *c*, by whose annular double flange *d* is held the open end of the glass casing *e*, thus forming an hermetically-closed chamber around the carbons *f* and *g*, of which the lower one, *f*, is placed upon the base *h*, arranged within the glass casing *e*, whereas the upper carbon *g* is surrounded and held by a tube *i*, carrying the soft-iron core *k* and suspended from the screw-plug *l* of any insulating material by means of a helical spring *m*, whose other function will be more fully explained later on. Upon the disk *c* is mounted a pump-cylinder *n*, and in the latter a plunger-piston *o* is arranged and movably connected at *p* to the heavy rod *q* of very soft iron entering the electromagnetic coil *r*, placed in alinement above the cylinder *n* and connected, on the one hand, by the wire *s* to the coil *a*, and, on the other hand, by the wire *t* to the tube *b*. Directly beneath the plunger-piston *o* the disk *c* is provided with an opening *u*, which under normal condition is closed by the ball-valve *v*. To let the latter under all conditions find its seat, that part of the surface of the disk *c* inclosed by the cylinder *n* is sloping downwardly to the opening *u*. In a similar manner the top of the plunger-piston *o* is provided with an opening *w*, capable of being closed by the ball-valve *x*. When now the electric current is admitted to the electromagnetic coil *a*, it will flow through the latter, from thence by way of wire *s* to the coil *r*, and reach the tube *b* by means of the wire *t*. The tube *b* will lead the current to the wire *y*, connecting the tube *b* with the helical spring *m*, attached to the upper end of the tube *i*, whose lower end is provided with a hinged catch *z*, surrounding and holding the upper carbon *g* by means of its one-sided attachment to the tube *i*, thereby transmitting the electric current to the carbon *g*, from whence it is passing to the carbon *f*, wire 1, and resistance-coil 2, and from thence back to the circuit-line.

As soon as the electric current is flowing, as indicated above, the core *k* and the rod *q*, acting as core to the coil *r*, will be drawn up-

ward through the influence of the electromagnetic coils *a* and *r*, respectively, whereby the motion of the core *k* causes the carbon *g* to ascend, thus establishing the arc of light between the points of the carbons *f* and *g*, whereas the upward motion of the rod *q* causes the plunger-piston *o* to ascend, which in turn will draw the ball-valve *v* upward, and thereby remove the superfluous amount of oxygen which may have accumulated in the glass casing during the time of disuse of the arc-lamp. The ball-valve *x* remains, of course, seated during the upward motion of the plunger-piston *o*, so that the volume of oxygen removed from the interior of the glass casing *e* will be held between the disk *c* and the hollow plunger-piston *o* as the ball-valve *v* is closing the opening *u* the instant the carbon *g* has been sufficiently raised to establish the arc of light. As soon as the superfluous oxygen has been effectually removed in the way described above normal conditions between oxygen and nitrogen are established within the glass casing and an extremely steady light secured. Upon cutting off the electric current the carbon *g* will drop down and contact with the lower carbon *f*, whereby the catch *z* may loosen and regain its hold upon the carbon *f* in any suitable manner in order to be ready to raise the latter when the current is again admitted to the coil *a*. Simultaneously with the dropping of the core *k* the rod *q* of the plunger-piston *o* is given free by the electromagnetic coil *r*, causing the plunger-piston *o* to drop to the bottom of the cylinder *n*, whereby the ball-valve *x* will be opened to let the oxygen filling the space between both ball-valves escape into the atmosphere.

Besides establishing the arc of light far quicker than hitherto and securing a very steadily burning light by removing the superfluous oxygen from the interior of the glass casing *e*, the burning period of the arc-lamp is considerably prolonged.

If for certain sizes of arc-lamps one pump should prove to be insufficient, two or more of them may be provided. In case the gases collecting within the glass casing during the disuse of the arc-lamp should be present in such proportions that upon the formation of the arc of light an explosion is taking place the two ball-valves, acting for the time being as simple relieve-valves, will be opened through the pressure created by the explosion and let the products of explosion escape into the atmosphere without endangering the glass casing in the very least, which hitherto under similar conditions was destroyed with very rare exceptions.

I do not desire to limit myself to the precise constructions and arrangements shown, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim—

1. In an arc-lamp of the class described, the combination with the closed chamber surrounding the lamp-carbons of an electromagnetically-operated oxygen-pump comprising a pump-cylinder; a valve to establish communication between the interior of said closed chamber and said pump-cylinder, a plunger-piston within said pump-cylinder; a valve in the top of said plunger-piston to establish communication between the interior of said plunger-piston and the atmosphere; an electromagnetic coil in electric connection with the means causing the vertical motion of the upper carbon and with the means conducting the electric current from said electromagnetic coil to said upper carbon; and a plunger-piston rod operated by said electromagnetic coil.

2. In an arc-lamp of the class described, the combination with an electromagnetic coil of a conducting-tube partly surrounded by said coil; a screw-plug hermetically closing the upper end of said tube; a lamp-carbon arranged in said tube and operated by said electromagnetic coil; a double-flanged disk on the lower end of said tube; a glass casing held by the double flange of said disk; a second lamp-carbon arranged within said glass casing; a pump-cylinder mounted upon said disk; a valve for establishing communication between the interior of the glass casing and said pump-cylinder; a plunger-piston in said pump-cylinder; a valve in said plunger-piston for establishing communication between the inside of the plunger-piston and the atmosphere; a second electromagnetic coil electrically connected with the first-mentioned electromagnetic coil and with the tube partly surrounded by the latter; and a rod movably secured to said plunger-piston and operated by said smaller electromagnetic coil.

3. In an arc-lamp of the class described, the combination with an electromagnetic coil causing the motion of the upper lamp-carbon of a tube partly surrounded by said coil; an insulating screw-plug hermetically closing the upper end of said tube; a smaller tube within the first-named tube; a hollow core forming part of the smaller tube and capable of being influenced by said electromagnetic coil when the latter is energized; a hinged catch at the lower end of said smaller tube, a carbon within the latter held by said catch; an elastic connection between the upper end of said smaller tube and said screw-plug; an electric conductor between said larger tube and said elastic connection; a flanged disk on the lower end of the larger tube; a glass casing held by said flanged disk; a base placed within said glass casing; a carbon supported by said base; an electric conductor passing through said glass casing and connected with said base; an oxygen-pump placed upon said flanged disk and communicating with the interior of said glass casing, and a second electromagnetic coil operating said oxygen-pump and electrically connected

with the first-named coil and the larger tube surrounded by it.

4. In an arc-lamp of the class described, the combination with the means for operating the upper lamp-carbon of a tube partly surrounded by said carbon-operating means and closed on its upper end; a lamp-carbon within said tube; means for moving said lamp-carbon; means for sustaining said lamp-carbon within said tube; an hermetically-closed chamber suspended from the lower end of said tube, a second lamp-carbon arranged within and supported by said closed chamber; an oxygen-pump mounted upon the top of said closed chamber and communicating with the interior thereof; a second electromagnetic coil for operating said pump and electrically connected with the means operating the upper lamp-carbon and with the tube surrounding the latter.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HUBERT EMONDS.

Witnesses:
HENRY QUADFLIEG,
D. J. REUTER.