(No Model.)

H. SEDLACZEK, F. WIKULILL & S. SCHUCKERT.

ELECTRIC LAMP.

No. 264,346. Patented Sept. 12, 1882.

Fig. 1**

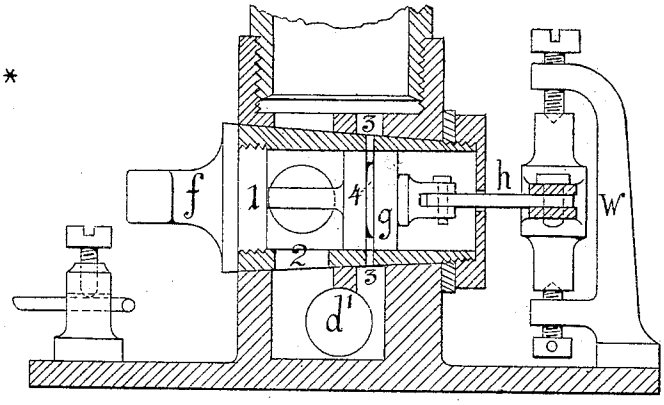


Fig. 1
Section p p

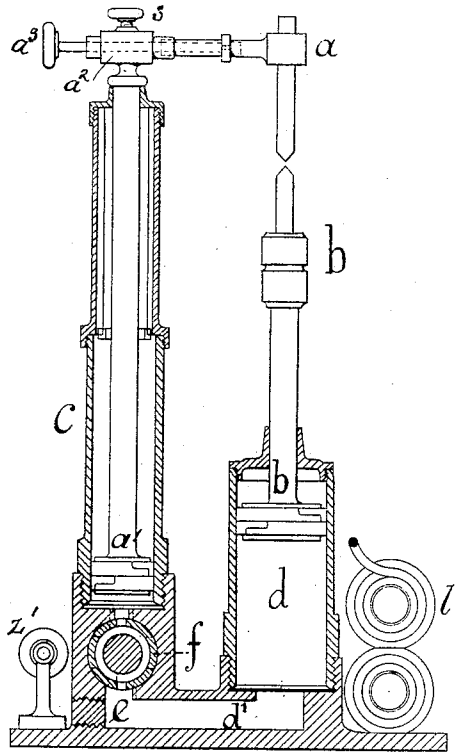
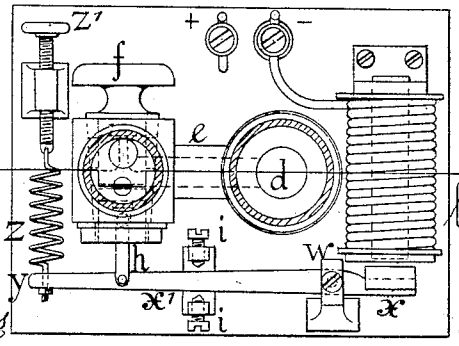


Fig. 1*



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UNITED STATES PATENT OFFICE.

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ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 264,346, dated September 12, 1882.

Application filed January 19, 1882. (No model.) Patented in Germany June 6, 1879, No. 8,580; in France June 11, 1879, No. 131,152; in Belgium June 12, 1879, No. 48,449, and April 20, 1881, No. 54,426; in Austria-Hungary August 6, 1879, No. 19,078, and October 28, 1879, No. 29,952, and in England April 12, 1881, No. 1,590.

To all whom it may concern:

Be it known that we, HERMANN SEDLACZEK and FRANZ WIKULILL, of Leben, Austria, and SIGMUND SCHUCKERT, of Nuremberg, Bavaria, Germany, have invented a new Improvement in Electric Lamps, of which the following is a specification.

This invention relates to an electric lamp the electrodes of which are so arranged as to be movable in vessels communicating with each other at their lower parts and filled with a suitable liquid. The communication of the vessels with each other and the height of the liquid in each vessel are regulated by a piston or equivalent device connected with an armature and electro-magnet, as below described. The novel construction of the lamp enables it to resist the most violent shocks and oscillations, which renders it especially suitable as a lamp for ships and locomotives.

With reference to the accompanying drawings, Figures 1, $1^{\times}$, and $1^{\times\times}$ represent a lamp embodying the present invention.

The two holders *a* and *b* of the carbon points of the electric lamp are each carried by a piston or equivalent device. The pistons move in the two vessels *c* and *d*, filled with the liquid and communicating with each other, while the weight of the upper carbon holder *a* is so proportioned to that of the lower one, *b*, that when the upper-carbon holder *a* sinks with its piston in the vessel *c* the liquid is forced into the other vessel, *d*, and the lower-carbon holder *b* is thus caused to rise. In the connecting-passage *e* between the two vessels there is arranged a cock, a valve, or a piston, or other suitable device for closing and opening the communication of the liquid between the two vessels *c* and *d*, connected with the two carbon-holders, and for otherwise regulating the distance between the carbon points. Thus, when the lamp is to be lighted the preliminary voltaic arc may be produced by closing the communication with the vessel *c*, with which the upper-carbon holder *a* is connected, and exhausting the fluid from the other vessel, *d*, thus causing the lower-carbon holder *b* to sink. Vice versa, the upper-carbon holder *a* may be caused to rise by means of the said piston or equivalent device by closing the opening passing to the vessel *d* of the lower-carbon holder *b* and forcing the liquid into the vessel *c* of the upper-carbon holder *a*. The same device serves for causing the upper-carbon holder *a* to rise at the same time as the lower one, *b*, is made to descend for the purpose of producing the voltaic arc. The upper-carbon holder *a* is connected to the head of its piston-rod *a'* through the medium of a handled rod, a^3, passing through a sleeve, a^2, on the piston-rod, so that the holder *a* may be adjusted horizontally to bring the upper carbon in line with the lower one, being secured after adjustment by a set-screw, *s*.

For the purpose of making this lamp with magneto-regulation applicable for ships and locomotives, the same is provided with the peculiar construction of armature-lever to be described hereinafter, and which construction is intended to obviate the disadvantages inherent in all lamps generally known, and which arise from the fact that there is too great a difference between the magnetic force of the regulating electro-magnet at the time of the normal length of the voltaic arc and at the time when the feeding forward of the carbon points takes place. Owing to this large variation in resistance the regulation of the lamp is difficult, because the counteracting spiral spring cannot always be adjusted in proportion to such resistance. Attempts have been made to remove this difficulty by placing the armature at a considerable distance from the electro-magnet, so as to insure a considerable movement of the parts which operate the regulating mechanism. These necessary requirements are attained by this invention even with the smallest play of the armature (which in this arrangement takes place in magnetic field of almost constant power) by making the lever-arm *x* of the armature short and the lever-arm *x'* of the counteracting spiral spring *z* proportionately long, as well as by giving to the regulating portion of the lamp (such as piston and valves) a point of attachment to the longer lever-arm *x'*, which insures a steady and sufficient action.

The distance of the point of attachment of the spiral spring from the fulcrum-pin *w* of the armature-lever, as well as its dimensions and elasticity, will be arrived at by setting forth as an axiom that the magnetic forces are in inverse proportion to each other as the squares of their distances. In addition to this attention to the relations of the several parts in order to insure the proper working of the lamp, the armature-lever *x x'* is mounted in such a manner that it will be movable on a vertical axis, and in this position it will act efficiently, even during the most severe shocks and shakings. The spiral spring *z* is of a size so as to approximately equilibrate the largest and smallest strain of the armature. Its point of application is adjusted by means of the adjusting-screw *y* and its resilient force by the screws *z'* in such a manner that with a certain electric arc—that is to say, with a certain amount of current—the armature and the spring-tension will counterbalance each other in every position. Every change of the strength of current will cause either a preponderance or a yielding of the spiral spring.

The channel *e*, which connects the spaces below the piston, is filled with a suitable fluid.

The communication between the two cylinders can be either formed or broken off by means of a cock or by means of the piston *g* working therein. For this purpose the cock *f* has an opening bored through it, which, in a certain definite position of the same, causes communication to be made without shock between the two cylinders. In another position of the cock—for instance, in that shown in the drawings at Fig. 1××—the space 1 at the rear of the piston *g* is in connection, by means of the hole 2, with the channel *d'* and the cylinder *d*. Besides this, the two cylinders *c d* in the position of the piston shown in the drawings communicate with each other by means of the holes 3 and a groove, 4, turned in the piston. The piston *g* is connected by means of a link, *h*, with the longer end of the above-described double lever. The stroke of the piston is fixed by the adjusting-screws *i i*.

The operation of the lamp is as follows: As soon as a sufficiently-powerful electric current passes through the coil of the electro-magnet *k* and the carbons (then in contact) the armature *l*, when properly adjusted by the above-described arrangement of the spiral spring *z*, will be attracted, whereby the piston *g*, by means of the link *h*, will be drawn backward and the holes 3 3 of the cock *f* will be closed. On the other hand, however, the space 1 at the rear of the piston is increased, which causes the piston in the vessel *d* to fall and produces the voltaic arc. As the carbons are consumed the attractive force of the electro-magnet becomes diminished until the same is overbalanced by the spiral spring, the piston *g* gradually returns to its original position, and the communication between both cylinders *c* and *d* by means of the groove 4 in the piston *g* is established, whereby the carbon points approach each other to such an extent that the armature *l* is again attracted and the communication between the two cylinders *c* and *d* is again closed. The same process is repeated during the entire working.

It will be understood that similar arrangements (with slight modifications) can be employed either for direct or alternating currents; but in the latter case, if the light is to be kept in one position, the two cylinders must be of the same diameter.

It is evident that without departing from the substance of this invention the pistons carrying the carbon-holders *a* and *b* may be dispensed with by forming the carbons so that their ends will pass through stuffing-boxes into the liquid.

It is also evident that, without departing from the substance of this invention, the purposes of the cock *f* and piston *g* may be attained by equivalent devices, such as valves or sacks or other arrangements adapted for opening and closing the communication between the two vessels *c* and *d* and for varying the level of the liquid therein.

We claim—

1. An electric lamp having two vessels containing liquid and communicating with each other, electrodes or carbon-holders movable in said vessels, and a valve regulating the communication between said two vessels, whereby the descent of one electrode causes the ascent of the other, all substantially as set forth.

2. The combination of carbon-holders and their pistons with vessels *c d*, communicating passage *e*, and regulating-valve between the said vessels.

3. The combination of electrodes or carbon-holders and communicating vessels in which said electrodes or holders move with intermediate regulating-valve, electro-magnet, and armature controlling said valve, substantially as described.

4. The combination of two vessels and electrodes or carbon-holders moving therein with communicating passage, cock *f*, piston *g* therein, and electro-magnet and armature controlling said piston.

5. The combination of communicating vessels having passages *e d'*, and electrodes or carbon-holders, with cock *f*, having holes 2 3, and piston *g*, having groove 4, all substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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