(No Model.) 2 Sheets—Sheet 1.

V. V. GOLITZINSKY & P. O. RYMASCHEFFSKI.

ELECTRIC ARC LAMP.

No. 343,811. Patented June 15, 1886.

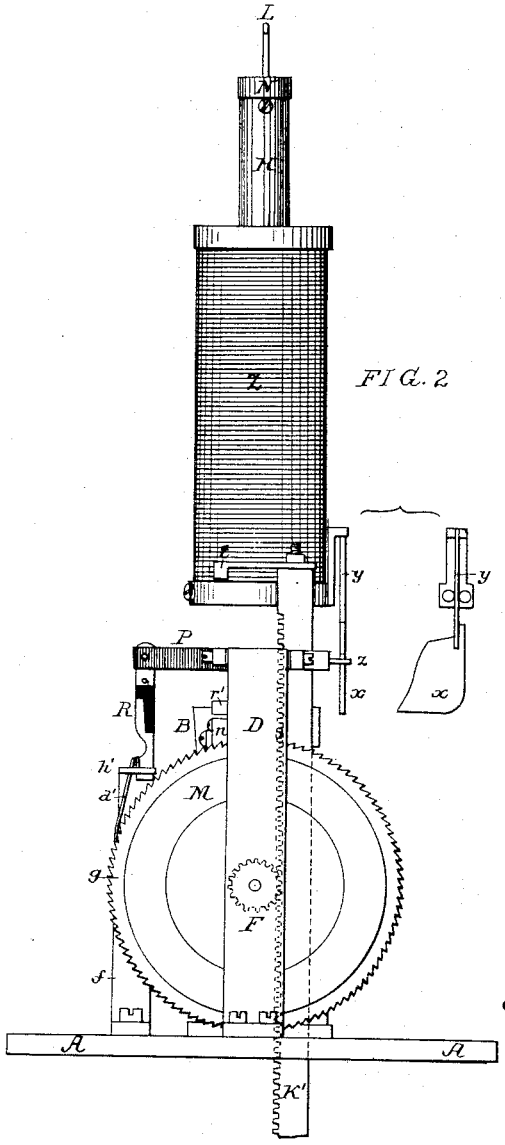

FIG. 2.

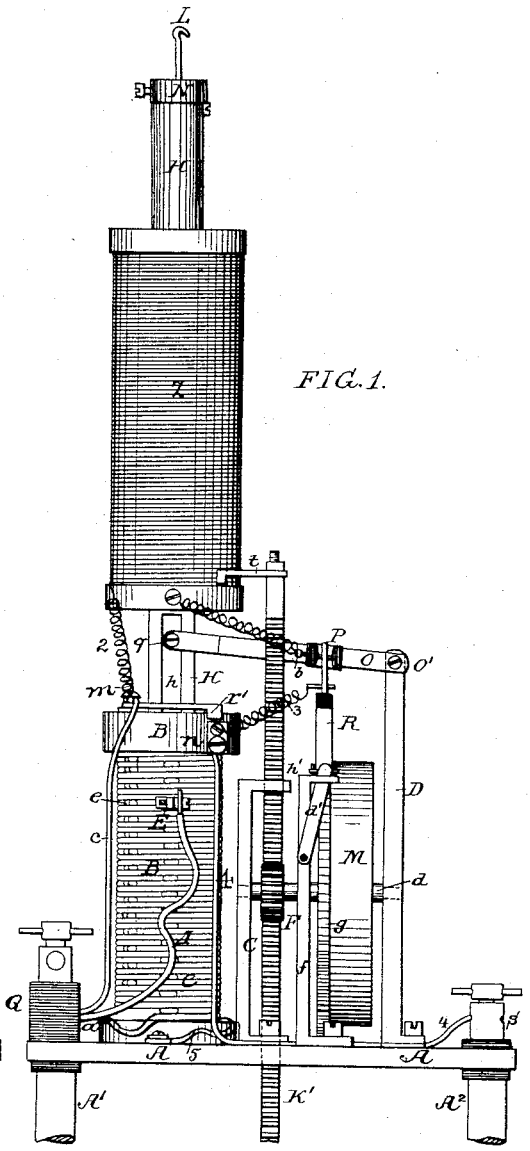

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

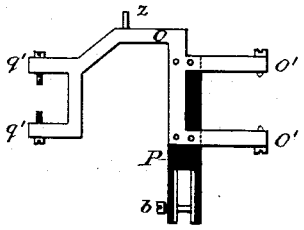

FIG. 4.

FIG. 5.

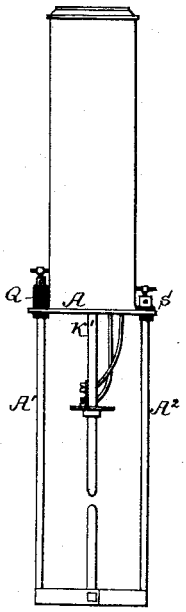

FIG. 6.

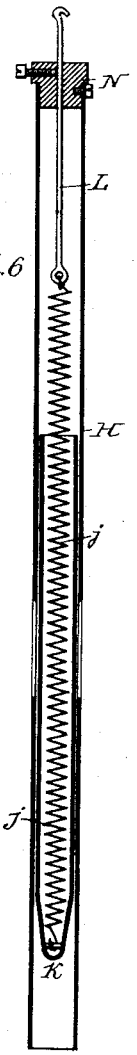

FIG. 7.

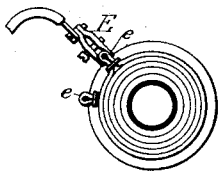

FIG. 9.

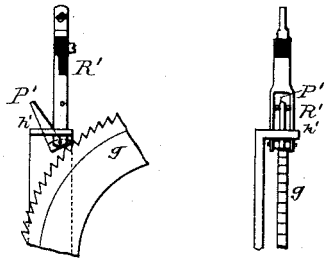

FIG. 8.

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UNITED STATES PATENT OFFICE.

VALERIAN V. GOLITZINSKY AND PAUL O. RYMASCHEFFSKI, OF MOSCOW, RUSSIA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 343,811, dated June 15, 1886.

Application filed July 7, 1885. Serial No. 170,912. (No model.) Patented in France May 23, 1885, No. 169,125; in England May 23, 1885, No. 6,371; in Germany June 6, 1885; in Belgium June 23, 1885, No. 69,370, and in Austria-Hungary August 11, 1885, No. 20,810 and No. 42,042.

To all whom it may concern:

Be it known that we, VALERIAN V. GOLITZINSKY and PAUL O. RYMASCHEFFSKI, subjects of the Czar of Russia, and both residing at Moscow, Russia, have invented certain Improvements in Electric-Arc Lamps, of which the following is a specification.

Our invention consists in certain improvements in the construction of electric-arc lamps, as fully described and claimed hereinafter.

In the accompanying drawings, Figure 1 is a side view of sufficient of the regulating mechanism of an electric-arc lamp to illustrate our invention. Fig. 2 is an end view. Fig. 3 is a plan view of a portion of the device. Fig. 4 is a side view of another portion. Fig. 5 is an outside view, drawn to an enlarged scale, of a complete lamp. Fig. 6 is a sectional view, drawn to the same scale as Figs. 1 and 2, of a portion of the lamp. Fig. 7 is a sectional plan illustrating one of the features of our invention. Fig. 8 is a plan view of another feature, and Fig. 9 illustrates in side view and end view a modification.

A is the metal cross-plate which supports the regulating mechanism, and to which the side bars, A′ A², of the frame of the lamp are connected, although insulated therefrom. This cross-plate carries two solenoid-coils, B and Z, the lower coil, B, being of coarse wire in the main circuit, while the upper coil is of fine wire in the shunt-circuit. The upper coil is supported by a tube, H, passing centrally through it and through the lower coil. On the plate A is also supported a standard, C, Fig. 1, which serves as a guide for the rack K′, to the lower end of which is fixed the holder for the upper carbon, Fig. 5. On the plate A is also supported another standard, D, and in this and the standard C is mounted a horizontal shaft, *d*, carrying a large locking or ratchet wheel, *g*, a fly-wheel, M, and a small pinion, F, which last gears into the rack K′.

Within the tube H, which supports the two coils B and Z, is mounted a movable tubular iron core, J, which is suspended by means of an internal spiral spring, *j*, Fig. 6, from a rod, L, which is adjustably secured in the plug N at the upper end of the tube H. The lower end of the spring is connected to an eye, *k*, at the lower end of the tubular core J. Two longitudinal slots, *h*, are made in the tube H between the two coils B and Z, for the passage of the two screws *q′*, by means of which the tubular core J is hinged to a forked lever, O, Fig. 3. This forked lever O is pivoted, by means of screw-points *o′*, to the upper end of the standard D. To this lever O, at a distance of about one-third its length from its pivoting center, is fixed a small plate, P, of insulating material, and from the end of this plate is suspended vertically a latch or pawl, R. This latch, as shown in Fig. 4, is in three parts, the intermediate part being of insulating material, so that there is no metallic connection between the top and bottom of the latch or pawl. The upper end of this pawl has a small piece of platinum, *r*, Fig. 4, fixed therein, with a square or other suitably-shaped hole, through which passes a platinum pin, *b*, carried by the end of the insulating-plate P, this platinum pin being somewhat smaller than the hole in the piece *r*, so that it can have some vertical play therein. The lower portion of the latch R is adapted to and to a certain extent confined in the slotted flange *h′* of the standard *f*, carried by the cross-plates A. The side of the latch R, as shown in Figs. 2 and 4, away from the wheel *g* is curved or recessed in such a way that while a wire soldered to the upper end of the spring *d′*, bearing against two upright pegs on the flange *h′*, will allow the latch to push downward on the ratchet-wheel *g*, the spring will keep the said latch in contact with the teeth of the wheel. In connection with this lever O, controlling the described feed mechanism, I provide a friction device which consists of a spring, *y*, fixed in the present instance to the lower part of the bobbin Z, and carrying at its lower end a curved plate, *x*, against the inclined face of which is adapted to bear a pin, *z*, on the side of the lever O. The lower end of this weighted plate *x* is cut on an angle to form a frictional surface for the pin *z* to bear against, while its upper part is cut on a curve corresponding with the line of movement of the said pin *z*. In some cases, where the current from the dynamo which supplies the lamps is not uniform, this frictional device may be replaced by the usual

glycerine or other dash-pot. The coarse wire coil B is wound somewhat differently from the usual method, in that the outer layer of wire is so arranged that a loop or eye, *e*, is formed at every turn, Figs. 1 and 7, and the insulation removed from the loops or eyes. A clamp, E, is provided to be connected to any one of these bared loops, according to the number of windings of the solenoid D it is desired to include in the circuit, for by thus connecting the conductor 1 to one or other of these loops more or fewer of the coils of the solenoid D may be included in the main circuit, and its action thus effectually regulated. The remaining portions of the lamp, including the carbon-holders, contacts, globes, &c., may be constructed in any usual manner. One of the binding-posts, Q, is insulated entirely from all parts of the frame, while the other, S, is insulated from the cross-plate A, but is metallically connected to the post A^2, and in electrical communication with the lower-carbon holder. From the insulated post Q leads a conductor, 1, to the above-described clamp E on the lower solenoid where it is desired to cut out some of the coils, but the direct connection to the terminal of the lower solenoid is through the wire *a*, while the other terminal of the same coil is electrically connected at 5 to the plate A. A third conductor, *c*, leads to a metallic plate, *m*, and from there through the conductor 2 to one terminal of the upper fine-wire coil, Z. The other terminal of this fine-wire coil is connected to a pin or screw, *b*, on the insulated plate P, from which the pawl R is suspended. A flexible conductor, 3, leads from the upper portion of this pawl R to a plate, *n*, Fig. 1, which is connected through the conductor 4 with the binding-post, S. A spring-contact, *r'*, is fixed to the metallic plate *n* in such a position as to be pressed on by an arm, *t*, at the upper end of the rack K' when the latter is distended to its lowest position, so as to thereby close the shunt-circuit around the lamp and cut the latter out.

The operation of the lamp is as follows: The weight of the rack K' and carbon acting on the pinion F overcomes the action which the weight of the pawl R and lever O with the solenoid core G exercises on the locking-wheel *g*, for it will be remembered that the principal part of the weight of the core J is counterbalanced by the spring *j*. By this means the carbons will normally tend to touch each other, and if there is no carbon the rack will sink to its lowest position and bring the bar *t* into contact with the plate to close the shunt-circuit between the binding-posts Q and S, the conductor *c*, plates *r'* and *n*, and conductor 4. When the carbons are adjusted, and the current is supplied to the lamp, the principal part of it will pass through the windings of the coarse-wire solenoid B; thence to the plate A and upper carbon across to the lower carbon, and out through the rod A^2 and binding-post S, while a small portion of the current passes through the shunt including the fine-wire coil Z; thence to the pin *b*, upper part of the pawl R, conductors 3 and 4, and post S. Consequently, by the overpowering action of the magnetism of the lower coil, B, the core J is drawn downward, carrying the outer end of the lever O with it, so that the pawl R engages with the teeth of the wheel *g*, and (releasing itself from the action of the spring *d'*) turns the said wheel, so that through the pinion F and rack K' the upper carbon will be raised to form the voltaic arc. As the resistance to the rack increases by the burning of the carbons, the proportion of the current which passes through the coil Z in the shunt will increase until the core J is raised and with it the lever O and latch R. When this latch or pawl R is raised so far as to bear against the side of the slotted flange *h* in which it is confined, the teeth of the wheel *g* will lift the pawl momentarily to let the tooth pass; but at the next moment the pawl will meet the next tooth and hold it, for at the moment the pawl R is lifted by the wheel the shunt-circuit will be momentarily broken by the lifting of the platinum plate *r* from the pin *b*, and immediately the core J of the coils will tend downward with the lever O until the shunt-circuit is closed again by the pin *b* coming into contact with the lower part of the eye-piece *r* in the pawl R. When the pawl R has stopped the comparatively slow movement of the locking-wheel *g*, (owing to the fly-wheel M,) the parts are brought to rest by the pin *z* coming into contact with the friction device *x*, so that the equilibrium between the actions of the currents in the two solenoids will be restored. When disturbed again, the above-described action is repeated and continues until the arm *t* on the upper end of the rack K' comes into contact with the plate *r'*, and closes the shunt-circuit between the binding-posts Q and S to cut the lamp out of circuit.

In lamps intended for places exposed to vibration—such as railway-stations—a modified form, as illustrated in Fig. 9, may be used. In this construction the lower portion of the pawl is forked for the reception of a pivoted tooth or lever, P'. When the back of this lever bears against the side of the slotted plate *h'*, as shown at the left-hand side of Fig. 9, the nose of the lever which engages with the teeth of the wheel *g* is inclined until it is practically thrown out by the movement of the rack K' when the edge of the tooth is almost tangential to the wheel.

We are aware that coils of a regulating electro-magnet have had some of their wires bared and connecting devices combined therewith to short-circuit some of the coils, and therefore do not claim this feature broadly.

We claim as our invention—

1. The combination of the coarse and fine wire coils of an electric-arc lamp and a lever, O, acted on by said coils, and carrying a pin, *b*, with a latch, R, suspended from said pin

but allowing some play thereon, and a ratchet-wheel, *g*, controlling the upper carbon-holder, and adapted to be acted on by the said latch, all substantially as set forth.

2. The combination of the coarse and fine wire coils of an electric-arc lamp, the core J, and its suspending-spring, with the slotted tube H and pivoted lever O, connected to the core and controlling the feed mechanism, substantially as specified.

3. The combination of the coarse and fine wire coils of an electric-arc lamp, and a lever, O, controlling the feed mechanism and having a pin, *z*, with a spring friction-plate, *x*.

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

VALERIAN V. GOLITZINSKY.
PAUL O. RYMASCHEFFSKI.

Witnesses:
G. GAREIS,
EDOUARD N. SOEDURN.