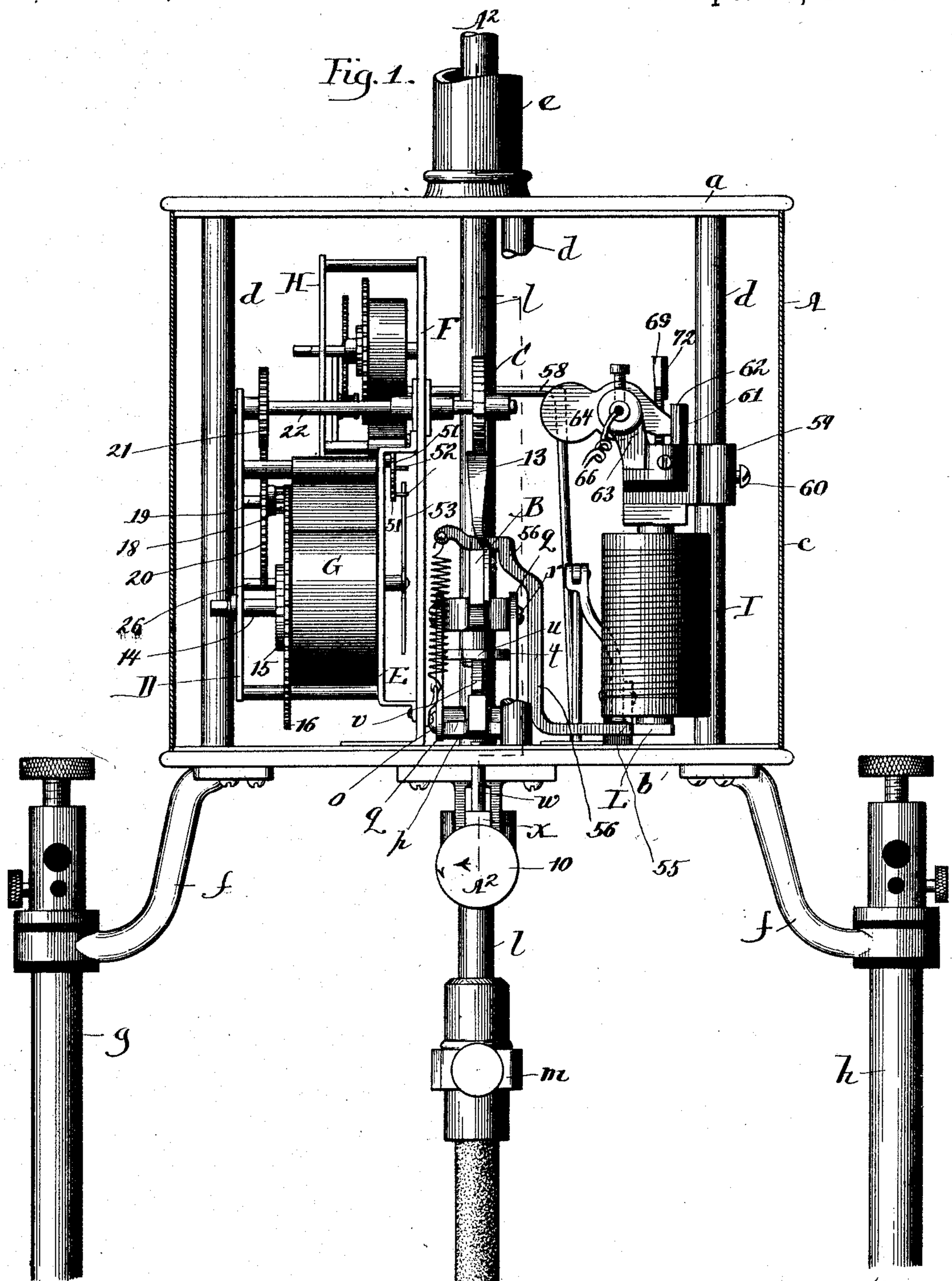
(No Model.) 4 Sheets—Sheet 1.

C. SCHMID.

ELECTRIC ARC LAMP.

No. 505,233. Patented Sept. 19, 1893.

Fig. 1.



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4 Sheets—Sheet 2.

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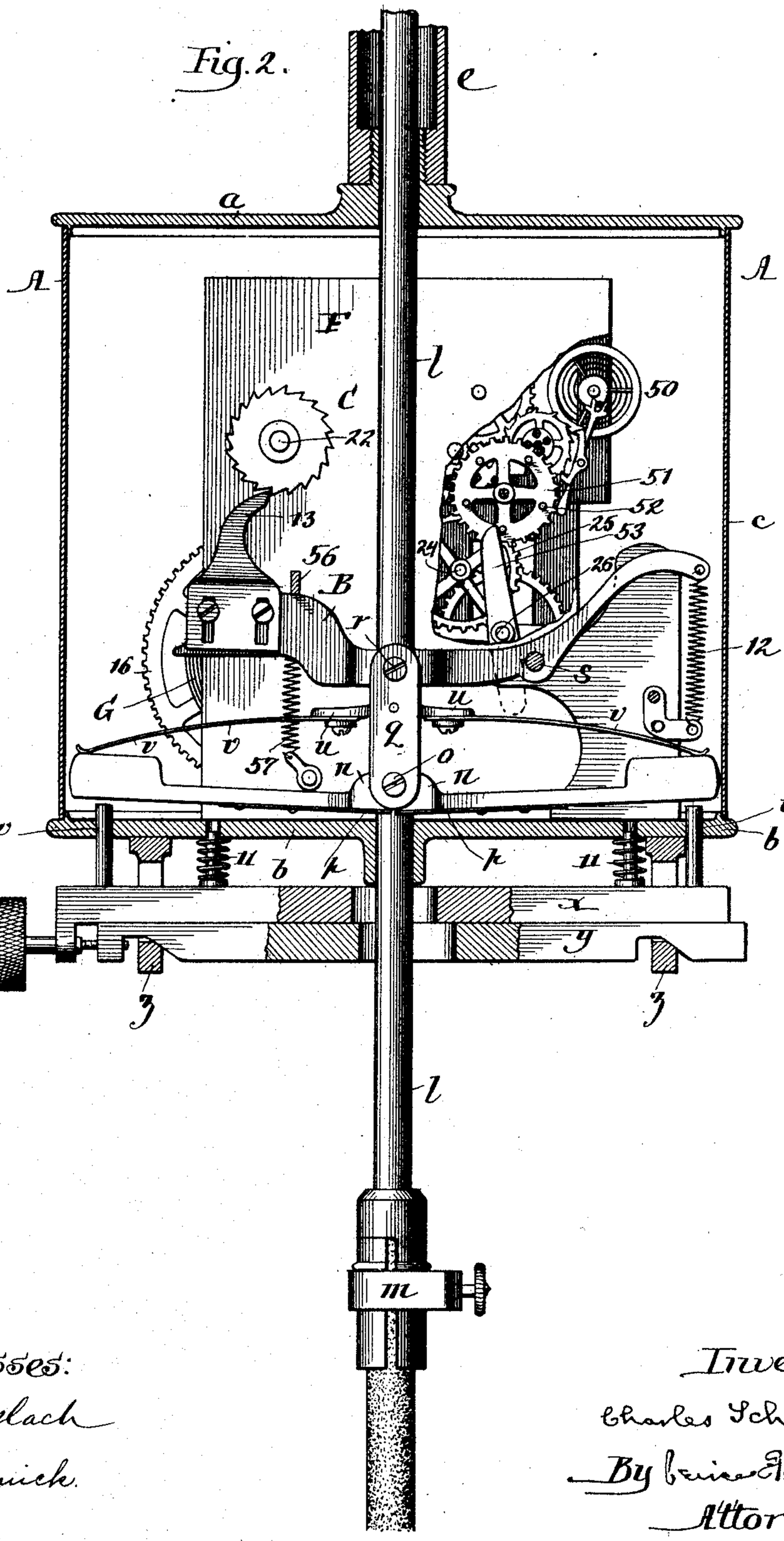
Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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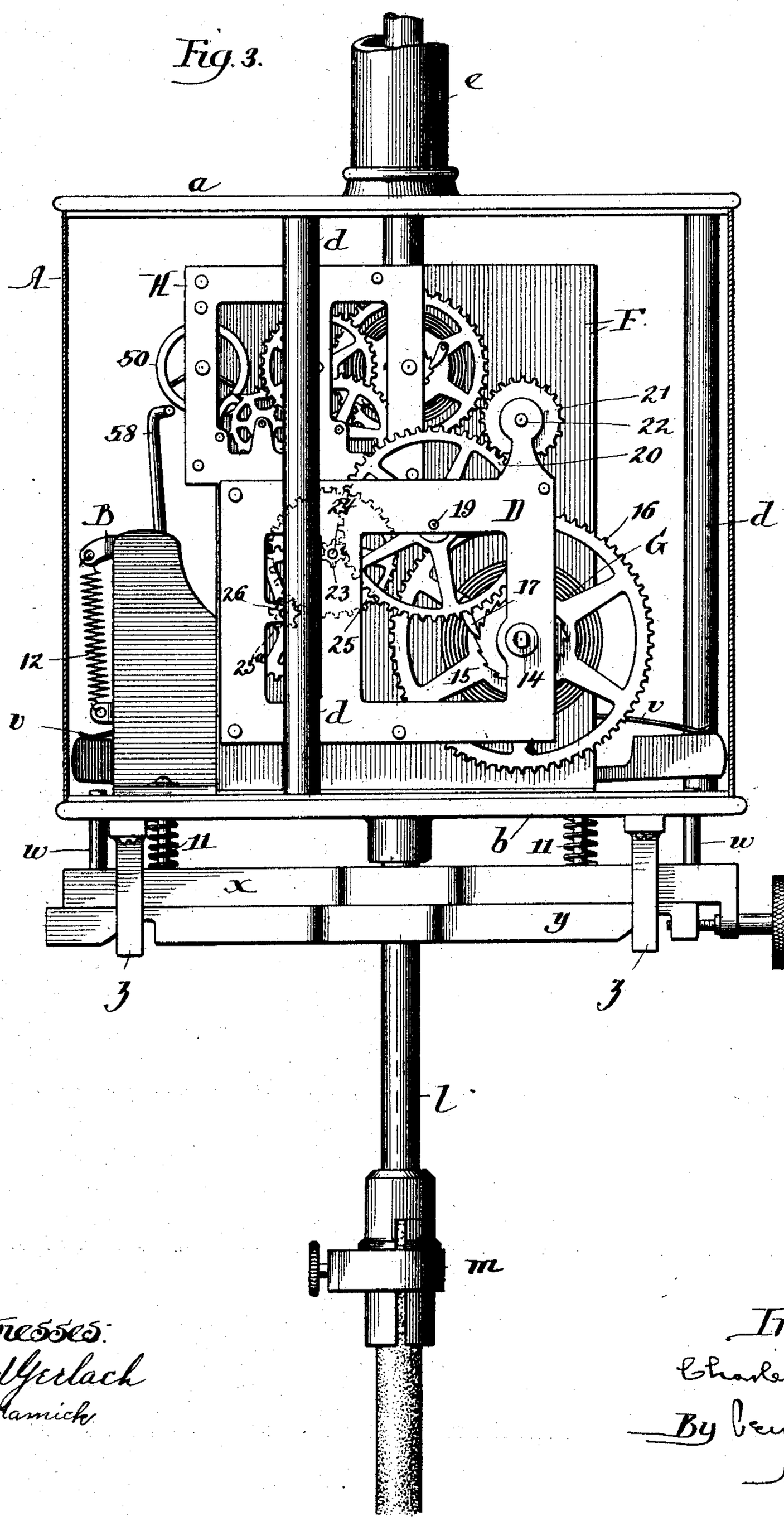
ELECTRIC ARC LAMP.

No. 505,233. Patented Sept. 19, 1893.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

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ELECTRIC ARC LAMP.

No. 505,233. Patented Sept. 19, 1893.

Fig. 4

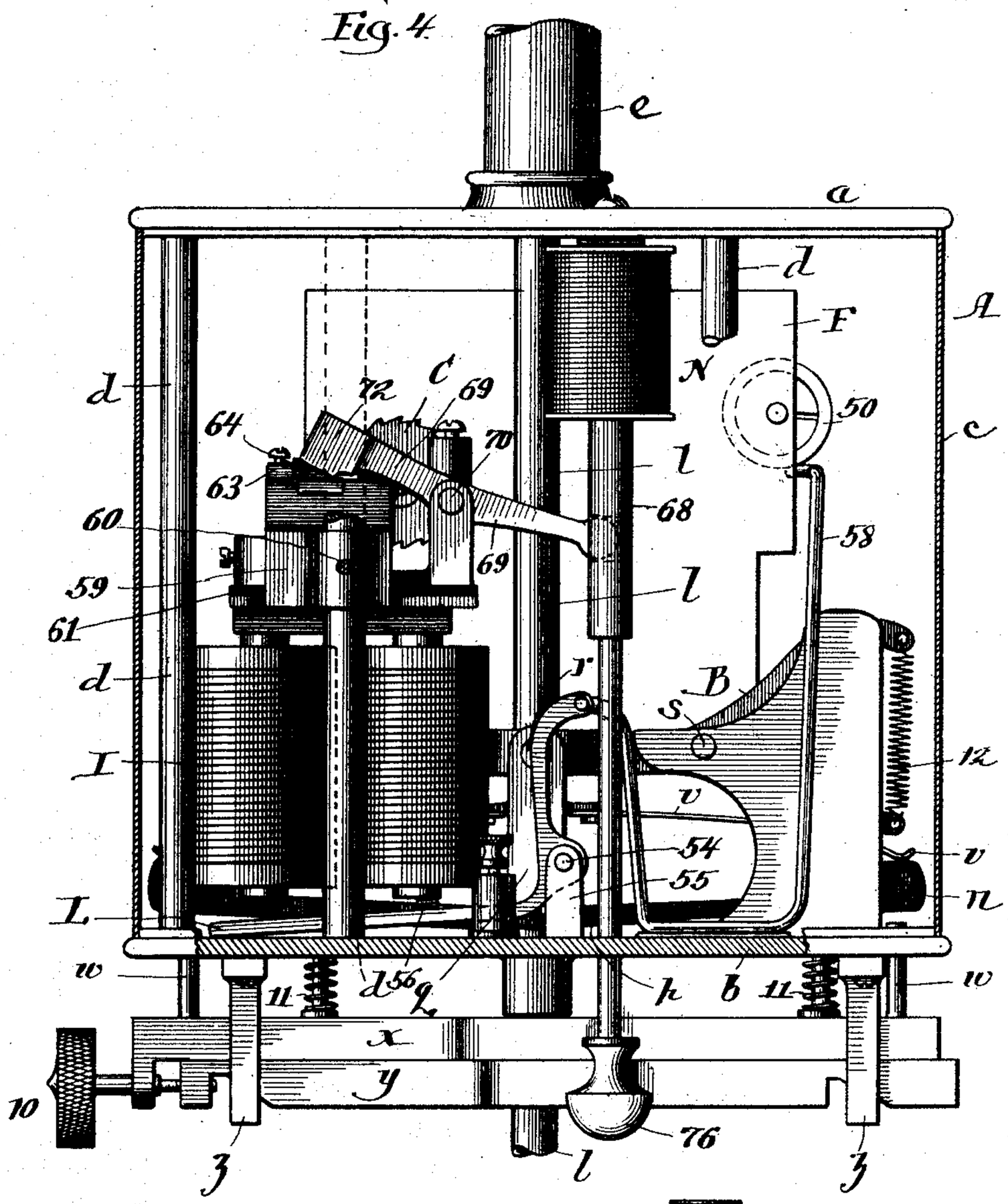
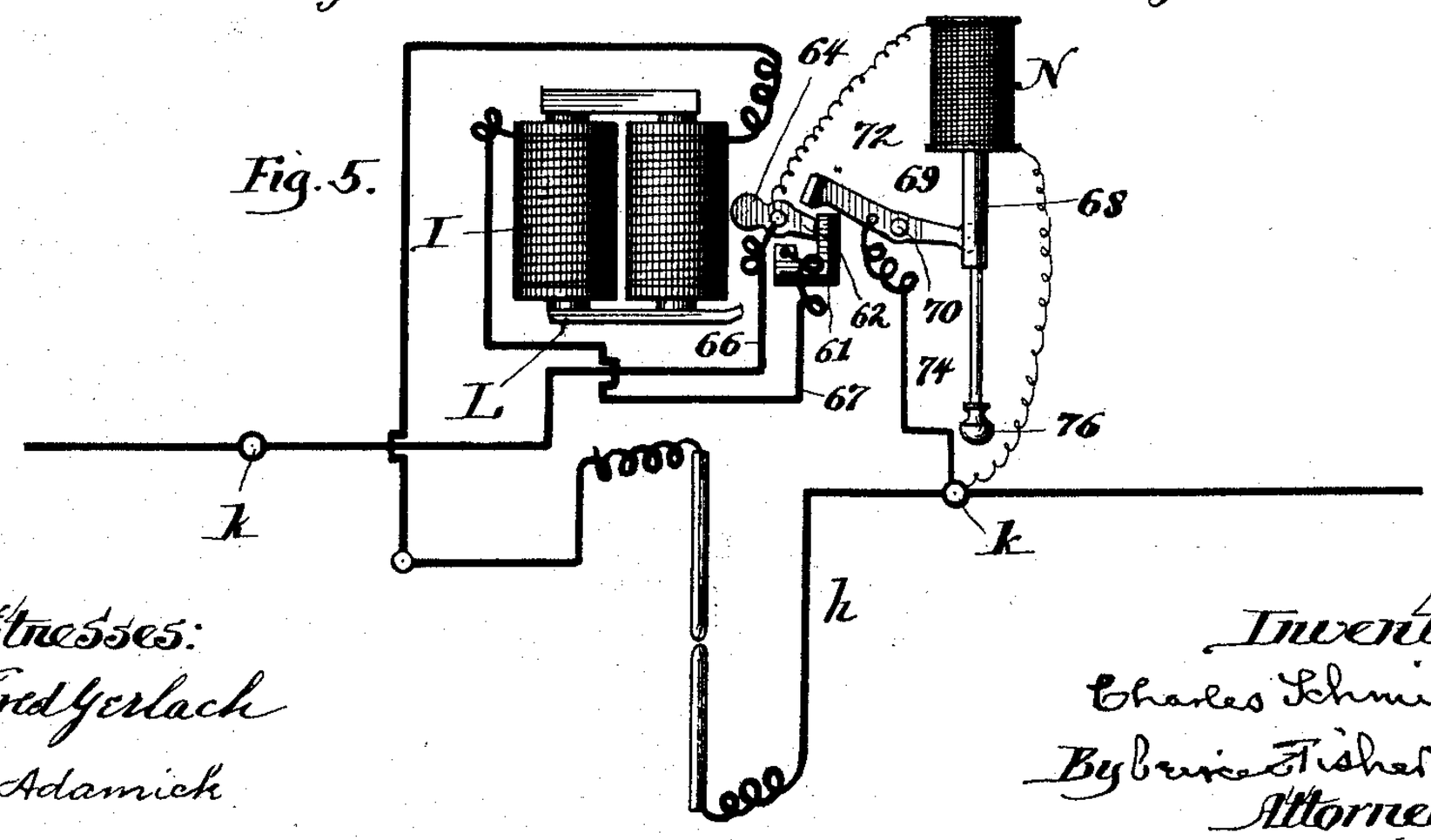


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES SCHMID, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO PANCRATIUS FRIEDRICH, OF JEANETTE, PENNSYLVANIA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 505,233, dated September 19, 1893.

Application filed January 10, 1893. Serial No. 457,877. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SCHMID, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is hereby declared to be a full, clear, and exact description, sufficient to enable others skilled in the art to which such invention appertains to make and use the same.

The invention designs to improve the structure of arc-lamps set forth in my Letters Patent No. 480,285, dated August 9, 1892, and is directed more especially to the separation of the mechanical trip-feed device, from the time-controlled mechanism which determines its play. Since the trip-feed acts only in intermittent fashion, requiring but occasional exercise of its power, while the time-control device is in constant movement, it is clear that if these parts be divided *i. e.*, made separate, the necessary power can be divided also, and the structure be rendered less expensive to make and maintain for any given period of active run.

The exact nature of the improvements will appear in detail from the description following and be thereafter pointed out by claims at the conclusion.

In the annexed drawings forming a part of the specification, like letters and figures of reference denote like parts throughout.

Figure 1 is a view of the improved lamp in front elevation, the inclosing box for the feed mechanism, &c., being in section to expose the parts. Fig. 2 is a view in sectional elevation at line A^2—A^2 Fig. 1 with the automatic switch parts removed. Fig. 3 is a view in side elevation on the feed-mechanism side of the lamp. Fig. 4 is a like view on the switch side; Fig. 5 a diagrammatic view to show the circuits.

Surmounting the lamp structure is a box-like casing A which consists of top and bottom plates *a b*, and cylindrical drum *c* fitted between them to inclose the working parts. Rods *d* (three are shown) tie the plates *a b* together and thus stoutly maintain the box in proper form. A suspension sleeve *e* fastened to the center of top plate *a*, terminates above in a hook or like device (not shown) by which the lamp can be hung. Brackets *f* extend outwardly from beneath the bottom plate *b*, and carry the familiar side-bars *g h* which latter at their lower ends sustain the usual socket-mount for the lower lamp-carbon. Both side-bars *g h* are insulated as shown from the brackets *f*, and are provided with binding-screws for line and local electric connection of the lamp respectively. One of the side-bars viz., *h* is included in circuit with the lower lamp-carbon. Its companion bar is properly insulated at the socket-mount beneath and remains inert, *i. e.*, is excluded from the circuit.

Through the box A extends the upper carbon-holder *l*, guided at top and bottom by holes in the plates *a b*, and terminating below in a socket-clip *m* to retain the carbon. Grip-jaws *n* hinged together by bolt *o* are arranged at the sides of the holder *l*, and carry attached thereto beneath, the clamp-plates *p* having semicircular notches at their confronting ends or edges to encircle and bite the holder *l*. Plates *p* being adjustable or removable adapt the jaws *n* for grasping carbon-holders of various diameter. The same pivot-bolt *o* to unite the grip-jaws *n*, carries the parallel links *q* which are secured above at opposite points by pivot screws *r* to the sides of a suspending lever B. Said lever is extended in hub-like fashion to loosely inclose the holder *l* and has its fulcrum as at *s* on the motor-frame.

Riveted to the links *q* in position about the holder *l* is a plate *t* with central hole to allow for play of said holder and projecting lugs *u* to which are fastened the flat springs *v*. At their outer ends said springs bear against the free terminals of grip-jaws *n* thus turning the same slightly about their pivot-joint *o* so that clasp-plates *p* may bite the carbon-holder *l* between them and keep it suspended through links *q* and lever B. If the lever be caused to rock about its fulcrum pin *s*, to lower the grip-jaws, these carry the holder *l* with them until the outer or free terminals of the jaws contact with the projecting stops *w*, whereupon the jaws are forced apart, against stress of springs *v*, releasing the holder *l* which then drops free by gravity until the upper carbon rests against the lower. The stops *w* extend from the upper of two adjusting bars *x y*,

carried as shown in the hangers *z* depending from the bottom-plate *b* of the casing. The lower bar *y* has a sidewise shift upon its companion bar through the medium of a thumb-screw 10 sustained by the bar *x* and threaded to the fellow bar *y*. Inclined notches at the bearings of bar *y* with hangers *z* serve to raise or lower the two bars in unison by adjustment of screw 10. Guide-pins and coil-springs 11 located between the bar *x* and base-plate *b* keep the bars *x y* in contact and on adjustment preserve the straight lift or depression of bar *x* with its stops *w*. By this adjustment the grip-jaws *n* can be made to impinge against the stops, sooner or later during the downward play of the suspending lever B, so that the free gravity fall thereafter of the holder *l* is regulated, and the feed of the carbon suitably controlled.

To return the grip-jaws and holder, with their adjuncts to uplifted position, a spring 12 at the tail of lever B is in action, and raises the parts (with the holder tightly in the bite of the jaws) under the impelling play of the jaw-springs *v*. At its head, the lever B is furnished with a detent 13 which can be adjustably set to extend within the path of ratchet-wheel C forming a part of the trip-feed mechanism. Ordinarily, the wheel C is at a standstill; but if quickly revolved the distance of one tooth it forces down the detent 13 and causes suspending lever B to rock about its fulcrum *s* to accomplish the feed of the carbon, as already detailed.

In the form shown, the trip-feed consists of a suitable wheel train mounted in place between the frame plates D E secured in turn by bracket-plate F to the box A. The motor-spring G is set upon an arbor 14 which carries a ratchet 15 and train wheel 16. A pawl 17 pivoted to the wheel 16 engages with the ratchet 15, so that both wheel and ratchet move in unison by force of spring G. Gear-wheel 16 is in mesh with pinion 18 upon an arbor 19 which latter is furnished with a train wheel 20 to drive a companion wheel 21 set upon the same shaft 22 with the feed-ratchet C. The feed-ratchet trips the suspending-lever B at intervals to accomplish the descent of the carbon-holder. The intermittent movement of said ratchet-wheel for such purpose is governed from the time-mechanism, in convenient fashion, as follows: The train-wheel 20 engages not only the companion gear 21 on ratchet-shaft 22 as already detailed but engages also with a pinion 23 (dotted lines Fig. 3) upon arbor 24. Arbor 24 sustains a wheel 25 in mesh with pinion 25^a (dotted lines Fig. 3) upon arbor 26 which carries also the fly 53.

The time control device comprises an ordinary clock train mounted between plates H F and furnished with the familiar escapement and wheel as at 50. The minute-wheel 51, for example has a series of space-pins 52 projecting therefrom into the path of the revolving "fly" 53. Generally the "fly" is practicaliy at rest against one of the pins 52 so that in consequence the trip-feed is held from movement and the carbon-holder stands suspended. But the constant advance of the minute wheel finally releases the "fly" from its stay-pin 52, whereupon the "fly" proceeds to revolve, through the impelling action of motor-spring G. Immediately thereafter it is caught and held by contact with the next succeeding stop 52 which has meanwhile advanced into its path. During the interval while the "fly" is revolving, the ratchet-wheel C moves the distance of one tooth and thus effects the feed of the carbon through its suspending lever B and adjuncts.

The switch for the lamp includes a simple electro-magnet I wound with coarse wire and having an armature L, bell-crank in form and pivoted at its bend 54 upon lugs 55 projecting from the base plate *b*. The end of the crank-armature L constituting the keeper proper, has a bent extension 56 (Figs. 1 and 2) which overlies the upper edge of suspension-lever B and at its terminal is controlled by a coil-spring 57, the pull of which tends to draw the lever B down and away from the trip ratchet C. That is to say, when the armature L is unaffected by the electro-magnet I, its coil-spring 57 maintains the armature and suspension lever at "release" position, permitting the carbon-holder to descend until the two carbons are resting against each other. At the same time, a brake-rod 58 (Figs. 1 and 4) pivoted to the tail of crank-armature L and sliding in semi-rocking fashion upon base-plate *b* is brought to bear against the rim of escapement-wheel 50 and thus to arrest the time mechanism. This is the normal position of the parts when the lamp is inactive, and as appears, both the trip-feed and time control are then held at rest.

At the base of its reverse U-core, the electro magnet I is sustained by a collar 59 and set-screw 60 from one of the upright rods *d* of the box A. Fastened to the base of the U-core but with an insulated strip 61 between, is a metal contact-piece 62 having ears 63 to pivotally sustain a gravity switch 64 the tip of which bears usually against the confronting face of the piece 62. Binding screw 65 at insulated pivot-ear 63 establishes switch 64 in electric connection with local wire 66 which extends thereto from binding-screw at side-rod *g*.

Referring to diagram (Fig. 5) the circuit is traced from switch 64, by contact piece 62, wire 67, through magnet I, carbon-holder *l*, upper carbon, lower-carbon, side-bar *h* and binding-screw *i* to main line again. When the current is thus established, the electro-magnet I becomes energized, attracting its armature L which latter thereupon rocks slightly about its pivot 54 rising clear, at one end, form contact with suspension-lever B and at its opposite end dropping slightly to

release the escapement-wheel 50, by a smart stroke, from the brake influence of rod extension 58. The suspension-lever being freed, the tail-spring 12 quickly rocks the lever about its fulcrum *s* throwing the detent 13 into the path of ratchet-wheel C and simultaneously lifting the grip-jaws and carbon-holder the distance proper to establish the arc-light. The release shift given to escapement wheel 50 starts the time control mechanism, so that the trip-feed proceeds mechanically at determined intervals as hereinbefore detailed.

Should the lamp-circuit become disarranged or broken, provision is made by automatic "cut-outs" to shunt the current around the lamp. A helix N suspended from top-plate *a* has a vertical core-armature 68 sustained by socket-joint from the tail-end of a metal lever 69 pivoted as at 70 on insulated ears extending from the base of the U-core for electro-magnet I. At its front end the lever 69 terminates in a metal head-piece back of which is an insulating strip 72. Lever 69 is connected electrically by wire 74 with the binding screw *i* and main-line at side rod *h*. The ends of the wire-helix N are joined respectively to binding-screw at side-rod *h* and to a binding-screw on the pivotal-switch 64. When the lamp-circuit becomes disarranged or broken, the current tends to pass from switch 64 through helix N and directly to the main line again at the side-rod *h*. The helix N is sensitized, lifting the core-armature 68 and thus tilting the lever 69 until its head-piece impinges upon switch 64, rocking the same away from its confronting contact-piece 62 and establishing the metal-head in contact with said switch 64 instead, whereupon the current passes by switch 64, lever 69 and wire 74 to the negative side-rod *h*, although enough of the current divides at the switch 64 to still maintain the helix N in action. The main-line circuit has thus been completely shunted around the lamp, thereby rendering electro-magnet I neutral and restoring the time-control and trip-feed mechanism to a state of rest. A knob 76 upon terminal of core-armature 68 enables the "cut-out" lever 69 to be actuated at will, to shunt the main current and extinguish the light.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In electric arc-lamps the combination with the carbon and its mechanically suspended retaining-clamp, of the mechanical trip-feed device, and the separate mechanical time-control device co-acting at pre-determined intervals to release the trip-feed device, substantially as described.

2. The combination with the carbon and its retaining clamps of the mechanical suspender therefor, the intermittent mechanical trip-feed device and the separate mechanical time-control device co-acting at pre-determined intervals to release the trip-feed, substantially as described.

3. In electric arc-lamps the combination with the carbon and its retaining clamps, of the mechanical suspender therefor having a projecting detent, and the intermittent mechanical trip-feed device provided with a ratchet engaging said detent, substantially as described.

4. In electric arc-lamps the combination with the carbon and its jaw-clamp, of the connecting link secured at the jaw-hinge, the suspending lever to carry said link and provided with a detent and the intermittent mechanical trip-feed device having a ratchet to engage said detent, substantially as described.

5. In electric arc-lamps the combination with the jaw-clamp for the carbon, and with its connecting link, of the regulating springs carried by said link and bearing against the free ends of the clamp-jaws, substantially as described.

6. In electric arc-lamps the combination with the carbon and with its mechanically suspended retaining clamps, of the mechanical trip-feed device to actuate said clamp, the separate mechanical time-control device to regulate the trip-feed, an electro-magnet energized from the lamp-current, an armature therefor and extension-arms operated by said armature to control the suspension clamp and the time mechanism respectively, substantially as described.

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