(No Model.) 2 Sheets—Sheet 1.

C. E. SCRIBNER.

ELECTRIC ARC LAMP.

No. 563,315. Patented July 7, 1896.

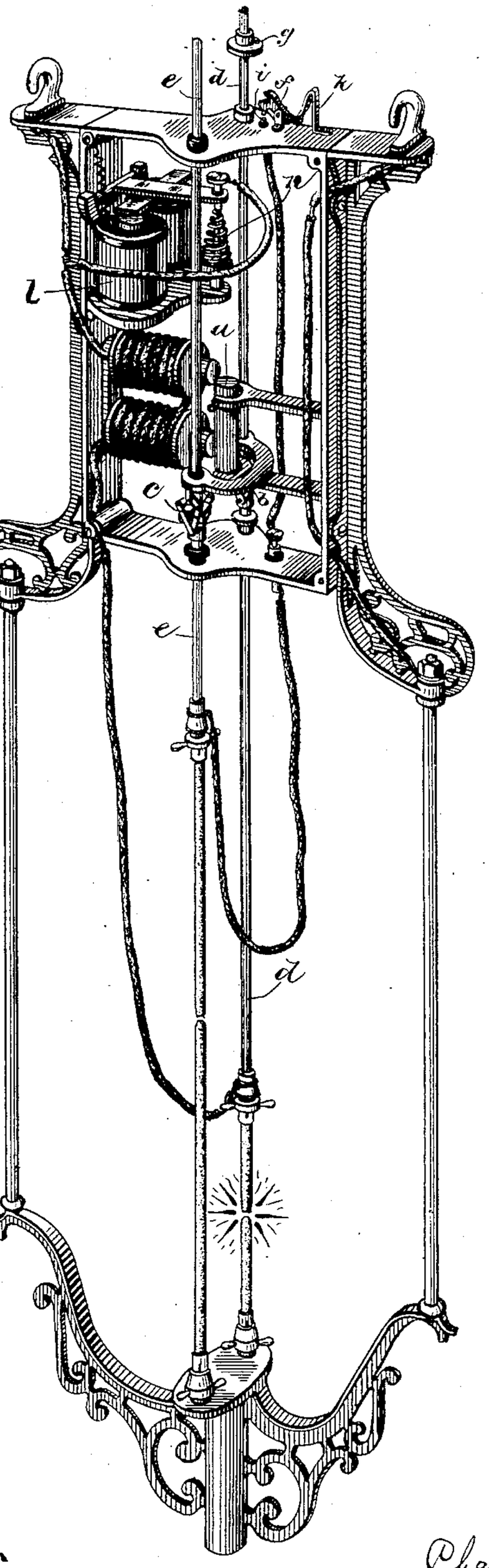

Fig. 1.

Attest
Paul A. Staley
Millard R. Powers

Inventor
Charles E. Scribner
By George P. Barton
Attorney

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2

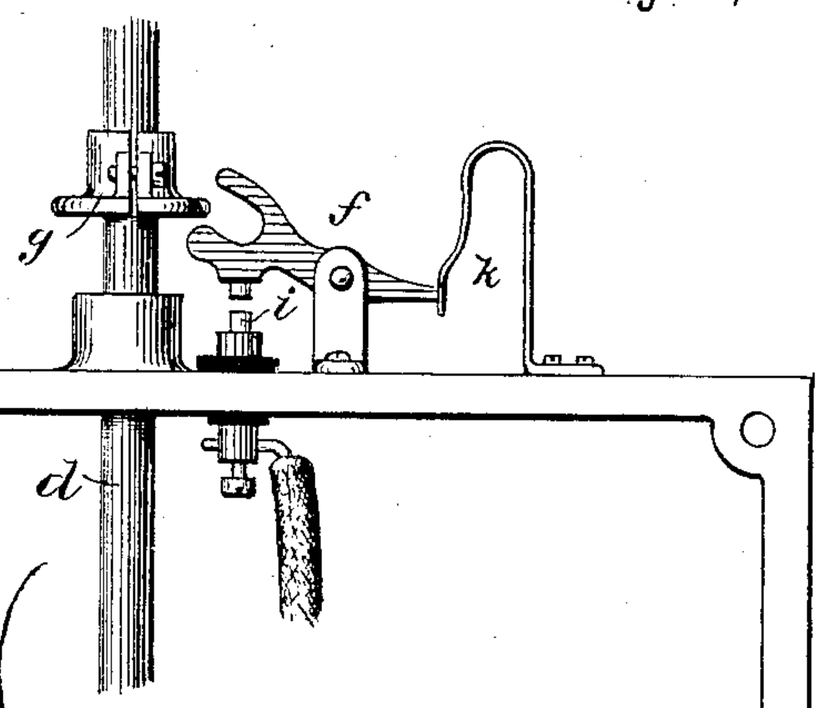


Fig. 5

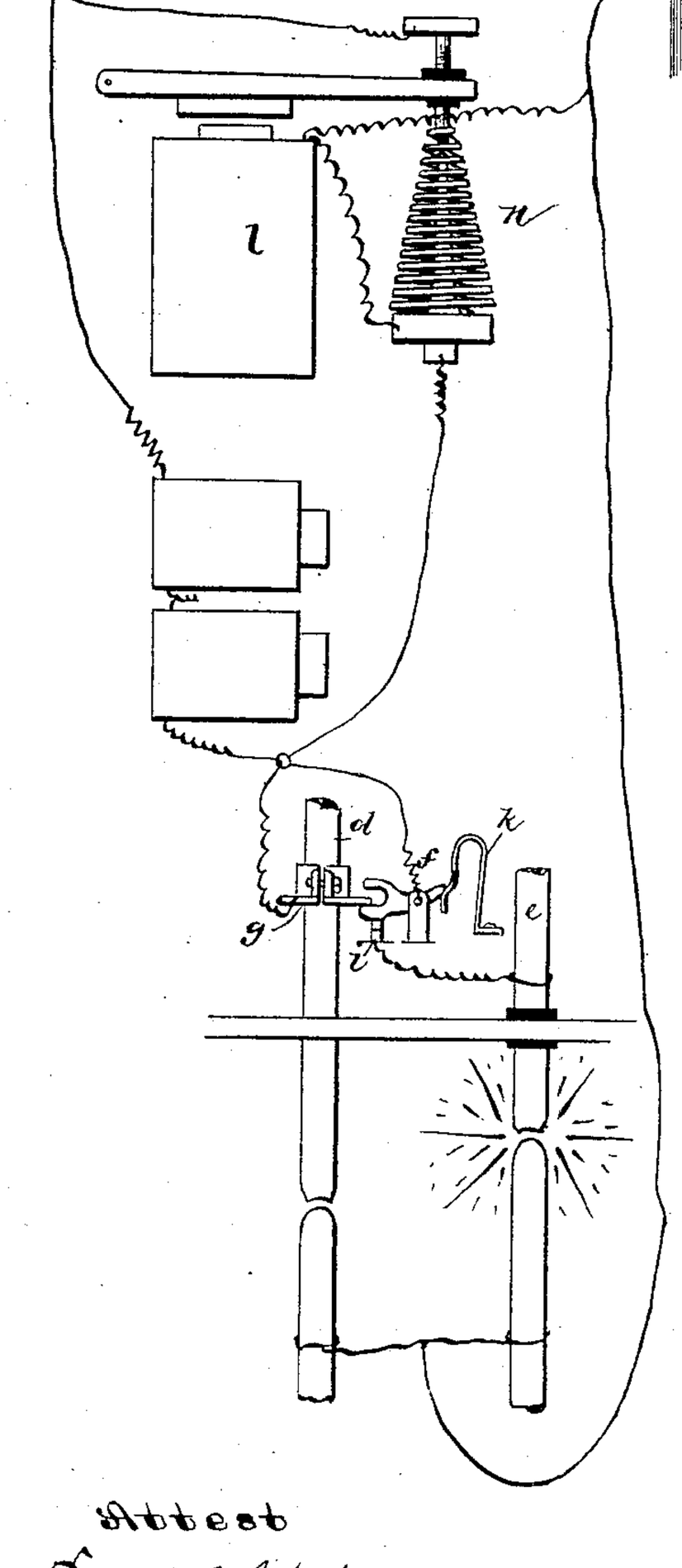


Fig. 3

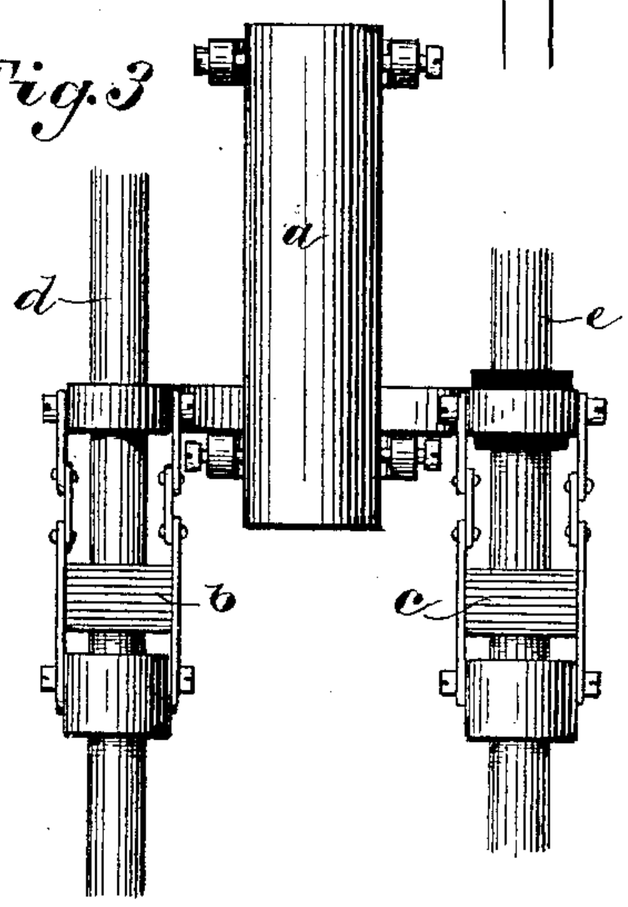
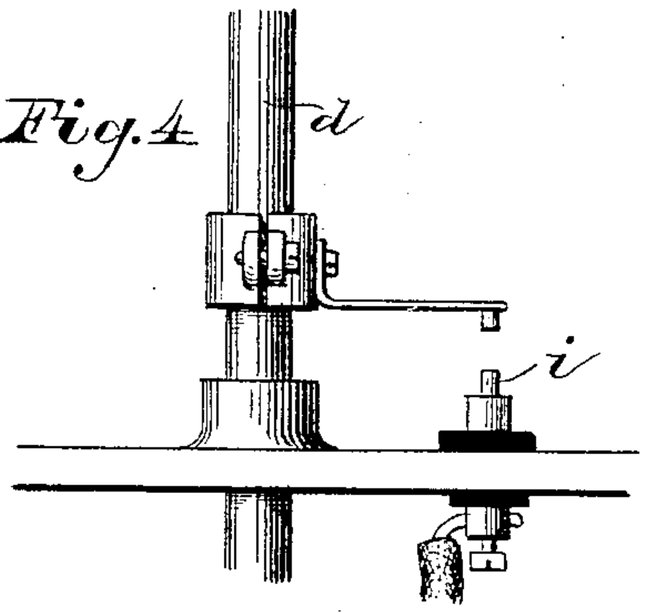


Fig. 4



Attest

Paul A. Staley.

William Ayling

Inventor

Charles E. Scribner

By George P. Barton

Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 563,315, dated July 7, 1896.

Application filed January 2, 1883. Serial No. 80,751. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switching Devices for Arc-Lamps, (Case No. 53,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric-arc lamps in which two sets of carbon-points are provided, so that when one set is consumed the other set may be automatically brought into circuit. Lamps are thus made to burn twice as long as when provided with only a single set of carbons.

My invention consists in the circuits and switching device herein described and claimed.

In the drawings, Figure 1 is a perspective view of an electric-arc lamp embodying my improvements. Fig. 2 is a detailed view of the switching device. Fig. 3 is a view showing the lifting-armature and clutches in detail. Fig. 4 is a view showing a modified form of the switching device. Fig. 5 is a diagram illustrative of the circuits.

Like parts are indicated by similar letters of reference throughout the several views.

The lifting-armature *a* carries two clutches *b* and *c*. Each clutch is designed to operate the rod of one of the sets of carbons. The clutch *b* operates rod *d*, and clutch *c* operates rod E.

The clutches being both attached to the same armature move uniformly synchronically, carrying with them the two rods while the lamp is burning. The rods *d* and *e* move together all the time the lamp is burning. During the burning of the first set, that is, the set operated by rod *d*, there is no circuit established through rod *e* and its set of carbons, the circuit of this set being open at point *i*. When carbon-rod *d* feeds, carbon-rod *e* is also released and the carbons come together. The clutch *c* thus goes through the motion of feeding every time clutch *b* feeds. This does no harm, since the opening of clutch *c* of the second set has no effect whatsoever upon clutch *b* of the first set and since there is no circuit through the second set.

The switching device *f* is adapted to change the current automatically from the first rod *d* to the second rod *e* at the proper time. This switching device is operated by the first rod, preferably by means of the collar *g*.

As the carbons of the first rod burn away the collar is brought lower and lower until finally it comes against the lower prong of the switch *f*. The rod *d* is thus arrested and can descend no farther. The carbon-points of rod *d*, however, continue to burn, and the resistance of their arc becomes greater and greater until finally the arc is extinguished. Before the arc of the first pair of carbons is thus extinguished the collar *g* brings the switch-lever *f* down, so as to close the circuit at point *i* to the second rod *e*. The rod *d*, being arrested by the stop *g*, cannot descend farther. The rod *e*, however, will be fed down and the second set of carbons will be brought together. It will therefore be but a moment at most after the first arc goes out before the other arc will begin to burn.

Any well-known form of clutch may be used.

The switching device shown in detail in Figs. 2 and 5 consists of a bifurcated lever pivoted as shown and a friction-spring *k*. The collar in its descent comes against the lower prong and carries the lever into contact with point *i*, as before described. On raising the rod the collar is brought against the upper prong and thus lifts the lever, separating the lever from the contact-point *i*. The lever is held in position by the friction of spring *k*.

In Fig. 5 the lever is shown in contact with point *i*. On raising the rod the collar comes against the lower side of the upper prong of the lever, and the lever is thus lifted away from point *i*. The lever is carried so far that the collar in its descent may pass by the upper prong freely, the friction of the spring *k* holding the lever in the position in which it is left by the collar. The second rod *e* is insulated from the frame and all parts of the lamp, so that no current can pass through it until circuit is closed by the descent of the first rod. As the resistance of the arc increases the compensating magnet *l*, included in the shunt of the arc, will become more strongly charged, and consequently the resistance of the variable rheostat *n* in the shunt around the lifting-magnet will be diminished. Therefore the current will be diverted from the lifting-magnet and the clutches will re-

lease their hold upon the rods respectively. It will be seen that at the moment the second set of carbons come together the current finds circuit through them, thereby short-circuiting and extinguishing the first arc. Immediately the second set of carbons are separated and their arc established. The contact of the second set of carbons which short-circuits the arc of the first set also short-circuits the regulating-magnet, thus directing the current through the lifting-magnet, separating the carbons and establishing the new arc, as before stated. This will be understood by reference to Fig. 5, in which the apparatus is shown in the act of shifting from one set to the other. The collar *g* has come against the switch *f* and the circuit has just been closed at point *i* through the second set of carbons. At this moment three circuits in derived circuit or multiple arc may be traced—one circuit through the first set of carbons, as at first; a second circuit through the second set by switch *f* and point *i;* a third circuit through the upper magnet, (shown in Fig. 5,) which magnet I have termed the "regulating electromagnet." Of the three circuits the one of lowest resistance is through the second set by contact-point *i*, since the second set are in contact at the moment of shifting. In Fig. 5 the carbons of the second set are shown just as they have been in contact and drawn apart to establish the arc.

There being very little resistance in the second set at the moment they are closed, the first set at that moment will be shunted and their arc extinguished; also at the same time the regulating-magnet will be shunted by the same short circuit through the second set. This causes the lifting-magnet to become active, and both clutches are lifted and with them both rods, and the arc is established at the second set. Although the rod of the first set is lifted at the same time that the rod of the second is thus lifted, no arc can be established at the first set, since the first set were not previously closed.

This regulating and compensating mechanism, being claimed in other of my pending applications, is not included as a part of the invention herein described except in combination as hereinafter set forth.

In Fig. 4 I have shown a modified form of switching device. A simple point is placed upon the rod *d*, so as to close upon point *i* when the rod descends. It will thus be seen that the switching device *f* may be made in many different forms and operated automatically by the rod in different ways without departing from my invention.

I have shown and described two sets of carbons only; but it is evident that three or more sets may be used, by adapting the second rod to close the circuit to the third, and so on, at the proper time.

I do not claim, broadly, means whereby the normally open shunt-circuit through the second burning pair of carbons is closed, as I am aware that this is accomplished indirectly in Patent No. 266,240 to Edward Weston and Patent No. 322,115 to Charles Lever, by causing the switch to first close circuit through an electromagnetic device, which in turn acts to close the normally open shunt-circuit through the second burning pair of carbons; but what I do claim in this regard is any means whereby a switch is actuated by the carbon-rod of the first burning pair of carbons to directly complete the normally open shunt through the second burning pair of carbons. I believe myself to be the first, however, to provide, in connection with the switch actuated by the carbon-rod, means whereby the second burning pair of carbons remain normally in contact during the burning of the first pair, and in this connection I do not desire to limit myself to the particular means by which the switch, actuated by the carbon-rod of the first burning pair of carbons, acts to effect the closing of the shunt through the second burning pair, since it is evident that the switch may act either directly or indirectly to complete the shunt-circuit through the second burning pair of carbons.

I claim as my invention—

1. The combination with two carbon-rods the second of which is insulated, of a bifurcated switch-lever, a contact-point and a collar attached to the first rod, said collar in its descent being adapted to pass the upper prong of the lever and come against the lower prong thereof and in its ascent to come against the upper prong, a friction-spring adapted to retain the lever in position and circuits substantially as and for the purpose specified.

2. The combination in an electric-arc lamp with the pivoted switch-lever adapted to make and break contact with the contact-point *i*, of the carbon-rod *d*, and a friction-spring mounted upon the lamp-frame and adapted to hold said switch-lever in either of the two positions to which it may be moved by the upward and downward movement of the rod, substantially as and for the purpose specified.

3. The combination with two pairs of carbons, of carbon-rods, each carrying the movable member of one pair of carbons, regulating mechanism controlling the said carbon-rods, a projection or collar on one of the said rods, a switch-lever adapted to engage with said projection at a predetermined point in the descent of the rod and a device or prong connected with said switch-lever adapted to be thrown into the path of the projection above the same when the lever is moved by the descent of the projection or collar, said device being positively acted upon by the projection to reset the switch-lever when the rod is raised, substantially as described.

In witness whereof I hereunto subscribe my name this 16th day of November, A. D. 1882.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE P. BARTON,

P. A. STALEY.