(No Model.)

3 Sheets—Sheet 1

C. E. SCRIBNER.

DOUBLE CARBON ARC LAMP.

No. 512,667. Patented Jan. 9, 1894.

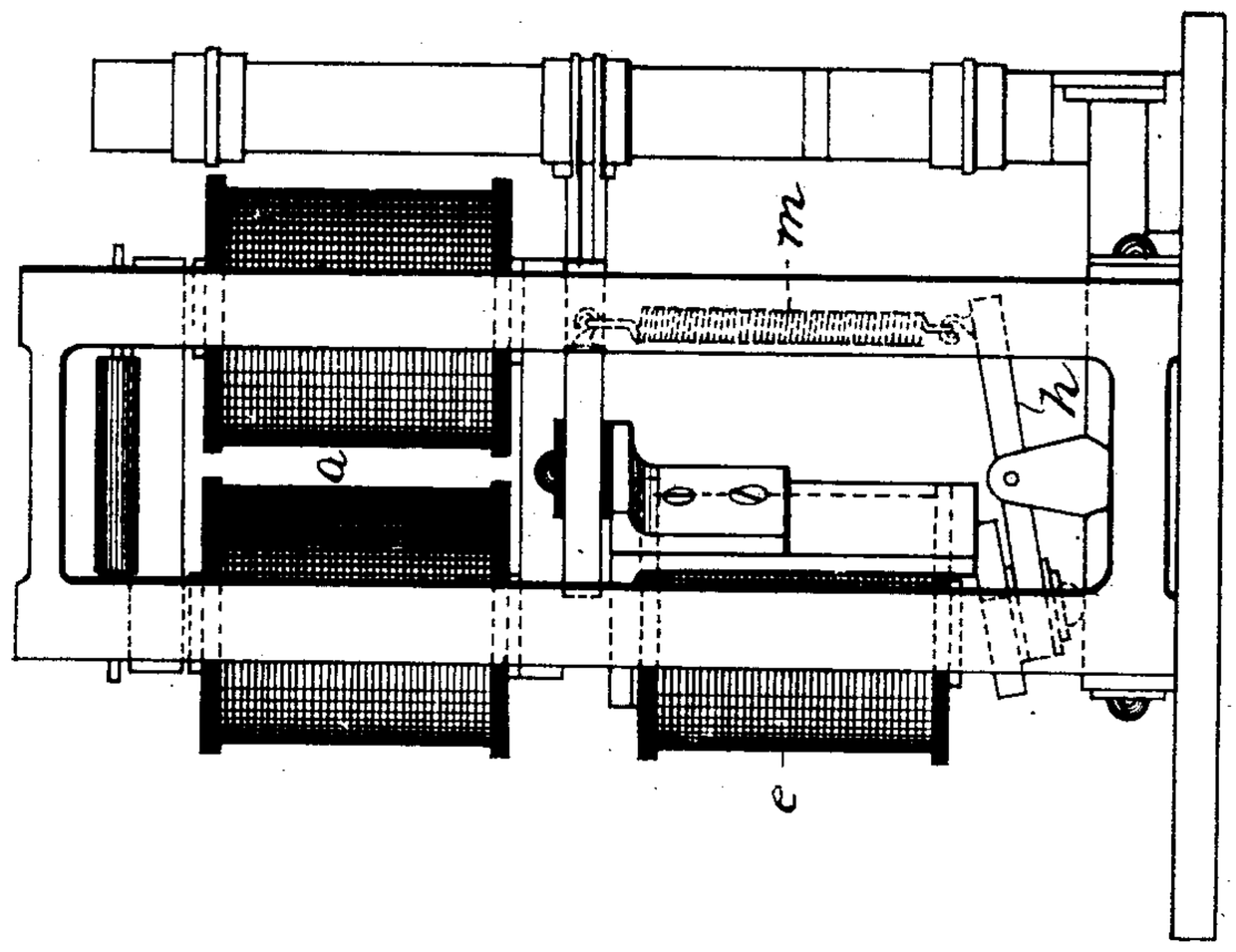

Fig. 2.

Fig. 1.

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(No Model.)

3 Sheets—Sheet 2.

C. E. SCRIBNER.

DOUBLE CARBON ARC LAMP.

No. 512,667. Patented Jan. 9, 1894.

Fig. 3.

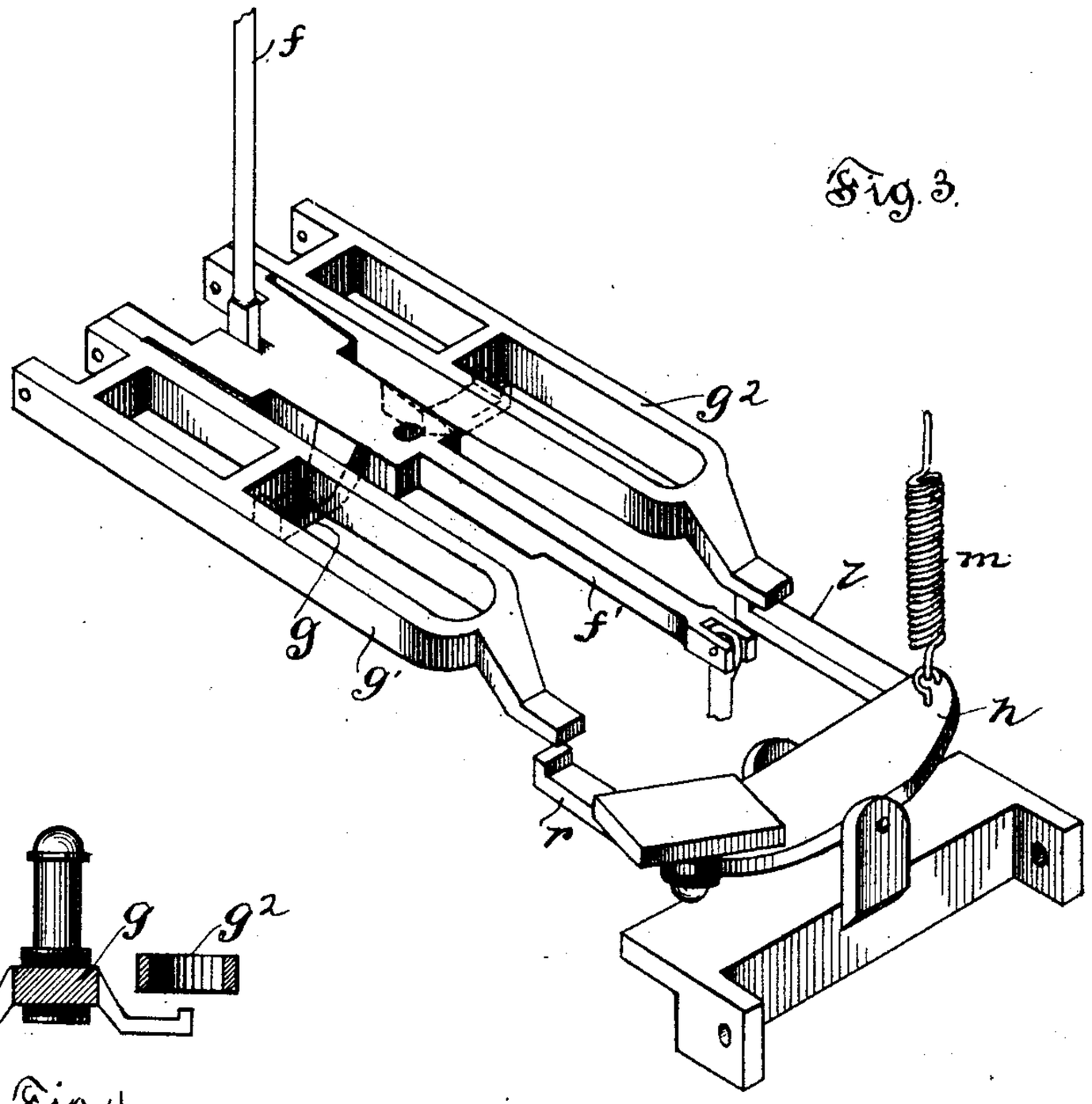

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

C. E. SCRIBNER.

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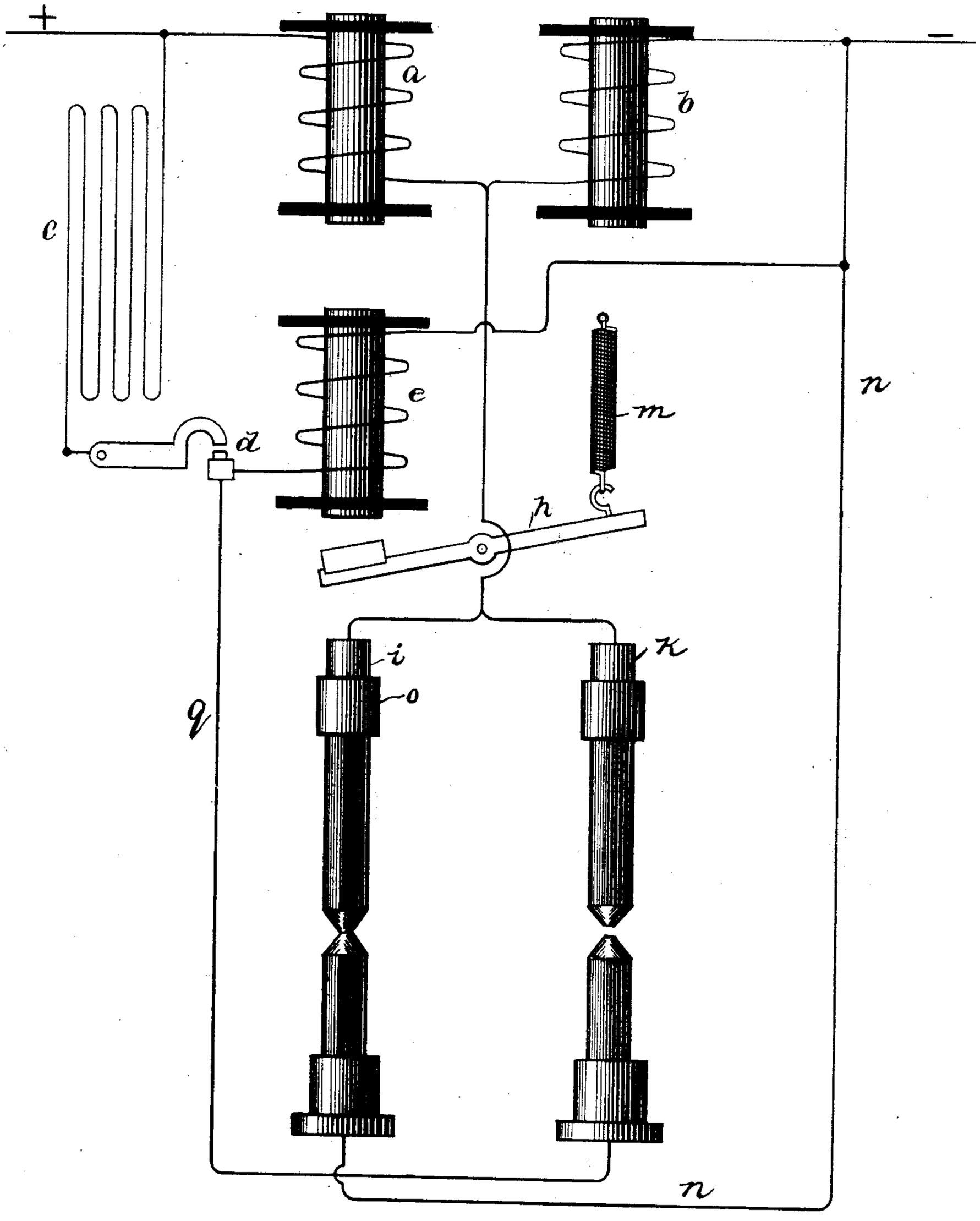
Fig. 3.



Witnesses:
George L. Cragg.
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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS.

DOUBLE-CARBON ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 512,667, dated January 9, 1894.

Application filed April 16, 1892. Renewed May 9, 1893. Serial No. 473,605. (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 Double-Carbon Arc Lamps, (Case No. 219,) 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 that class of electric arc lights in which two sets of carbons are employed, the different sets being so arranged that one set will be practically consumed before the carbons of the other set are brought into service.

Heretofore various forms of arc lamps have been used. As usually constructed the carbon points are at first placed so as to be in contact; when the current is established the points are moved apart a sufficient distance to produce the arc. Now as the carbons are burned away the carbon points must be fed together so as to maintain the arc as nearly constant as is possible.

In my Patent No. 415,571, granted November 19, 1889, for arc lamps, I have described a single carbon lamp with circuits and mechanism thus adapted to feed the carbon points so as to maintain the arc as nearly constant as possible.

My invention herein is described and illustrated in connection with a lifting balance and feeding balance similar to those described and claimed in said patent. In my said patent the armature lever of the lifting magnet is opposed by a spring, such a spring as is usually employed in low tension lamps; it is not, however, essential to the successful operation of any lamp and is usually omitted in lamps of the high tension type. I do not illustrate or describe this spring in combination with my present invention further than to simply state the well known fact that it may be used and is desirable in low tension lamps, though not necessary or important in high tension lamps.

In my Patent No. 418,758, issued January 7, 1890, for double carbon arc lamps, I have described and claimed a double carbon arc lamp of such construction that a uniform length of arc is maintained during the whole time the lamp is burning, while at the same time the lifting mechanism is relieved from the weight of the idle rod, thus causing the lamp to feed its carbons with greater regularity than had heretofore obtained in this class of lamps. As described in said application, this I accomplished by relieving the mechanism feeding the carbons that may be burning, whether one set or the other, from the weight or influence of the idle set. Two retaining magnets were employed and the two sides of the lamp were made symmetrical, the one with the other, and the action of the feeding and regulating mechanism rendered precisely the same whether the arc might be burning on one side or upon the other, it being a matter of indifference determined by the accidental difference in resistance of the two sets of carbons whether one set or the other should take the arc when current was first closed through the lamp.

A special feature of my said invention, as described in said application, consists in the lifting lever or yoke supporting the two clutch levers placed on opposite sides thereof, at the free end of each of the clutch levers there being provided an armature, and above these armatures the retaining magnets, respectively.

My invention herein has precisely the same object in view as was the object of my invention described and set forth in said Patent No. 418,758, to wit: to produce a double carbon lamp in which the mechanism in active operation should not be obstructed or rendered sluggish by the weight of the idle rod, while the arc during the entire service of the lamp should be maintained at a practically uniform length. This I accomplish in a more simple manner by a novel construction of the retaining mechanism in connection with the circuits of the lamp, whereby the idle carbon rod is supported independent of the lifting and feeding mechanism.

Speaking generally my invention consists—

First, in providing in connection with the yoke and two clutch levers, as heretofore employed, a retaining magnet having a pivoted lever placed in such relation to the clutch lever that one of said clutch levers or the other will be held up thereby, to prevent the rod, carried by the particular lever which is held up, from feeding, the position of the armature le-

ver being determined by the electrical condition of the retaining magnet.

Second. My invention consists in the combination in a double carbon arc lamp, of a retaining magnet and its pivoted armature lever, with two independent clutch devices for the different rods and circuit connections, so arranged that one pair of carbons will be held and maintained separated and the weight thereof taken off from the feeding mechanism until the carbons of the first set are consumed, whereupon the second set of carbons will be brought into service and the carbon rod and clutch of the first set lifted and supported free from the feeding mechanism during the time the second set of carbons are burning.

Third. My invention consists in the combination with the lifting magnet included in the main circuit, of the feeding magnet included in the shunt of the arc, a shunt around the lamp including resistance and an automatic cut out, a retaining magnet initially included in this shunt containing the cut out and mechanism, whereby the lifting magnet serves to operate the cut out to open the circuit through the retaining magnet when current is first established, before said retaining magnet becomes energized sufficiently to attract its armature.

Fourth. My invention consists in a pivoted bifurcated armature lever held in one position by the force of a spring to lift the clutch mechanism of one of the rods of a double carbon lamp and remove the weight thereof from the feeding mechanism, said armature lever being adapted, when the retaining magnet is energized, to be moved to its other position against the force of the spring to lower the clutch mechanism of the said rod, previously supported to bring the same into action, and at the same time to remove from the feeding mechanism the weight of the clutch mechanism of the other rod, and hold said other rod and its said clutch mechanism out of service.

My invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the regulating mechanism of a double carbon arc lamp embodying my invention. Fig. 2 is a rear view thereof. Fig. 3 is an isometric view of the clutch levers and the pivoted lever of the retaining magnet, the position of the yoke being indicated in dotted lines. Fig. 4 is an enlarged sectional view upon line X of Fig. 1, showing the construction of the yoke or central lever and its relation to the clutch levers. Fig. 5 is a diagram illustrative of the circuit connections when the lamp is connected in circuit before the current is established, one of the sets of carbons being shown in contact and the members of the other pair separated.

Like parts are indicated by similar letters of reference throughout the different figures.

The lifting magnet a is included in the main circuit; the fine wire feeding magnet b is included in a shunt around the arc. A shunt circuit including resistance c and an automatic cut out d is connected around the lamp; in this shunt circuit I place the retaining magnet e. The armature levers of the lifting and feeding magnets are connected by the link or rod f with the central lever f' and the yoke g carried thereon, this yoke being pivoted between the clutch levers g' g^2 and serving to carry one or the other of said clutch levers and operate the same responsively to changes in the arc which is burning, accordingly as the pivoted lever h of the retaining magnet is in position to support the one or the other of said clutch levers.

Now it will be observed that the lifting magnet a, the feeding magnet b, their armature levers, the connection of said armature levers with the yoke or feeding device g, and the position of the clutches and the clutch levers g' g^2 are substantially the same as in my prior application, and form no part of my invention herein, except as used in combination with the retaining electro magnet e and the pivoted armature lever h of said retaining magnet. I therefore deem it unnecessary to enter into a complete description of arc lamps and double carbon arc lamps in general, since my invention herein relates more particularly to the means whereby the carbon rod of the idle set of carbons, together with its special clutch mechanism, is supported and its weight taken off from the instrumentality, in this instance yoke g, through the medium of which the rod of the burning pair of carbons is fed, the construction of the lamp being preferably such as herein described, so that the average length of the arcs of the different sets of carbons will be the same, thereby obtaining a steady and uniform brilliancy of light during the entire service of the lamp.

Having thus briefly described the construction of my lamp, I will now describe its operation in connection with the circuits shown in Fig. 5.

The several parts of the lamp, as shown in the drawings, are in what I term their normal position; that is to say, in their position when the lamp is trimmed and in circuit but before the current is established.

We will now consider the current as coming in by the wire marked + and going out by the wire marked −. The rod i, which is that of the first set of carbons, is down so that the members of the first set are in contact. The rod k of the second set is held suspended since the foot or lug l of the pivoted armature lever h is held up by the spring m under the clutch lever g^2 to lift the same from the yoke, as shown most clearly in Fig. 3. Therefore the members of the second set of carbons are held apart and the current will be sent through the lifting magnet a, the rod i of the first set, and thence as shown by wire n out to line. When current is first established there will

be an impulse through the shunt containing the resistance *c* and the cut out *d*, and the retaining magnet *e* which is included in this shunt; thus the first impulse would tend to energize the retaining magnet so as to attract the armature of the pivoted armature lever *h*. This, however, will be but an impulse which will have no appreciable effect. In practice the armature of the retaining magnet will not be moved at all by this impulse, since the current passing through the lifting magnet *a* causes it to attract its armature, thus lifting the central lever *f'* which carries one of the contacts of the cut out *d;* thus the cut out *d* is opened immediately and the whole current is sent as before described, through the lifting magnet *a*, the first set of carbons, and thus by line *n* out to line —, and the retaining magnet *e* will now be connected with the branch containing the second set of carbons, which are separated, and, hence, the retaining magnet will not be excited. The yoke *g* is thus raised and with it the clutch lever *g'* carried thereon, and the arc is established at the first set, and the first set continues to burn until finally the rod *i* descends until its stop *o* comes against the frame of the lamp, preventing its feeding further. Now in order that the arc may be shifted to the second set, the arc of the first set must be extinguished and the carbons of the second set brought together and pulled apart. The rod *i* having been arrested in its descent the first arc will be lengthened until the current through the feeding magnet *b* is strong enough to cause said magnet to attract its armature against the force of spring *p* and lower the yoke *g* until the cut out *d* is closed. As soon as this cut out is thus closed a shunt is formed around the elongated arc and the arc goes out with a snap. The circuit through wire *n* is thus interrupted and the circuit is established directly through the retaining magnet *e*, this circuit being from wire + through the shunt containing resistance *c*, cut out *d* and said retaining magnet *e* to wire —; the armature of said retaining magnet is attracted against the force of the retractile spring opposing the same and the pivoted armature lever *h* is moved away from clutch lever g^2 and the said clutch lever g^2 is thus allowed to come upon its support upon the yoke *g* to be carried thereby. Thus the rod *k* is lowered so as to bring the second set of carbons together, and now immediately the current passes through said second set of carbons and by wire *q* through the retaining magnet, the lifting magnet *a* being brought into circuit immediately by the closing of the circuit through the second set of carbons. Thus when the second set of carbons touch each other the lifting magnet *a* is energized, the lever *f'* which carries the yoke *g* is lifted and the cut out *d* opened, while at the same time the clutch lever g^2 is lifted to draw the second set of carbons immediately apart after being closed to draw the second arc. The second arc being thus established, as before stated, the current will pass through the lifting magnet, through the arc of the second set by wire *q*, through the retaining magnet *e* and thence out by wire —. That is to say, the retaining magnet after the first arc goes out, will be brought into circuit and will remain in circuit. In the first place this circuit is through the shunt containing resistance *c* and immediately thereafter, that is, as soon as the second set of carbons are brought together, the shunt circuit will be opened at *d*, but the whole current will find circuit by way of the second set of carbons through the retaining magnet *e* so that it will continue to be energized from the time the first arc goes out. Now the retaining magnet being thus included directly in circuit with the second set of carbons, it will be energized to attract its armature and thus hold the tilting or pivoted lever *h* in its second position, that is to say the foot or lug *r* will be held up against the end of the clutch lever *g'* to lift said clutch lever *g'* off from the yoke *g*, thus taking the weight of the rod *i* and the special clutch mechanism thereof off from said yoke so that the feeding mechanism will be unobstructed by the weight of the idle rod. When the carbons of the second set are consumed, that is to say, when rod *k* is arrested in its descent, the arc of this set will increase in length, and, hence, cause a greater proportion of the current to pass through the fine wire magnet *b* until finally the cut out *d* will be again closed, and thereupon the current will pass through the shunt including resistance *c*, the cut out *d* and the retaining magnet *e*, and the arc will go out.

As to the prior art, reference is made to Reissued Letters Patent No. 11,002, granted Clarence B. Noble, May 7, 1889, for electric arc lamp.

My invention is not limited to any particular form of lifting and feeding electro magnetic devices, since it is evident that the retaining magnet and the pivoted lever thereof might be used in connection with the special clutch devices of any double carbon lamp to sustain the weight of the idle rod when the carbons of the other set are in service.

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

1. In a double carbon arc lamp, a feeding lever provided with a yoke raised and lowered by electro magnetic devices in the circuit of the lamp responsively to changes in the arc which is burning, in combination with two pivoted levers, each provided with a clutch, a retaining magnet and the pivoted lever thereof, said pivoted lever being held under the clutch lever of the idle pair of carbons to sustain the weight thereof, to prevent the rod carried by the clutch of the lever thus held up from feeding, and remove the weight thereof from the said feeding lever, substantially as and for the purpose specified.

2. The combination with the lifting magnet included in the main circuit, of the feeding magnet included in the shunt of the arc, a shunt around the lamp including resistance and an automatic cut out actuated by the lifting and feeding magnets, a retaining magnet initially included in this shunt containing the cut out and lever mechanism, whereby the lifting magnet serves to operate the cut out to open the circuit through the retaining magnet when current is first established before said retaining magnet becomes energized sufficiently to attract its armature, substantially as and for the purpose specified.

3. The combination in a double carbon arc lamp, of a yoke and two symmetrical clutch mechanisms for the different rods, a retaining magnet and its pivoted armature lever adapted to support one or the other of said mechanisms to relieve the yoke of the weight thereof, and the cut out, one of the contacts thereof being carried on the same lever with the yoke, substantially as specified.

4. In combination with two pairs of carbons in different parallel branches of a main circuit, regulating mechanism adapted to control both pairs of carbons, a spring controlled lever normally engaging with the clutch mechanism of one pair to hold the members of the said pair separated, a retaining magnet in circuit with the said normally separated pair adapted to act upon said lever in opposition to the spring to disengage the lever from the clutch mechanism, an electro-magnet in shunt of both pairs of carbons, and a switch controlled thereby adapted to momentarily close the circuit through the said retaining magnet upon an abnormal increase of resistance in the arc between either pair of said carbons, substantially as described.

5. The combination with two pairs of carbons in different continuous parallel branches of a main circuit, of regulating mechanism comprising a magnet in the main circuit and a magnet in shunt of the pairs of carbons acting differentially through suitable mechanism to control the separation and approach of the carbons during burning, a spring controlled lever normally engaging with the clutch mechanism of one pair of carbons to hold the members of that pair separated, a retaining magnet in circuit with the normally separated pair of carbons adapted to act in opposition to the spring upon the spring controlled lever to cause the disengagement of the said lever from the clutch mechanism, and contact points controlled by the shunt magnet of the regulating mechanism to close the main circuit directly through the said retaining magnet when the said shunt magnet becomes abnormally energized, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of April, A. D. 1892.

CHARLES E. SCRIBNER.

Witnesses:

GEORGE L. CRAGG,

GEORGE MCMAHON.