(No Model.)

3 Sheets—Sheet 1.

M. KRUEGAR.

ELECTRIC ARC LAMP.

No. 496,882. Patented May 9, 1893.

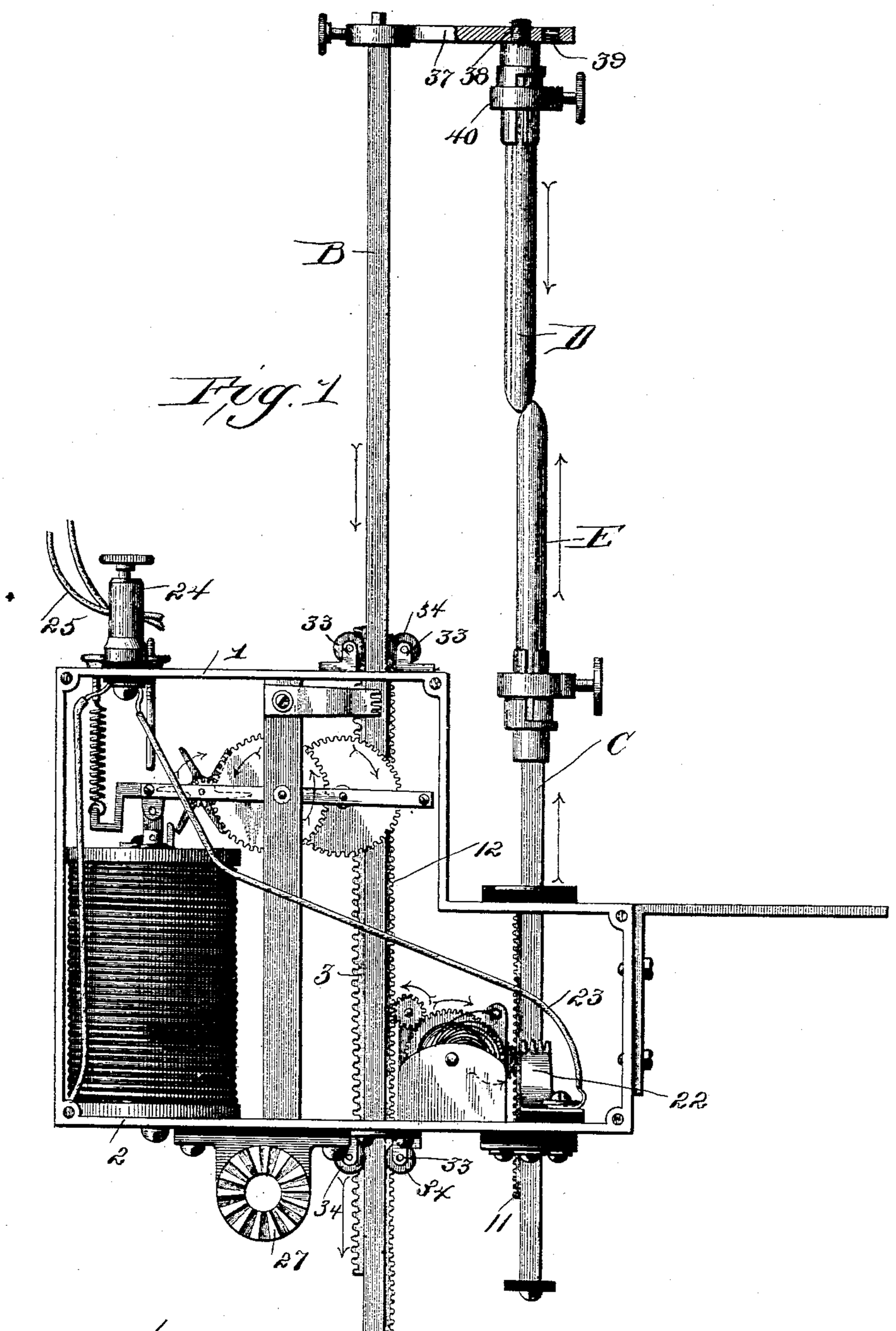

Fig. 1.

Witnesses
Wm. M. Rheems
[illegible]

Inventor
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By Sons & Kennedy Attys

(No Model.)

3 Sheets—Sheet 2.

M. KRUEGAR.

ELECTRIC ARC LAMP.

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Fig. 3

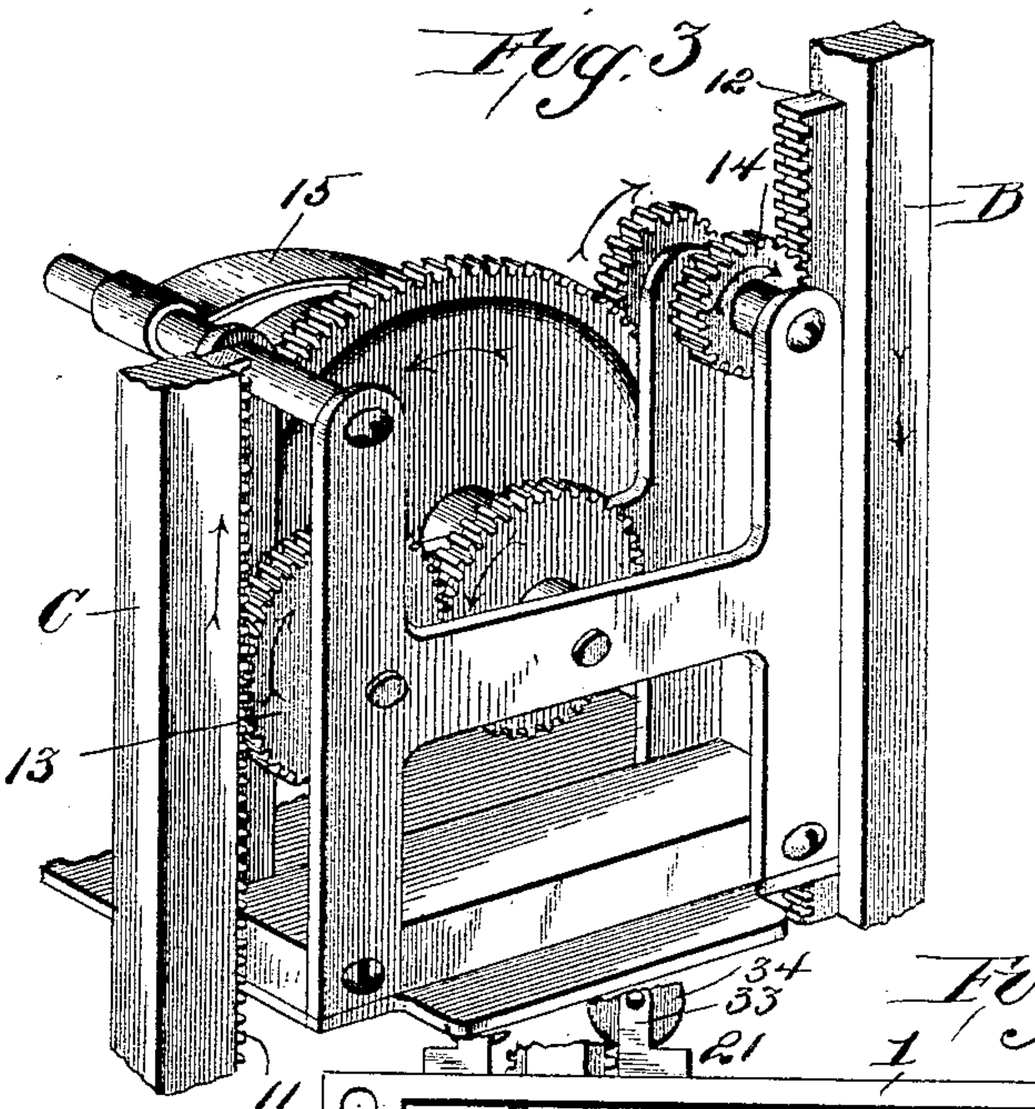


Fig. 2.

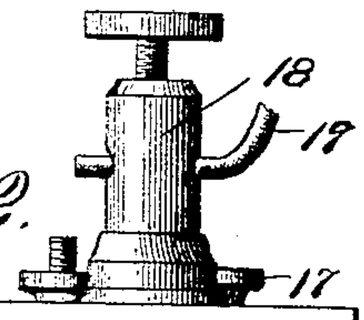
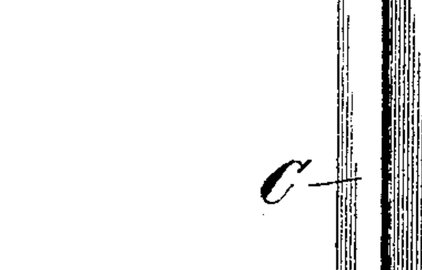
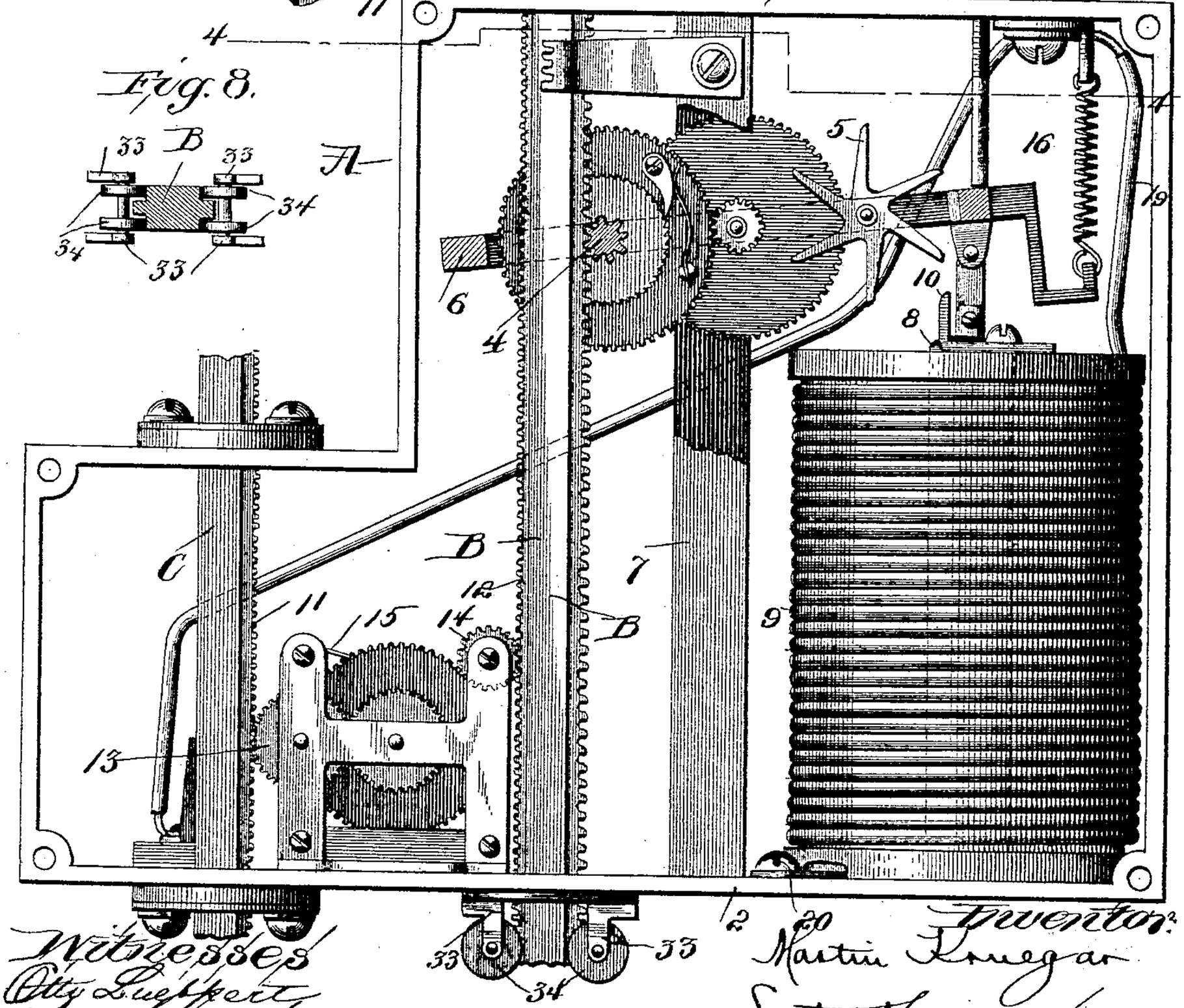


Fig. 8.





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(No Model.)

3 Sheets—Sheet 3.

M. KRUEGAR.

ELECTRIC ARC LAMP.

No. 496,882. Patented May 9, 1893.

Fig. 4.

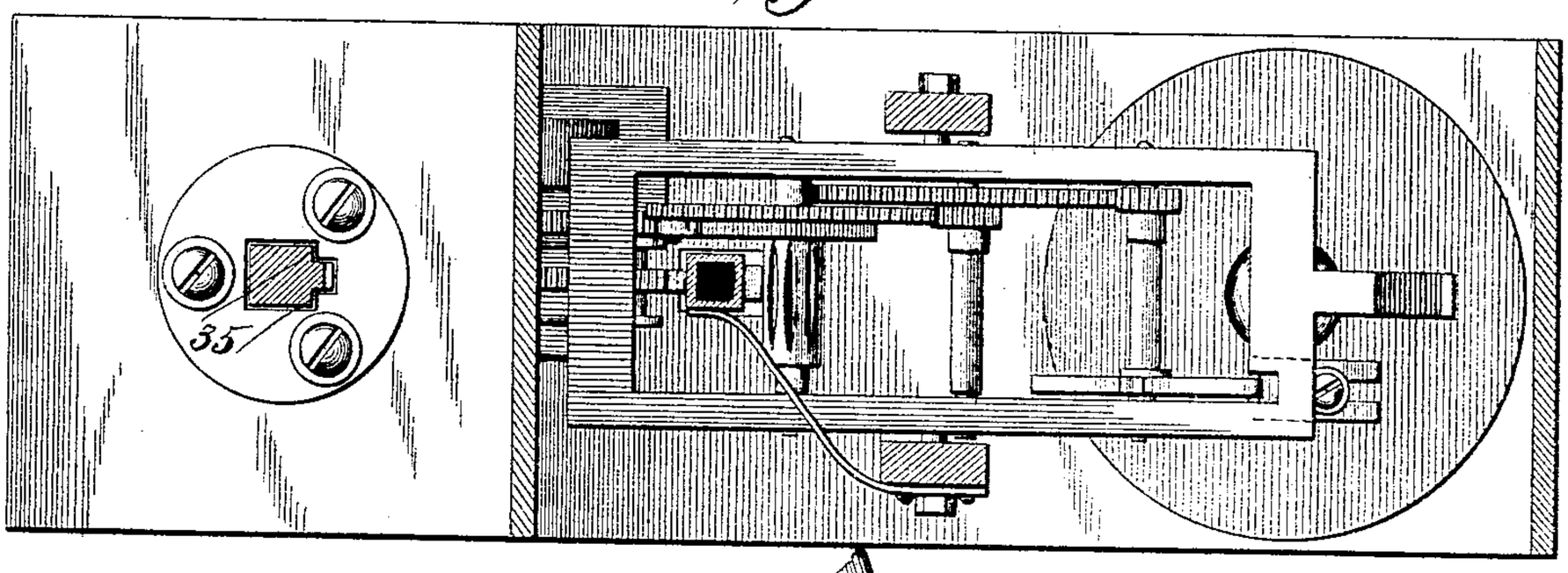


Fig. 7.

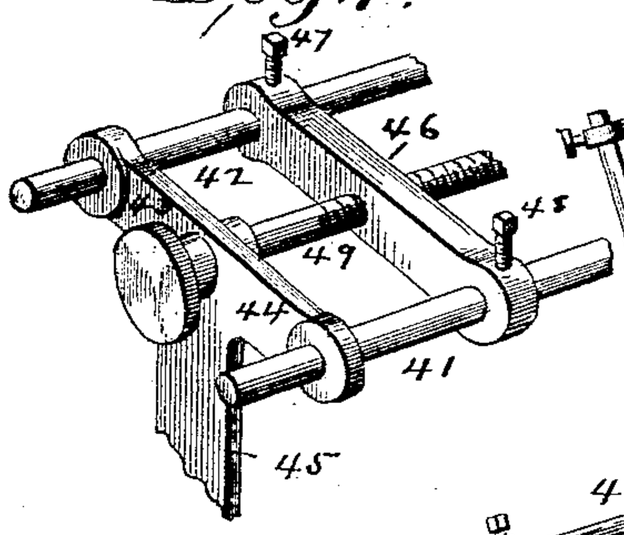


Fig. 5.

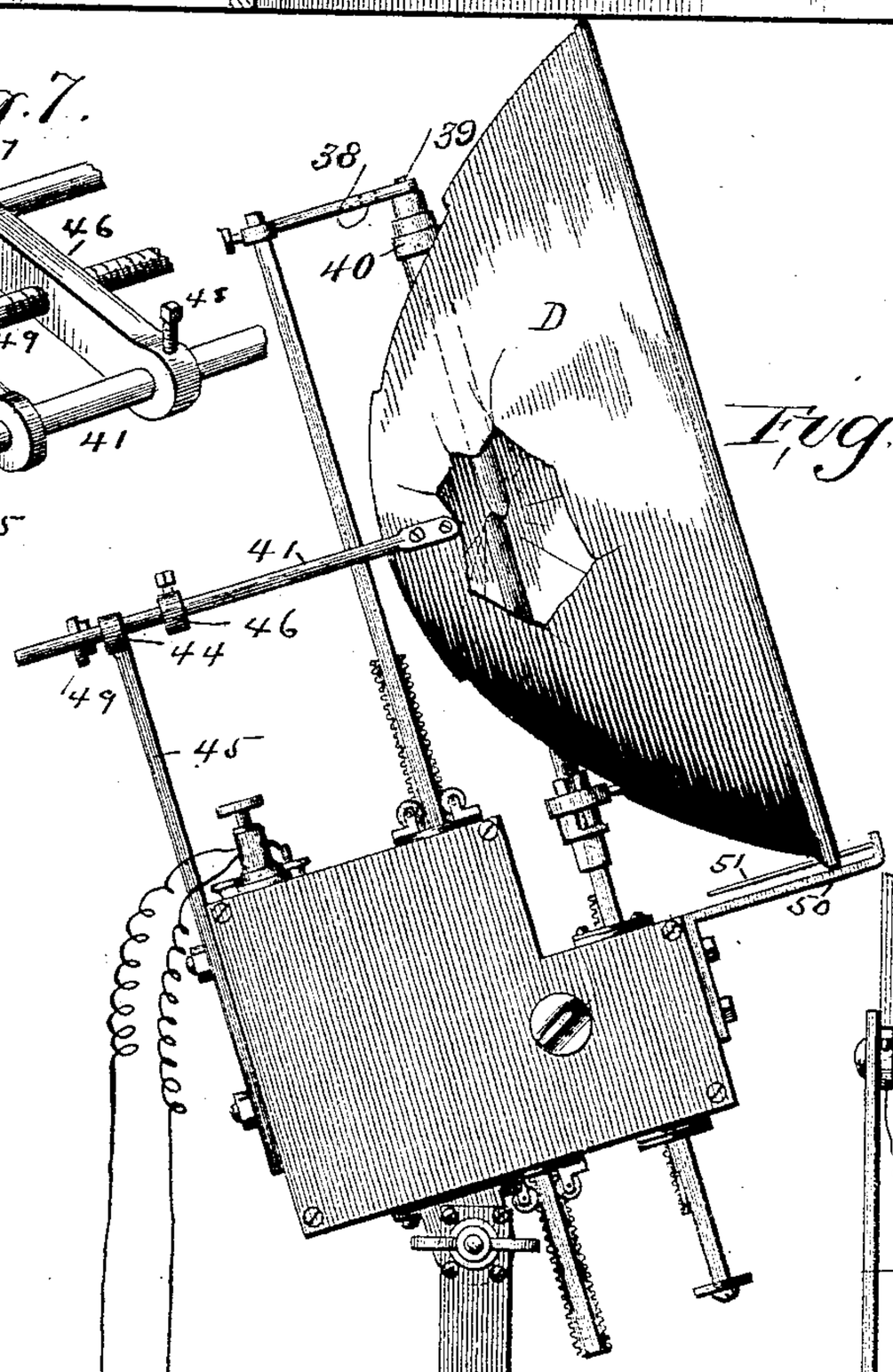
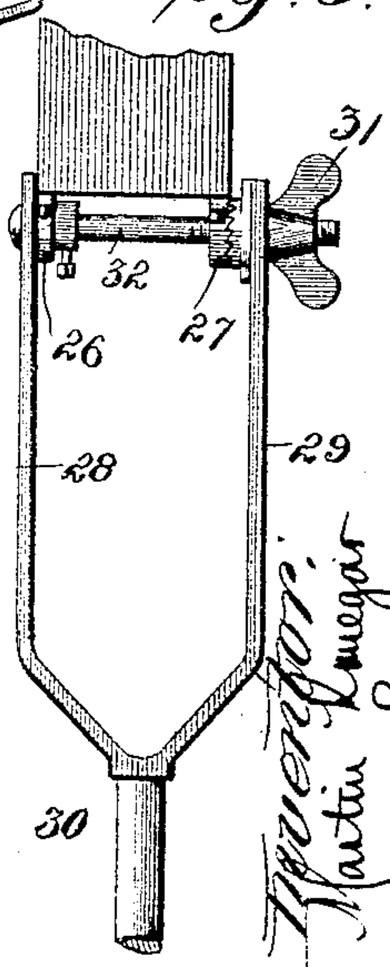


Fig. 6.



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UNITED STATES PATENT OFFICE.

MARTIN KRUEGAR, OF CHICAGO, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 496,882, dated May 9, 1893.

Application filed October 5, 1891. Serial No. 407,724. (No model.)

To all whom it may concern:

Be it known that I, MARTIN KRUEGAR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Arc Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a novel construction in electric arc lamps, and more particularly to electric arc lamps, that are used behind the scenes upon the stages of theaters to attain certain stage effects.

The objects of this invention are to provide an arc lamp of this description that can be tilted; to provide improved devices for feeding both carbons when the lamp is tilted as well as when it is in an upright position, so that the arc will always be located in the same position with relation to a fixed reflector or lens carried by the lamp, and to provide for the general efficiency and utility of electric arc lamps of this description.

To these and other useful ends my invention consists in the features of construction and combinations of parts hereinafter fully described and specifically claimed.

In the accompanying drawings illustrating my invention: Figure 1 is a side elevation of an electric arc lamp constructed in accordance with my invention, with sides of the box inclosing the carbon feeding and regulating devices removed. Fig. 2 is a side elevation of the carbon feeding and regulating devices taken on an enlarged scale and from the opposite side shown in Fig. 1. Fig. 3 is a perspective view of the carbon feeding devices. Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 2, with certain parts omitted. Fig. 5 is a side elevation of the lamp and its standard and showing said lamp in a tilted position. Fig. 6 is an end elevation of the upper end portion of the lamp standard and the lower end portion of the lamp. Fig. 7 is a detail perspective view of the device for securing a reflector to the lamp, and Fig. 8 is a detail view of the carbon carrying rod and anti-friction rollers.

Referring to said drawings, A indicates a box or receptacle within which the carbon feeding and regulating devices are inclosed.

B is the rod carrying the positive carbon point. C is the rod carrying the negative carbon point, and D is a reflector sustained as more fully described hereinafter to be moved and adjusted transversely of the carbon carrying rods.

The class of electric lights to which my invention refers is that in which both carbons are moved toward each other to maintain the arc and compensate for the consumption of the carbons. The rod B passes through openings made in the upper and lower sides 1 and 2 of the box A and is provided on its rear face with a toothed rack 3 that engages with a pinion 4, making one of a train of gearing that drives the fly wheel 5. The pinion 4 and fly wheel 5 are mounted upon frame 6 that is pivoted between two uprights 7 located within the box. To one end of said frame 6, the core 8 of the electro-magnet 9 is pivoted and serves to draw the fly wheel 5 in engagement with a projection 10 or releases the same from engagement with said projection according to the condition of the current that is passing through the said electro-magnet.

The above described mechanism is similar to that in use and does not form a part of my invention, and since the operation of such carbon regulating mechanism will be obvious to those familiar with electric lights, a further description will be unnecessary. The rod C carrying the negative carbon point also passes through openings in the top and bottom sides of the receptacle A and is located directly in front of the rod B. This rod C is provided on its rear face, with a toothed rack 11, and the rod B is provided on its front face with a toothed rack 12. The motor or clock work mechanism (illustrated in detail in Fig. 3) is secured to the bottom piece 2 of the housing A and has a gear pinion 13 intermeshing with the toothed rack 11 of the rod C and a gear wheel 14 intermeshing with the toothed rack 12 of the rod B. The spring 15 of said clock work mechanism is wound up by the elevation of the rod B when trimming the carbons and in unwinding turns the gear wheel 13 in such a direction to cause the rod C to be elevated and also turns the gear pinion 14

in a direction to lower the rod B. In this way it will be seen that the carbon points D and E are brought together, to compensate for their consumption. The relative dimensions of the gear pinion 14 and the gear wheel 13 are such with relation to the other members of the clock work mechanism, that the upper carbon point D will be moved about twice as fast as the lower carbon point E for obvious reasons, and said gear wheels are suitably insulated. When the rod B is elevated when trimming the carbons, the rod C will be depressed by reason of its gear connection therewith and the clock work mechanism will exert a constant tendency to bring the carbons together, but this is prevented by the carbon regulating device carried by the frame 6 in a familiar manner, but when, by reason of the consumption of the points of the carbons, the current passing there through is weakened, the spring 16 connected with the end of the pivoted frame 6 adjacent to the electro-magnet 9 serves to elevate the core 8 and release the fly wheel so that the clock work mechanism is then at liberty to move the rods B and C. The clock work mechanism then brings the carbon points together to restore the current to its desired strength and the core 8 is then drawn down by the electro-magnet 9 against the action of said spring 16, thereby throwing the fly wheel 5 into engagement with the projection 10, which prevents further movement on the part of said rods.

I have arranged a device for adjusting the strength of the spring 16. This is done to compensate for the difference in strength of the spring 15 of the clock work mechanism when it is entirely wound up and when it is almost run down.

A simple and convenient way of adjusting the strength of spring 16 consists in securing the same at its upper end to a thumb screw 17 having a screw threaded connection on the top piece 1 of the housing A and have a swiveled connection at its lower end with said spring 16.

When the clock work mechanism is entirely wound up and is exerting its full force on the rods B and C it will be noted that the same force is not required to tilt the pivoted frame 6 that is required when the clock work mechanism is partly unwound, so that in the first case the thumb screw 17 is turned to reduce the strength of the said spring 16, and as the clock work mechanism gradually unwinds the said spring 16 is tightened to compensate therefor, so that the core 8 will always be drawn up at the proper time to attain a steady and even light.

The housing A is preferably made of metal and the current for supplying the light passes through the conductor 17, thumb screw 18 and conductor 19 to the electro-magnet 9. From thence it passes through the bottom piece 2 of the housing by means of the connection 20 and then through the uprights 7 and contact brushes 21 to the rod B, after passing through the rod B, carbons D and E and rod C, it passes through the contact brushes 22 that are insulated from the housing A, through the conductor 23, thumb screw 24 and conductor 25.

As a further and separate improvement, I have provided a peculiar connection between the electric light and the stand therefor by means of which, the light can be tilted back and forth and throw the rays in any desired direction. To accomplish this purpose, the back piece 2 of the housing is provided on its lower face with two eye-lugs 26 and 27. A screw-bolt 32 passes through said lugs 26 and 27 and through the spring arms 28 and 29 upon the upper end of the standard 30. The upper ends of the arms 28 and 29 are located at the outside of the lugs 26 and 27 and have a tendency to spring outward when from engagement with said lugs, but by means of a thumb nut 31 upon the end of the screw-bolt 32, the said spring arms can be brought together in contact with said lugs. It will be noted that the screw-bolt forms a pivotal connection between the spring arms and the lugs and that when spring arms are not held in engagement with said lugs, the lamp can be turned on its pivotal connection and then secured in any desired tilted position. The meeting faces of the lug 27 and spring arm 29 are toothed or serrated, so that when brought together a rigid connection is formed. It will be noted that when the light is tilted the rods B and C will shift slightly and bear to a greater or less extent upon the gear wheel of the carbon regulating and feeding devices, which will cause a certain amount of friction between the gearing, which it is desirable to avoid. To accomplish this object, anti-friction rollers 33 are mounted in bearings upon the top and bottom pieces 1 and 2 of the housing. These anti-friction rollers are recessed in their center portion and have two bearing surfaces 34, which engage the shoulders 35 on said rods B and C. The said anti-friction rollers are adjusted so that one or the other engages said rods at all times and will hold the same in a true position with relation to the gearings that drive or are driven by the same. I have also provided an improved connection between the rod B and the upper carbon point D. It will be noted that it is desirable to change the location of the upper carbon point D according to the use to which the lamp is put. For instance, when a reflector is used, it is desirable that the upper carbon should be slightly in front of the lower carbon, so that the rays of light will be thrown back against the reflector, and when a lens is used it is found desirable to place the upper carbon point D slightly in the rear of the lower carbon point E, so that the rays will be thrown forward. To accomplish the adjustment of the upper carbon, I therefore provide the arm 37 upon the upper end

of the rod B with two perforations 38 and 39, the carbon holder 40 can be secured in either of these openings.

In Fig. 1 the carbons are arranged for use in connection with a lens, so that the carbon holder is secured in the rear opening 38, which brings the carbon D slightly in the rear of carbon E, but in Fig. 5 the carbon holder 40 is secured within the forward opening 39 of said arm 37 and this brings the said carbon D a little in advance of the lower carbon.

The reflector D, as before stated is sustained so that it may be adjusted transversely of the carbon carrying rods. To provide for this adjustment, I secure to the rear side of the reflector a frame in the form of two connected rods 41 and 42 which extend rearward loosely through openings formed in the ends of two arms 43 and 44 extending laterally in opposite directions from the upper end of a vertical standard 45 the lower end of which is secured rigidly to the rear side of the housing. Between the standard and the reflector these rods are connected by a cross bar 46 the ends of which are provided with openings to receive the rods which are held therein by set screws 47 and 48. At its center, the connecting bar is provided with a threaded opening which is adapted to receive the threaded end of a set screw 49 mounted to turn loosely in the upper end of the standard as shown in Fig. 7. Under this construction it will be seen that by turning the set screw the frame and the reflector connected thereto will be caused to move transversely of the carbon carrying rods—outward or inward as the case may be. At its lower edge the reflector slides on a guide or bracket 50, projecting from the front of the housing, and is guided and prevented from moving laterally by means of a rod 51 extending rearward from the end of the bracket above the same and through an opening in the lower edge of the reflector.

I claim as my invention—

1. The combination in an arc lamp of the housing, the carbon carrying rods B and C mounted therein one in advance of the other, the rack 11, on the rear of rod C, the racks 3 and 12 on opposite edges of rod B, the motor located between said rods and engaging the racks 11 and 12 to move the rods in opposite directions the electro magnet located in rear of rod B, its movable core, the pivoted frame connected to said core, the train of gearing and fly wheel carried by the frame and receiving motion from racks, and the stop arranged to encounter the fly wheel, substantially as described.

2. The combination with standard 30 provided at its upper end with perforated arms 28 and 29 tending constantly to spring apart, of the lamp and its housing, the perforated lugs 26 and 27 projecting from the housing and seated between the ends of the arms the meeting faces of lug 27 and arm 29 being serrated, the pivot bolt 32 extending through the perforations in the lugs and arms and the thumb nut applied to the end of the bolt.

3. In an arc lamp the combination of the housing, the standard 45 at the rear of the same, the reflector, the rearwardly extending rods attached to the reflector, and passing loosely through the standard, the cross bar connecting the rods, the adjusting screw mounted in the standard and engaging the cross bar, the bracket at the front of the housing in position to sustain the lower edge of the reflector and the rod 51 secured to the bracket and passing through the reflector.

4. The combination of the housing the standard sustained thereby, the carbon holders, the reflector movable bodily transversely of the carbon holders and provided with slots through which the carbons extend, and the bracket projecting from the front of the housing in position to sustain and guide the lower edge of the reflector.

5. The combination in an arc lamp of the carbon carrying rods B and C—the rack 11 on rear of the rod C—the racks 3 and 12 on opposite edges of the rod B, the motor engaging the racks 11 and 12 to move the rods in opposite directions, the train of gearing driven by the rack 3 and the stop arranged to engage and arrest the motion of the train of gearing.

6. In an arc lamp the combination of the carbon carrying rods B and C—the motor engaging said rods to move them in opposite directions, the train of gearing driven by rod B and the stop to arrest its motion.

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN KRUEGAR.

Witnesses:

HARRY COBB KENNEDY,

OTTO LUEBKERT.