

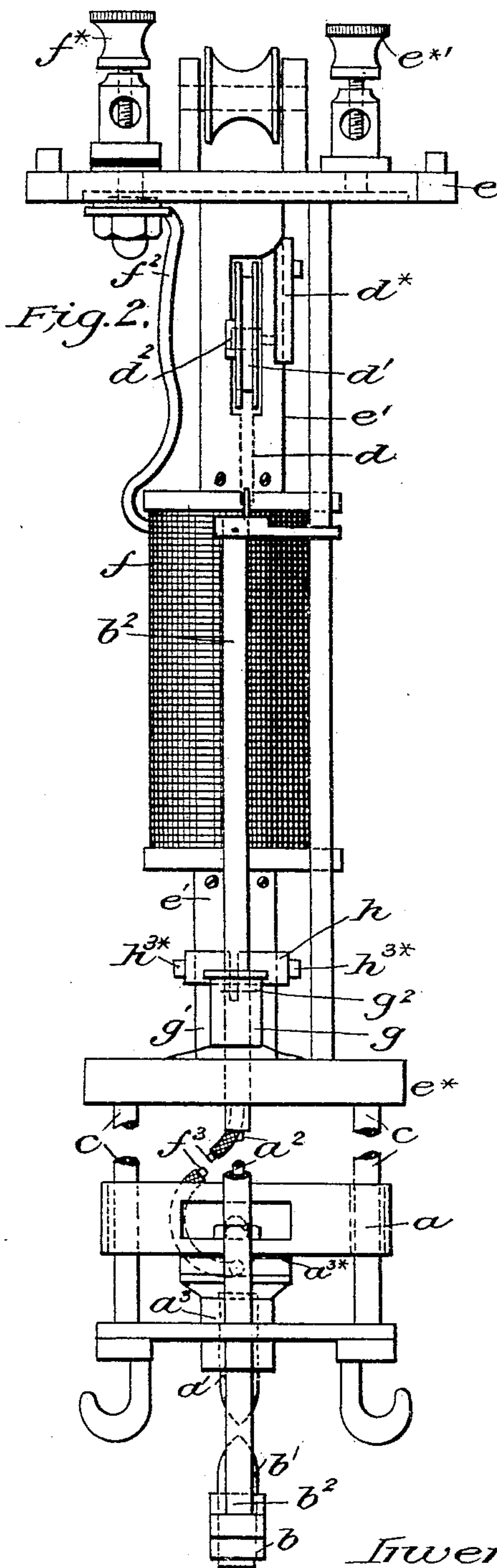
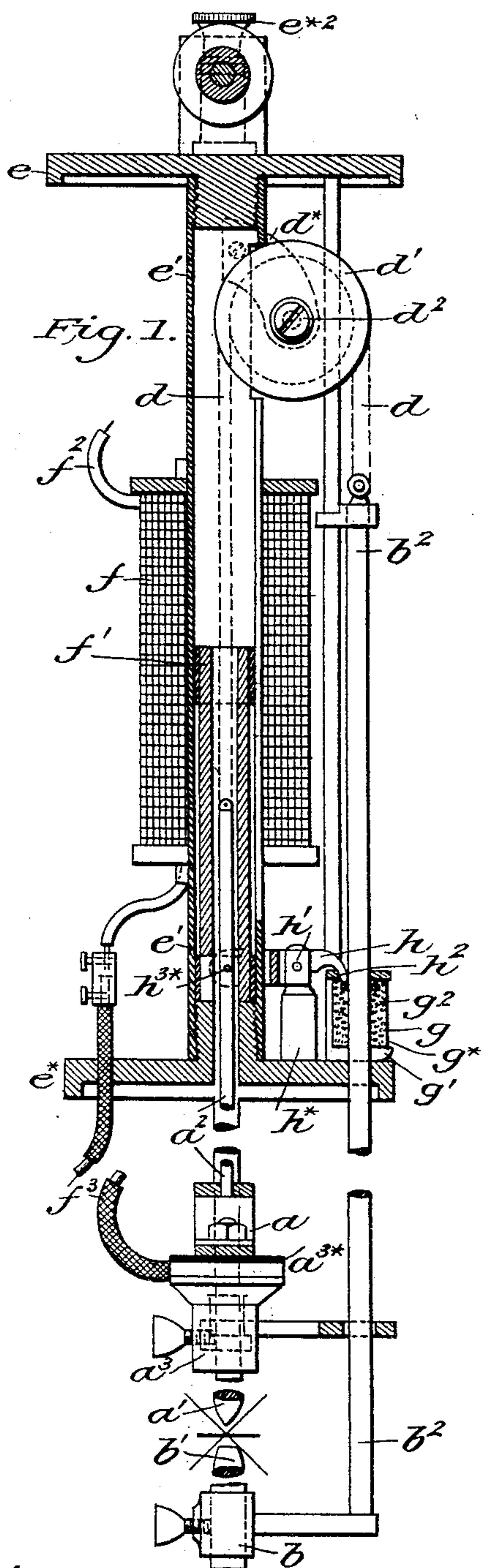
(No Model.)

2 Sheets—Sheet 1.

W. H. AKESTER.  
ELECTRIC ARC LAMP.

No. 496,387.

Patented Apr. 25, 1893.



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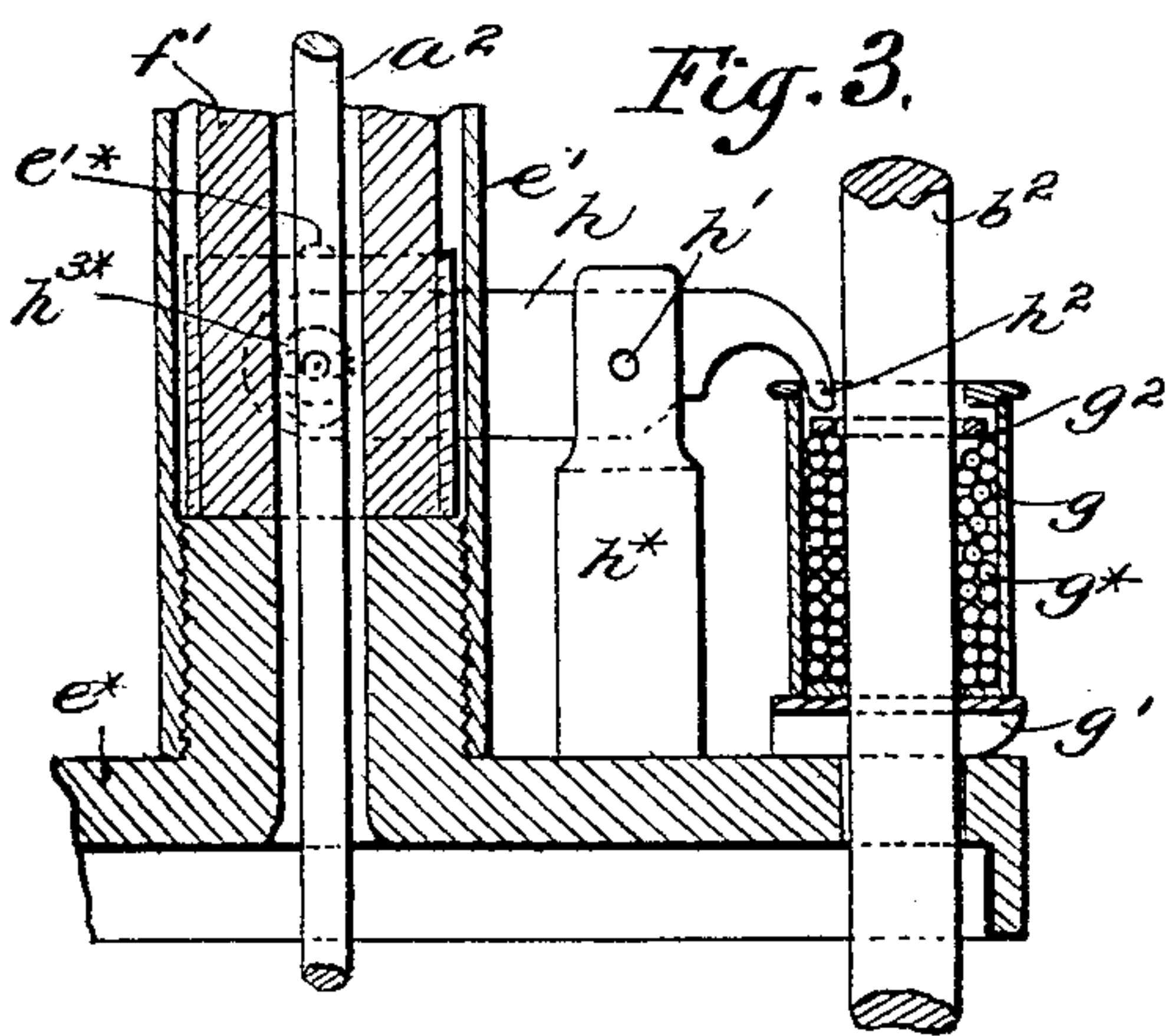


Fig. 3.

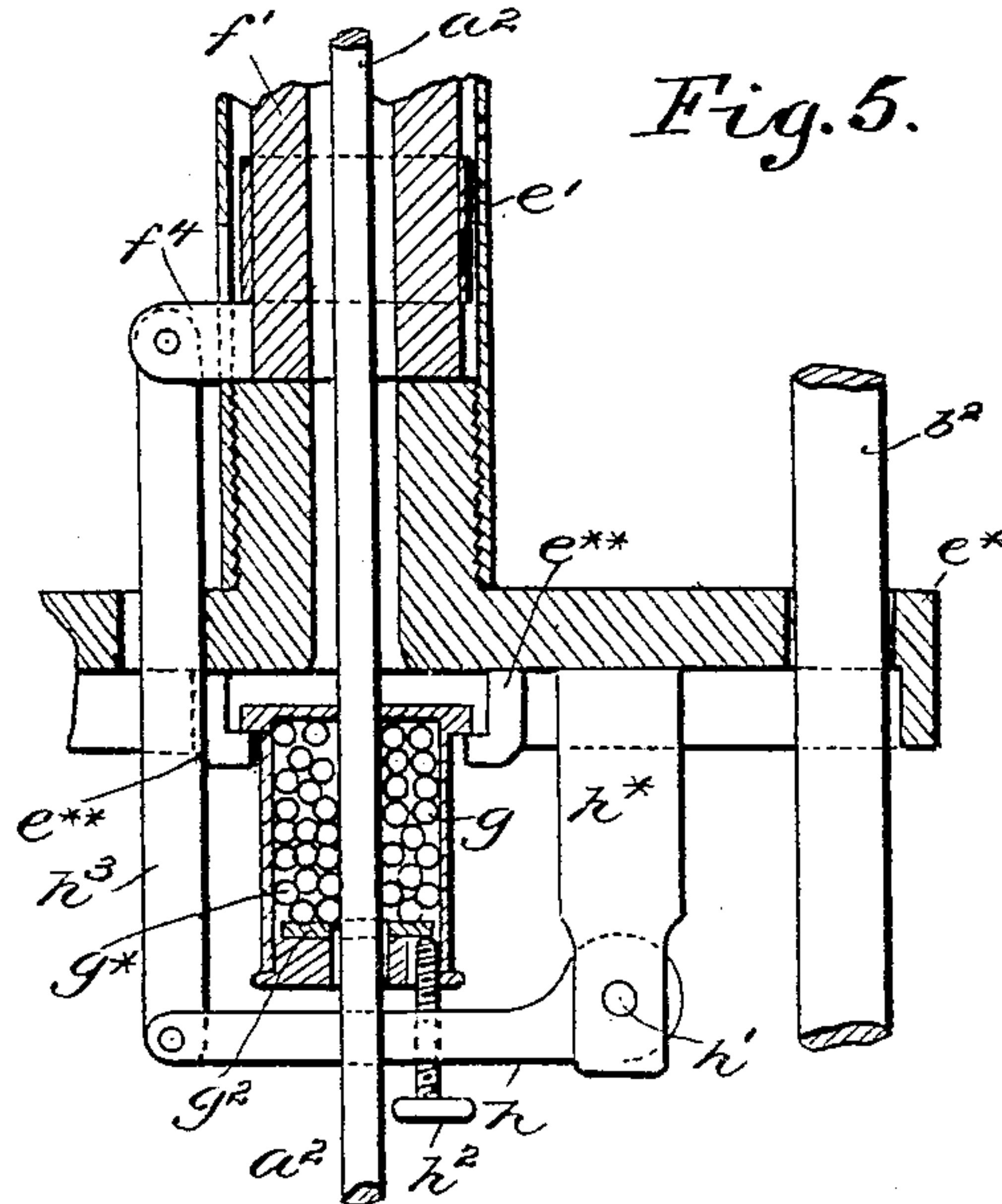


Fig. 5.

Fig. 4.

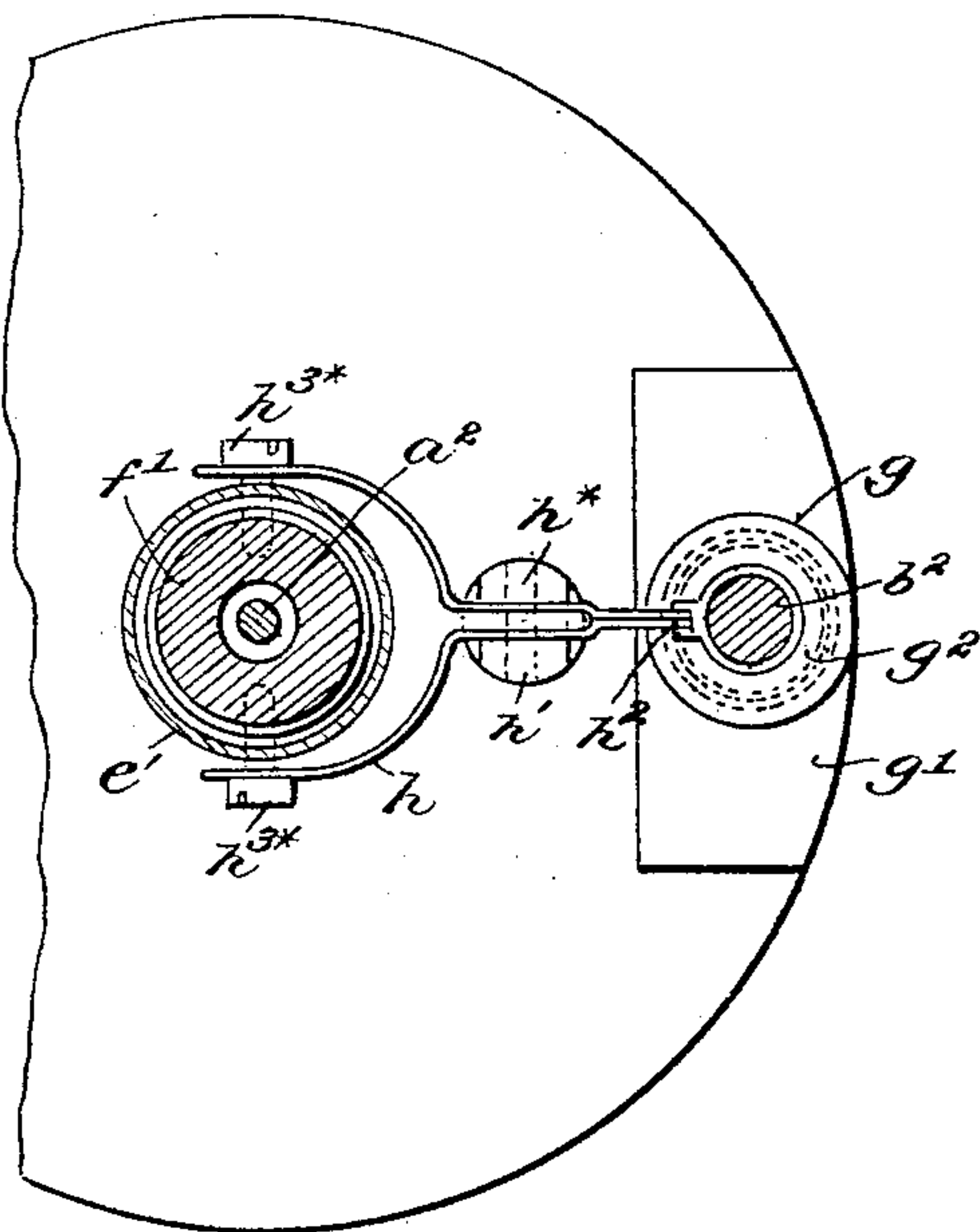
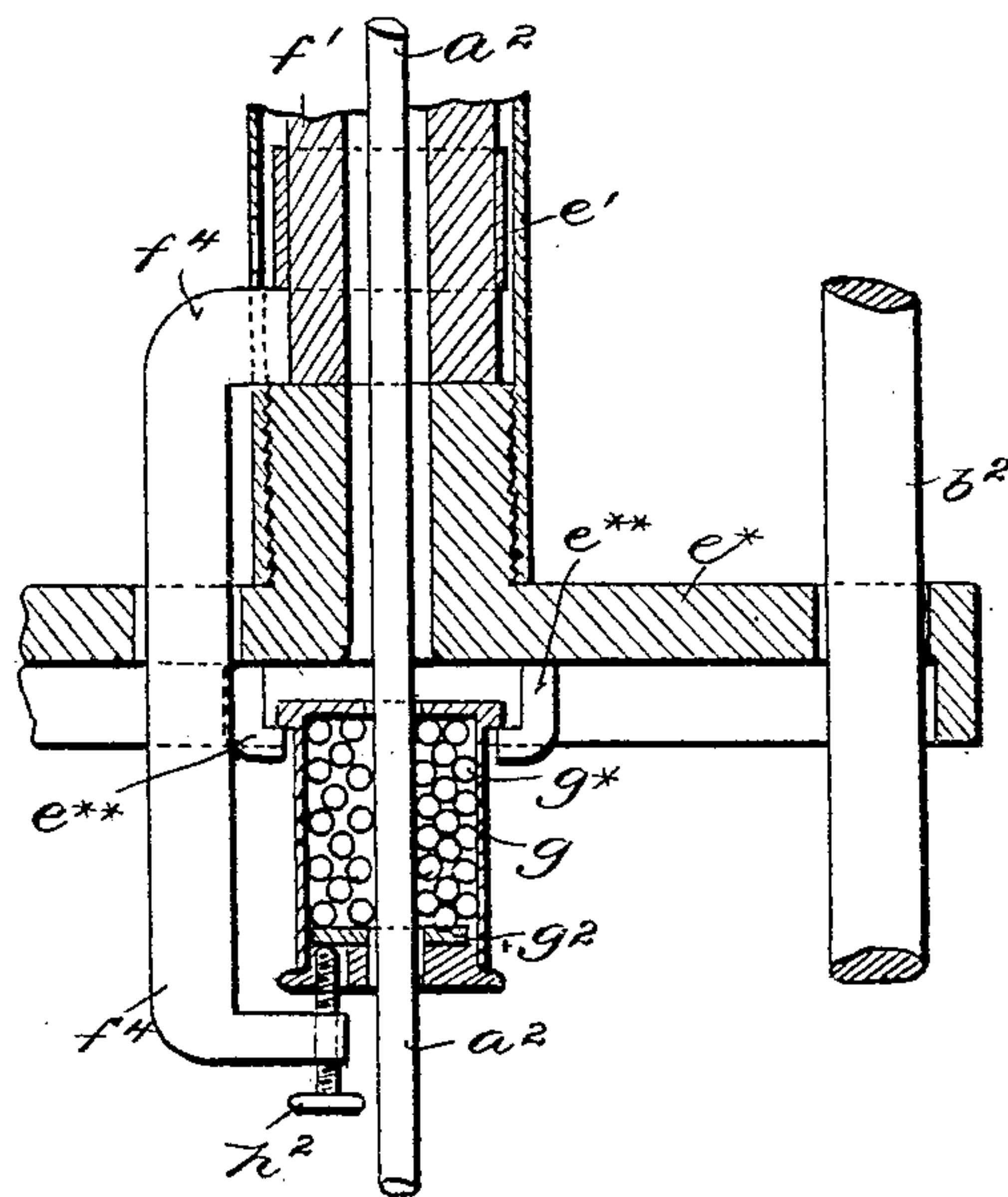


Fig. 6.



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# UNITED STATES PATENT OFFICE.

WILLIAM HOPKIN AKESTER, OF LONDON, ENGLAND.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 496,387, dated April 25, 1893.

Application filed September 9, 1892. Serial No. 445,475. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HOPKIN AKESTER, electrical engineer, a subject of the Queen of Great Britain, residing at Fulham, London, in the county of Middlesex, England, have  
5 invented certain new and useful Improvements in or Connected with Electric-Arc Lamps, of which the following is a specification.

10 This invention relates to that class of arc lamps in which a solenoid or an electro magnet is employed to assist in controlling or regulating the feed of the carbons and the object of the present invention is to obtain a more  
15 sensitive device for effecting that purpose. For this purpose I attach to each carbon holder or to a suitable part fixed thereto a vertical slide or rod as heretofore proposed and I connect the two slides or rods by a  
20 flexible connection which may pass through the hollow core of the solenoid and over a guide pulley so that upon the descent of the slide or rod of the lower carbon the carbons will be separated while upon the ascent there-  
25 of they will approach each other. The upper carbon holder and rod are made heavier than those of the lower carbon so that when the gripping device hereinafter described, is released, the superior weight of such upper carbon holder and rod will cause the carbons to  
30 approach until arrested.

Around the slide or rod of the lower carbon and supported upon a suitable spring I arrange a box or case which I fill, or nearly so,  
35 with spherical pellets, and upon the top of these pellets I place a disk or washer formed with the central aperture to loosely receive the slide or rod.

In connection with the disk or washer I employ a lever which is mounted upon an axis of motion and one end of which lever I provide with a set screw to bear upon the disk or washer, and I connect the opposite end thereof with the core of the solenoid by a suitable flexible connection. By these means,  
40 upon the core of the solenoid descending, the opposite end of the lever will be raised permitting the disk or washer to assume a horizontal position thereby freeing the slide or rod while upon the core of the solenoid  
50 rising the lever will press upon the disk and tilt or cant it until it grips upon the slide or

rod and thereby arrests the further movement thereof and this action is materially assisted by the pellets contained within the box or  
55 case which upon being displaced by the depression of the disk or washer at one side will rise upon the other side of the box or case and assist the canting action of the disk or washer while, at the same time, they constitute an auxiliary grip. When the slide or  
60 rod is gripped by the disk or washer, and pellets as lastly described the continued pressure of the arm of the lever upon the disk or washer will cause the slide or rod to  
65 be slightly depressed thereby compressing the spring and striking the arc.

In some cases, I arrange the gripping device in connection with the slide or rod of the upper carbon and I then fix the set screw on the  
70 lever at a point between its axis and point of connection with the core of the solenoid or I may dispense with the employment of the lever, and in lieu thereof, prolong the lower end of the core of the solenoid and bend it out-  
75 ward. I also invert the box or case containing the disk or washer and spherical pellets so that the disk or washer is below the pellets, and I provide the end of the core of the solenoid with a set screw, which, on the ris-  
80 ing of the said core comes into contact with the underface of the disk or washer and causes it to be tilted or canted and the slide or rod to be gripped and slightly raised so as to separate the carbons and strike the arc. In this  
85 case, the action of the weight of the pellets, and the box or case obviates the necessity for a spring.

I have hereinbefore described the employment of a solenoid for effecting the purpose  
90 of my invention, but when an electro magnet of ordinary form is employed the set screw provided for the purpose of tilting or canting the disk or washer is carried by the armature or some part moving in unison therewith.  
95 And in order that the said invention may be more clearly understood and readily carried into effect, I will proceed, aided by the accompanying drawings, more fully to describe the same.

In the drawings—Figure 1 represents an elevation partly in section of an electric arc lamp constructed according to the present invention and with the globe removed. Fig. 2



is an elevation thereof taken at right angles to Fig. 1. Fig. 3 represents a portion of Fig. 1 drawn to an enlarged scale. Fig. 4 is a plan thereof. Figs. 5 and 6 are similar views to Fig. 3 representing slight modifications in the arrangement of parts.

In the several figures like parts are indicated by similar letters of reference.

Referring to Figs. 1 to 4  $a$  represents the runner which carries the holder  $a^3$  of the positive or upper carbon  $a'$  while  $b$  represents the holder for the negative or lower carbon  $b'$ . The carrier or holder  $a^3$  of the upper carbon  $a'$ , which holder is insulated from the runner  $a$  by a mica plate or other insulating material  $a^{3*}$ , is made heavier than the holder or carrier  $b$  of the lower carbon, and it is arranged to slide up and down upon two vertical side rods  $c$  of the lamp, in the manner now well known, and the carrier or holder  $a^3$  is connected by means of a rod  $a^2$  to one end of a chain or other suitable flexible connection  $d$  which passes over a pulley  $d'$  mounted loosely upon a shaft or axle  $d^2$  carried in bearings in a bracket  $d^*$  from a tube  $e'$  connecting the two plates  $e$   $e^*$  of the frame of the lamp. Or, if desired, the bracket  $d^*$  might be carried by the top plate  $e$  or other convenient part of the frame of the lamp. The other end of the flexible connection  $d$  is attached to the upper end of a rod  $b^2$  rising vertically from the carrier or holder  $b$  of the negative carbon  $b'$ . Beneath the pulley  $d'$  and fixed to the tube  $e'$  is arranged a solenoid  $f$  provided with a hollow movable soft iron core  $f'$  through the center of which passes freely the rod  $a^2$  and part of its attached chain  $d$ . Around the slide or rod  $b^2$  of the lower carbon holder  $b$  and supported upon a suitable spring  $g'$  or it might be upon the end of a counter balanced lever is arranged a cylindrical box or case  $g$  closed at each end with the exception of a central aperture to allow of the passage of the rod  $b^2$ , and this box or case  $g$  is filled or nearly so with spherical pellets  $g^*$  and upon the top of these pellets is placed a disk or washer  $g^2$  formed with a central aperture therein to loosely receive the slide or rod  $b^2$ .

In connection with the disk or washer  $g^2$  is employed a lever  $h$  mounted upon an axis of motion  $h'$  carried by a short standard  $h^*$  rising from the plate  $e^*$ , and one end of this lever is formed with a downward projection or hook  $h^2$ , or it might be provided with a set screw which passes through a small aperture provided in the top of the box  $g$  and bears upon the disk or washer  $g^2$  at one side thereof, while the opposite end of the lever  $h$  is bifurcated to embrace the tube  $e'$  and at its ends is furnished with screw studs  $h^{3*}$  which pass through long slots  $e'^*$  formed in the tube  $e'$  and screw into the core  $f'$  of the solenoid  $f$  so that the lever  $h$  is pivotally connected therewith.

The action of the mechanism hereinbefore described is as follows:—The passage of the

current through the coil  $f$  of the solenoid causes the soft iron core  $f'$  to be more or less raised or drawn farther into the center of the solenoid according to the strength of the current, while upon the current diminishing or ceasing the core  $f'$  will correspondingly descend as is well understood. When no current is passing through the lamp the superior weight of the carrier or holder  $a^3$  will bring the carbons  $a' b'$  into contact, and the hooked end  $h^2$  of the lever  $h$  will be raised permitting the disk or washer  $g^2$  to assume a horizontal position as indicated in the drawings, and thereby freeing the slide or rod  $b^2$ , and permitting it to rise or fall, while upon the current being admitted it passes by the terminal  $f^*$  and conductor  $f^2$  of solenoid  $f$  and after passing therethrough it is led by the conductor  $f^3$  to the carrier  $a^3$  of the upper carbon  $a'$ . It then passes through the carbons  $a' b'$ , carrier or holder  $b$ , slide or rod  $b^2$  and the frame of the lamp to the terminal  $e^*$ . The passage of the current through the coil of the solenoid causes the soft iron core  $f'$  to be raised or drawn farther into the center of the solenoid thereby causing the hooked end  $h^2$  of the lever  $h$  to press upon the disk or washer  $g^2$  and tilt or cant it, until it grips the slide or rod  $b^2$  and thereby arrests the further movement thereof, and this action is materially assisted by the pellets  $g^*$  contained within the box or case  $g$ , which upon being displaced by the depression of the disk or washer  $g^2$  at one side will rise upon the other side of the box or case  $g$ , and assist the canting action of the disk or washer  $g^2$  while at the same time they constitute an auxiliary grip. When the slide or rod  $b^2$  is gripped by the disk or washer  $g^2$  and pellets  $g^*$  as lastly described, the continued pressure of the hooked end  $h^2$  of the lever  $h$  upon the disk or washer  $g^2$  will compress the spring  $g'$  or depress the counter-balanced lever as the case may be and cause the slide or rod  $b^2$  to be slightly depressed thereby striking the arc. The intensity of the current being now diminished, the core  $f'$  of the solenoid  $f$  will descend to its normal position and will thereby raise the hooked end  $h^2$  of the lever  $h$  and permit the disk or washer  $g^2$  to resume its horizontal position thereby again freeing the slide or rod  $b^2$  and permitting the spring  $g'$  to re-assert itself.

In the example given at Fig. 5, the box  $g$  is arranged in connection with the rod  $a^2$  of the upper carbon  $a'$  and is supported in an inverted position, and with capability of vertical movement by lugs  $e^{**}$  projecting downward from the plate  $e^*$  while the post or standard  $h^*$  is arranged upon the under side of the plate  $e^*$  and the axis of motion  $h'$  of the lever  $h$  is arranged at one end thereof, and the opposite end is by a link  $h^3$  connected with a bracket or projection  $f^4$  from the core  $f'$  of the solenoid  $f$  the projection  $h^2$  of the lever  $h$  being in this case a set screw arranged between its axis  $h'$  and its point of connection with the link  $h^3$ .



In the example given at Fig. 6, the parts are similar to those lastly hereinbefore described, but in this case the lever  $h$  is dispensed with and a projection or bracket  $f^4$  from the solenoid  $f$  is carried down to support the set screw  $h^2$  which bears upon the disk  $g^2$  of the box or case  $g$ .

The operation of the two devices lastly hereinbefore described is substantially the same as that described with respect to Figs. 1, 2, 3 and 4, and will be readily understood upon reference thereto, the weight of the box or case  $g$  and pellets  $g^*$  in these two examples taking the place of the spring  $g'$ .

I have hereinbefore described the employment of a solenoid for effecting the purpose of my invention, but when an electro magnet of ordinary form is employed, the set screw  $h^2$  the purpose of which is to tilt or cant the disk or washer  $g^2$  is carried by the armature or some part moving in unison therewith as will be readily understood.

What I claim is—

1. In an electric arc lamp, the combination of two carriers for the carbons supported by the lower ends of suitable rods suspended by means of a flexible connection passing over

a pulley, a vertically movable box or case surrounding one of the rods and filled with spherical pellets and held in its normal position by a spring or weight, a loose disk or washer within the box, a solenoid and a stud or projection connected with the core of the solenoid and bearing upon the loose disk, substantially as herein shown and described and for the purpose stated.

2. In an electric arc lamp, a regulating device consisting of a vertically movable box or case filled with spherical pellets and held in its normal position by a spring or weight, a rod passing therethrough and connected with one of the carbons, an apertured disk located within the box and a stud or projection bearing upon the disk and carried by some electrically controlled part of the lamp, substantially as herein shown and described and for the purpose stated.

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