

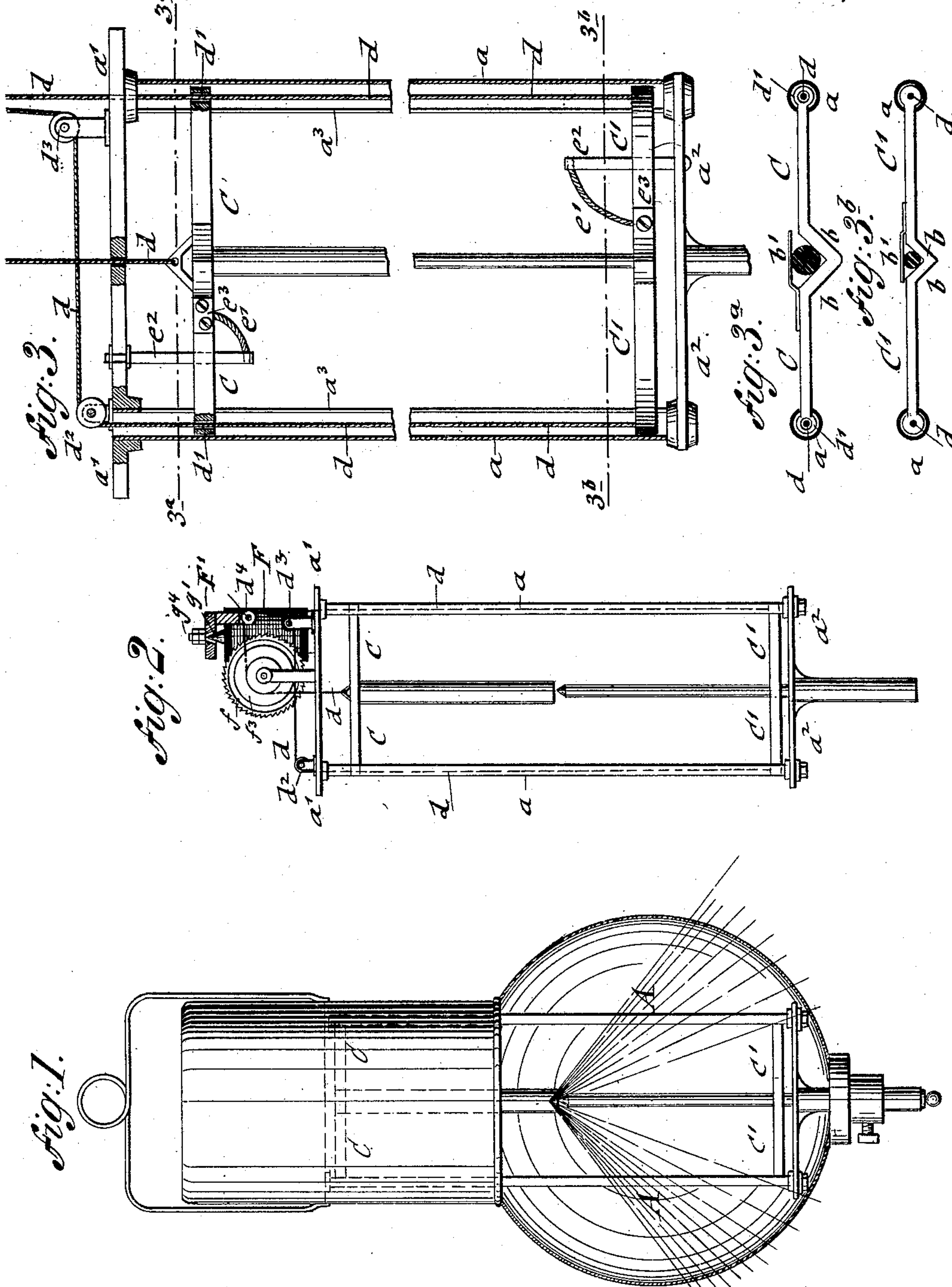
(No Model.)

2 Sheets—Sheet 1.

J. RIEDEL.
ELECTRIC ARC LAMP.

No. 467,199.

Patented Jan. 19, 1892.



WITNESSES:

A. Schuhl
Charles Schroeder

INVENTOR

Josef Riedel
BY
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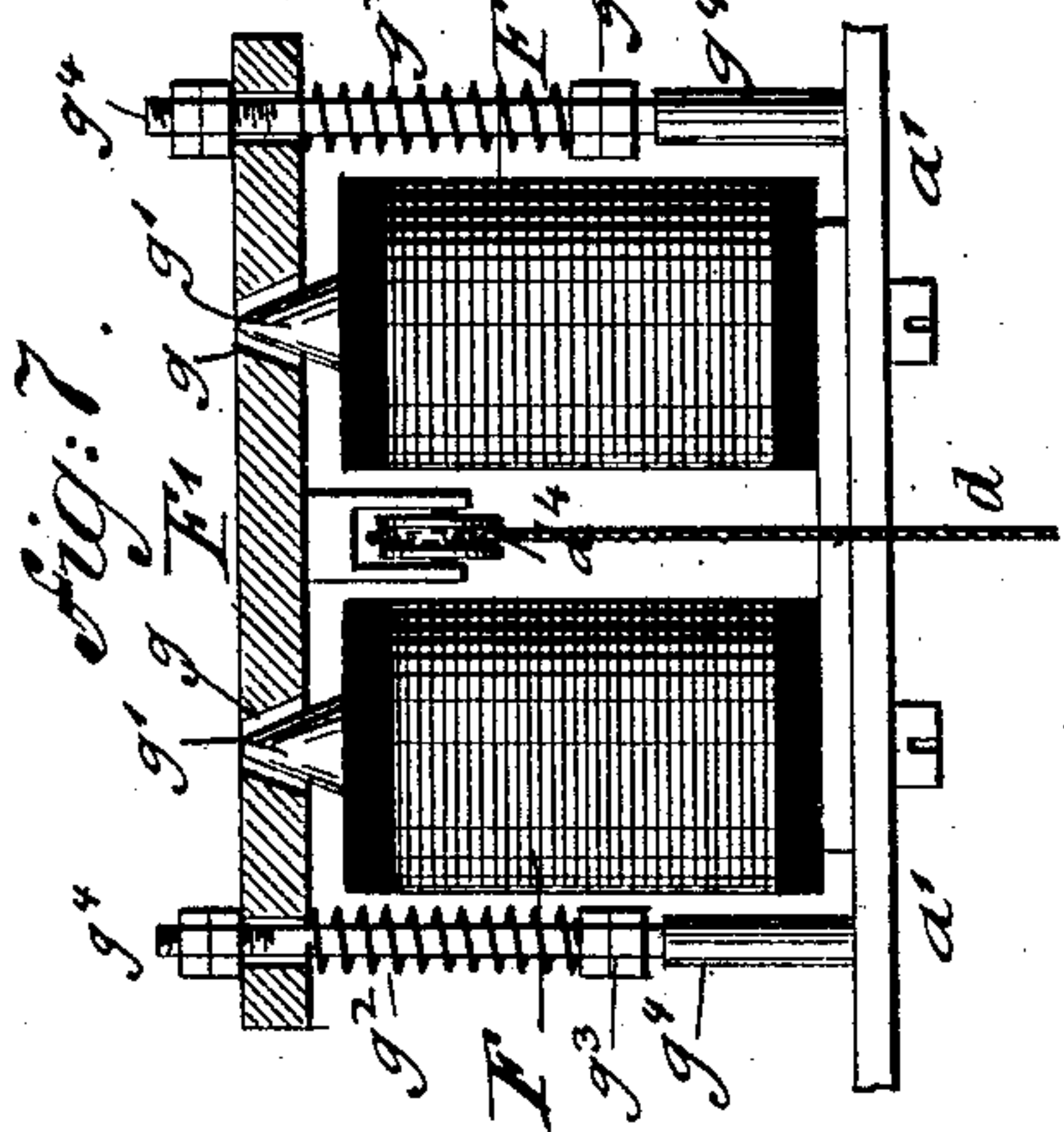
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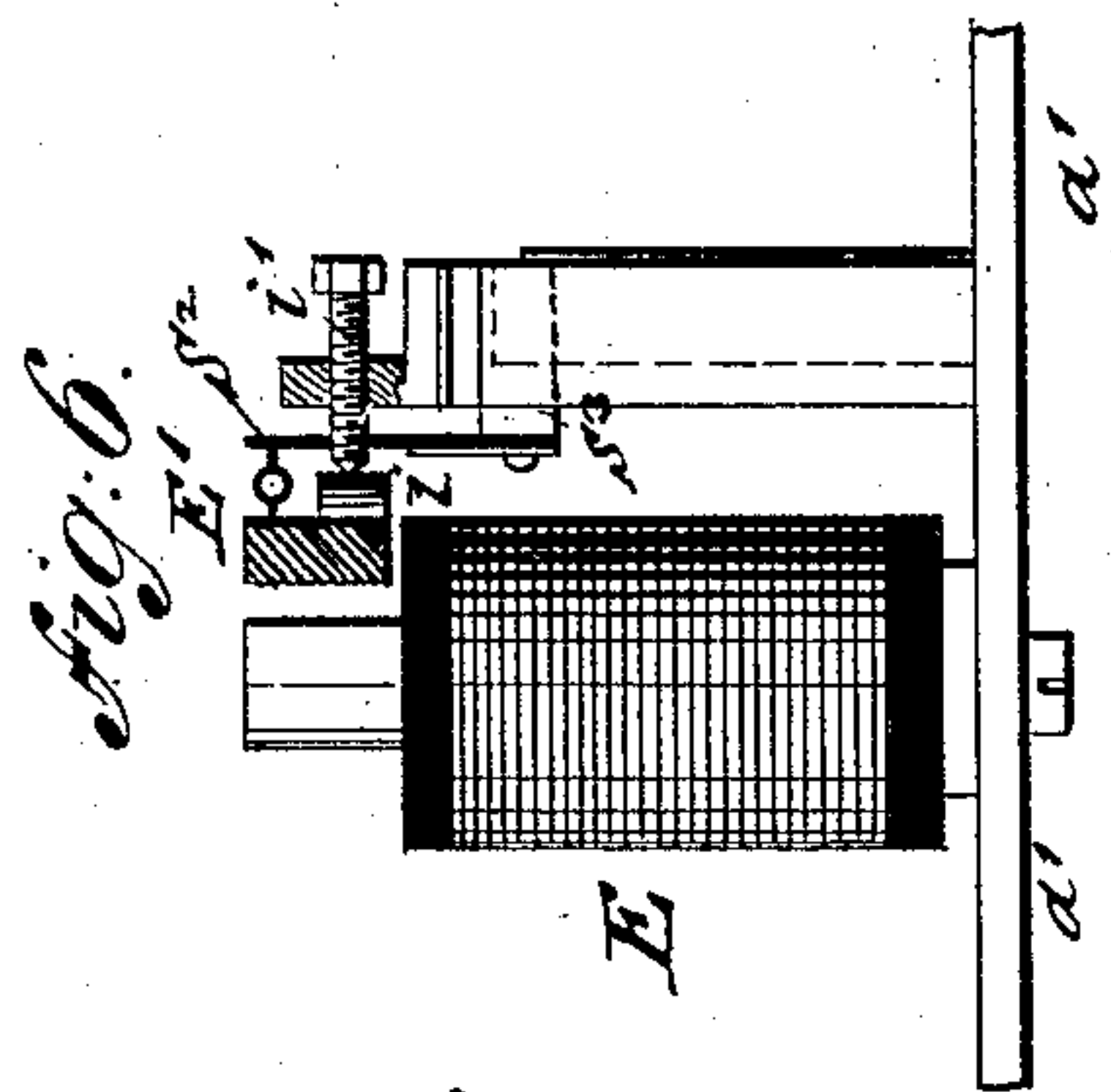
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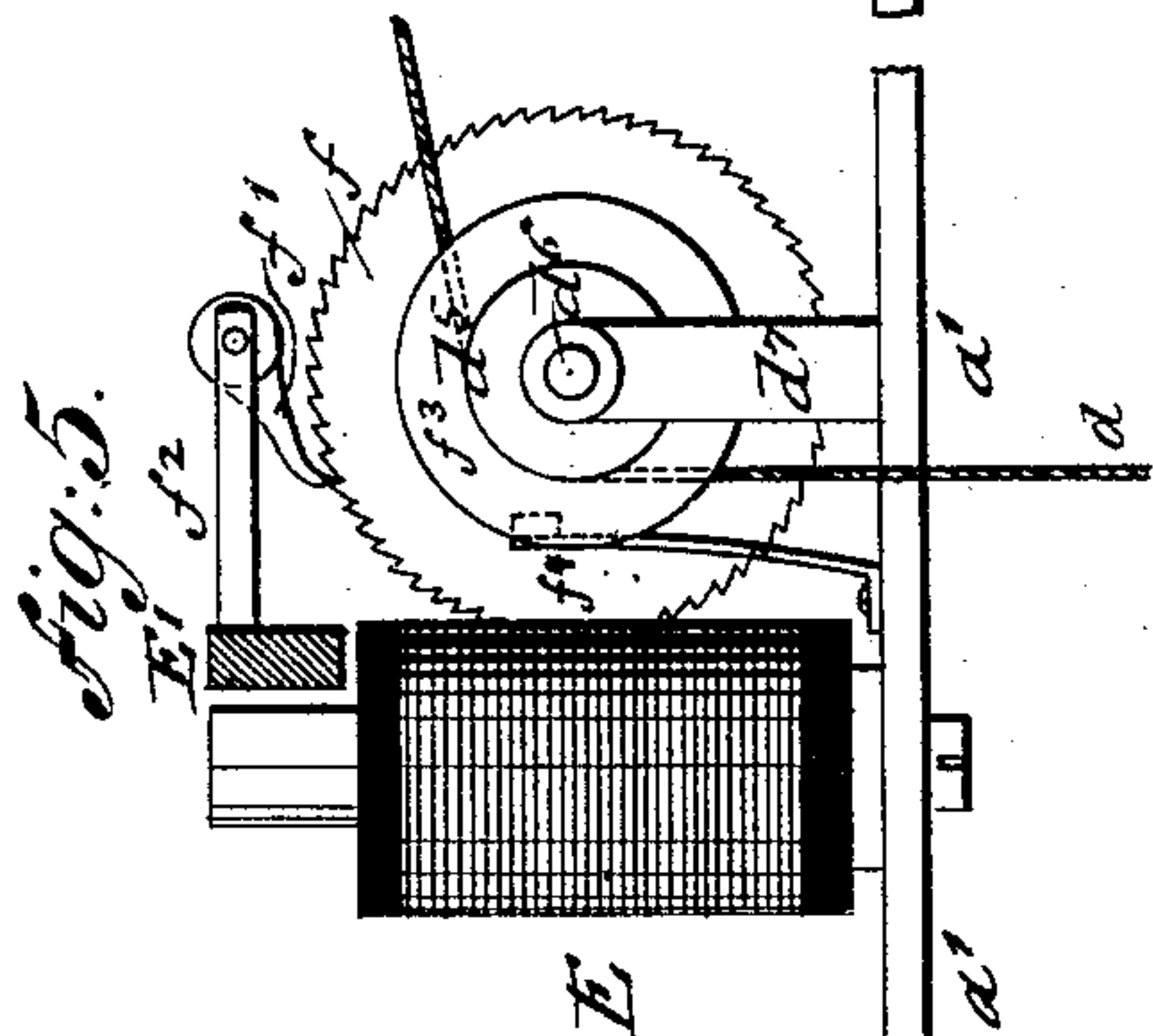
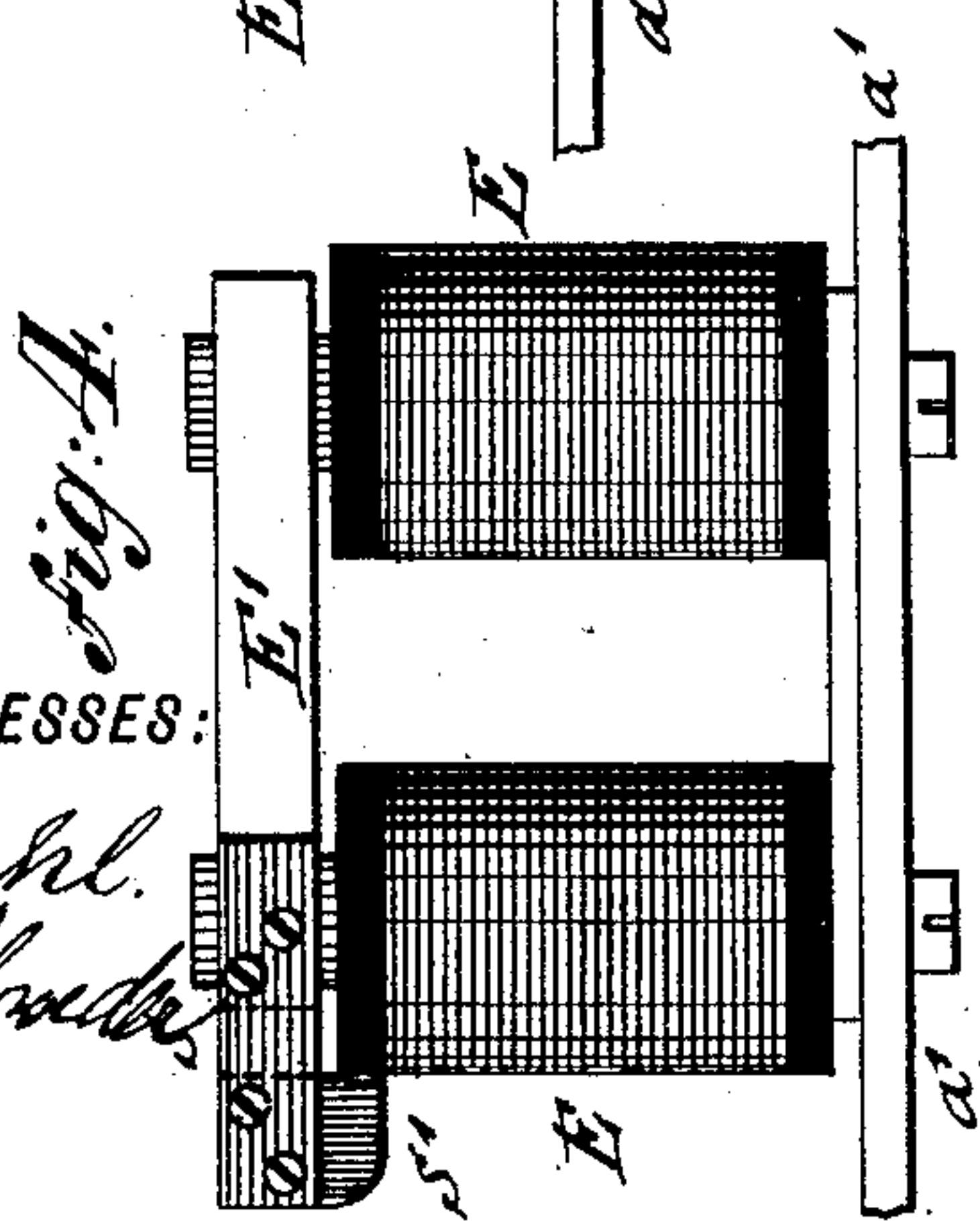


fig. 5.



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WITNESSES:

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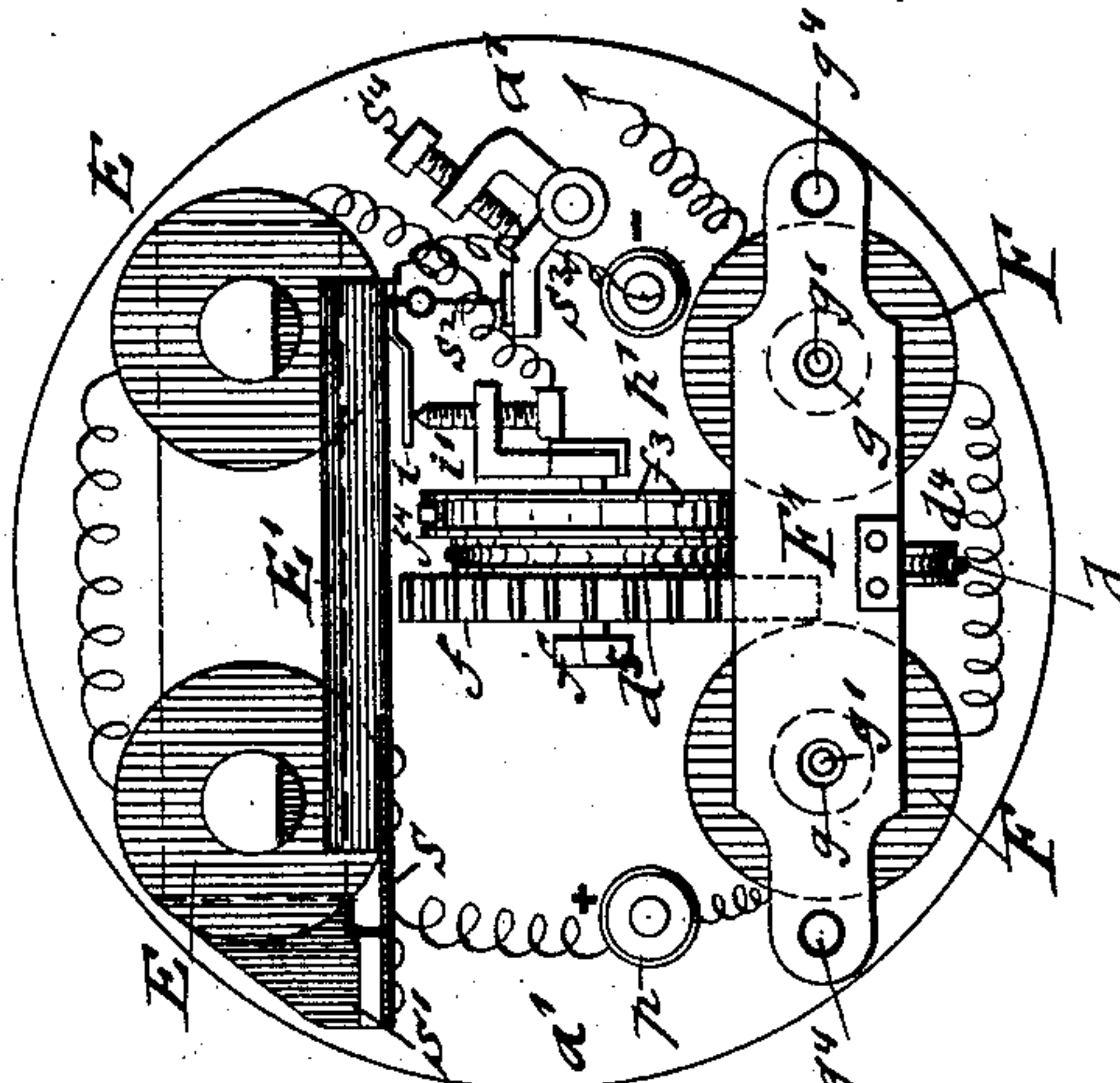
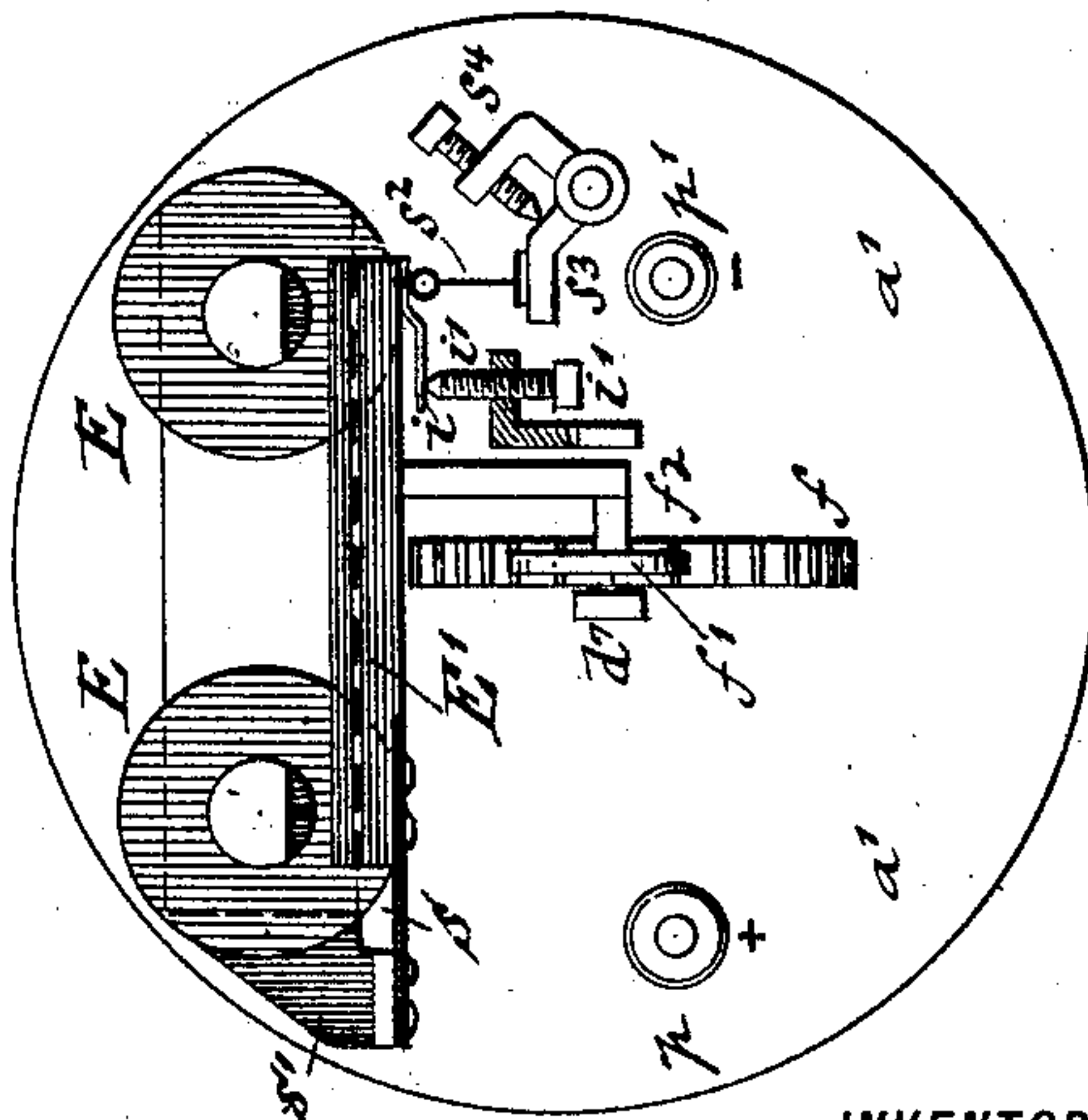
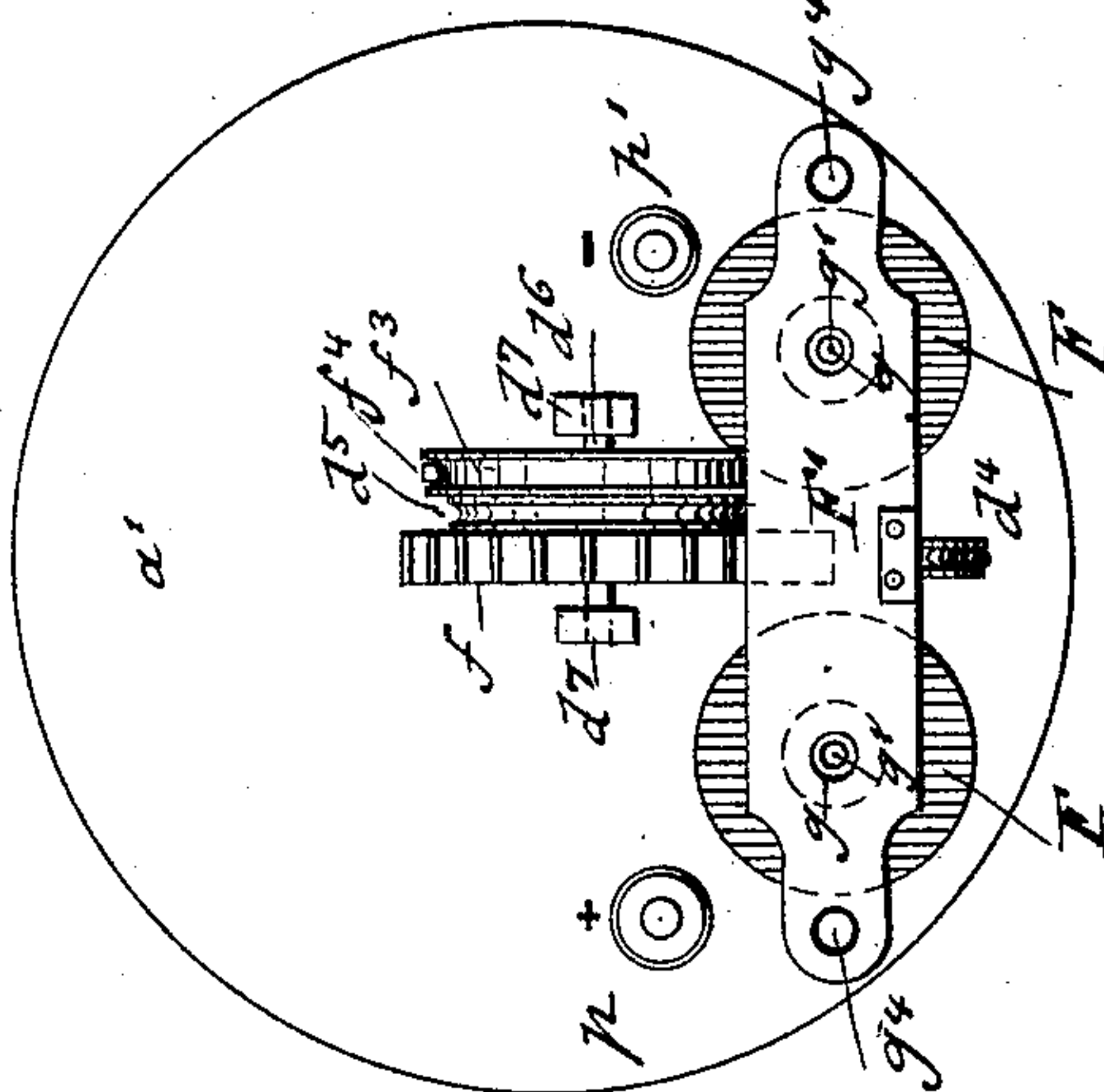


Fig. 9.



8. 10. 1918.

INVENTOR

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UNITED STATES PATENT OFFICE.

JOSEF RIEDEL, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 467,199, dated January 19, 1892.

Application filed May 23, 1891. Serial No. 393,812. (No model.)

To all whom it may concern:

Be it known that I, JOSEF RIEDEL, of the city, county, and State of New York, a citizen of the Empire of Austria-Hungary, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention relates to an improved electric-arc lamp in which the arc is formed at a point of uniform height and regulated by means of movable carbon-holders, which are operated by an electro-magnet arranged on the top part of the lamp-supporting frame, and a suitable feed mechanism, while the formation of the arc is regulated by a second electro-magnet that produces the separation of the carbon when the current is switched into the lamp. For this purpose the invention consists of an electric-arc lamp the construction of which is fully set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation of my improved electric-arc lamp, showing the actuating mechanism of the same inclosed in a suitable casing. Fig. 2 is a front elevation with the casing removed, so as to show the regulating mechanism for the carbon-holders. Fig. 3 represents, also, a front elevation, partly in section, of the lamp-frame and the movable carbon-holders drawn on a larger scale. Figs. 3^a and 3^b are horizontal sections respectively on lines 3^a 3^a and 3^b 3^b, Fig. 3. Figs. 4, 5, and 6 are details of the electro magnet employed for feeding the carbon pencils as they are consumed. Fig. 7 is a sectional side elevation of the electro-magnet by which the arc is established. Figs. 8 and 9 are plan views of the electro-magnets shown in Figs. 4 and 7, and Fig. 10 is a plan view showing the relative positions of said electro-magnets on the top plate of the lamp-frame.

Similar letters of reference indicate corresponding parts.

By reference to the drawings, A represents the supporting-frame of my improved electric-arc lamp, which frame is formed of two longitudinal guide-tubes *a a*, which are connected by a top plate *a'* and a transverse bottom plate *a''*. The upright guide-tubes *a* are provided at their inner side with longitudinal guide-slots *a'''*, which serve for guiding

the upper and lower carbon holders C C', which are formed of transverse bars having V-shaped portions *b b* at their center and springs *b' b'* extending across said V-shaped portions, so as to hold the carbon pencils inserted into said V-shaped portions. The lower-carbon holder C' is suspended by silk or other cords *d d*, which are attached to the ends of the same and which are passed through the guide-tubes *a a* and through eyes *d' d'* at the ends of the upper-carbon holder C and over guide-pulleys *d'' d'''* on the top plate *a'* and a guide-pulley *d''''* on the armature F' of an electro-magnet F, as shown in Figs. 2, 3, and 7. The cords *d d* are then united and passed over a larger center pulley *d''''''*, that is keyed to a shaft *d''''''''*, turning in bearings of standards *d''''''''''*, attached to the top plate *a'*. The united cord *d* is then continued in downward direction and attached centrally to an eye of the upper-carbon holder C, which is accurately balanced on said cord. A flexible wire connection *e' e'* is established by arms *e'' e''*, attached to the top and bottom plates *a'* and *a''* of the supporting-frame A, and binding-posts *e''' e'''* on the carbon-holders C C', as shown clearly in Fig. 3. The cross-section of the upper carbon pencil is made of twice the size of that of the lower carbon pencil, so as to provide for the slower burning off of the upper pencil in forming the arc. This arrangement has also the advantage that at the point where the arc is formed in the upper pencil a conical cavity is formed, which serves to some extent as a reflector for throwing the light rays emitted by the arc in downward direction, as indicated in broken lines in Fig. 1.

As the upper and lower carbon holders C C' are suspended from the cords *d d*, they are moved simultaneously either away from or toward each other, the suspension of both carbon-holders having for its object the uniform motion of the carbons and the formation of the arc at a fixed point midway between the top and bottom of the frame of the lamp.

On the top plate *a'* of the frame A are arranged two electro-magnets E and F, one at each side of the guide-pulley *d''''*. On the shaft of the guide-pulley *d''''* is mounted a ratchet-wheel *f*, which is engaged by a pawl *f'*, that is applied to the end of an arm *f''*, attached to the armature E' of the electro-magnet E.

The armature E' extends across the flat poles of the electro-magnet E and is supported at one end by a flat spring s , which is attached to a bracket-arm s' of the top plate of one of the coils of the electro-magnet E , as shown clearly in Figs. 4 and 8. The free end of the armature E' is acted upon by a flat spring s^2 , by which it is returned into its normal position toward the poles of the electro-magnet E , said spring being attached to an arm s^3 and its tension regulated by a set-screw s^4 , as shown clearly in Figs. 6 and 8. The armature E' is provided at the same end with a contact-spring i , which is in contact with a set-screw i' . The electro-magnet E is located in a shunt-circuit, which enters through the binding-post p and passes through the coils of the electro-magnet E to the set-screw i' and the contact-spring i and then to the binding-post p' . When the arc has been formed by the separating of the carbons, the same is kept up by the action of the shunt-current passing through the electro-magnet E , the poles of which attract the armature E' and produce by the pawl f' the turning of the ratchet-wheel f for one or more teeth. Simultaneously the contact between the spring i on the armature E' and the screw i' is interrupted and the armature returned by its spring s^2 into its former position, so that the pawl is placed in a position for turning the ratchet-wheel f by the next forward motion of the armature E' . This produces the turning of the guide-pulley d^5 and thereby the approach of the carbon-holders and the keeping up of the arc between the carbons. When the size of the arc and consequently its resistance increases, the current is passed again through the coils of the electro-magnet E , so that the armature E' is attracted, the carbons fed toward each other, and thereby the normal size of the arc kept up by the action of the electro-magnet E , its armature E' , and the movable carbon-holders. The main current passes from the binding-post p through the coils of the electro-magnet F and from the same over the upper arm e^2 and flexible connection e' to the upper-carbon holder C , over the upper carbon to the lower carbon and the lower-carbon holder, and over the arm e^2 and flexible wire e' and the frame to the binding-post p' and to the line. When the current passes through the coils of the electro-magnet F , the armature F' of the same is suddenly attracted and thereby the guide-pulley d^4 of the same lowered, so that the lower carbon pencil is quickly lowered and by the separation of the carbons the arc formed. The armature F' is provided with conical recesses g , which fit on the conically-shaped pole ends g' of the electro-magnet F , the armature being supported on spiral springs g^2 , placed on screw-nuts g^3 of the posts g , which are arranged sidewise of the electro-magnet F on the top plate a' of the frame A . The conical shape of the pole ends g' permits the armature F' to be located close to said pole ends, so that by the quick

attraction of the armature F' by the electro-magnet F the almost instant separation of the carbon pencils and the formation of the arc between the same are produced. When the lamp is switched out, the spiral springs g' lift the armature F' and support the same in its normal position above the conical pole ends of the electro-magnet F , while the carbon pencils are placed in contact with each other. On the shaft of the ratchet-wheel f and sidewise of the latter is arranged a friction-disk f^3 , the circumference of which is placed in contact with a suitable spring f^4 , that acts as a brake by which the too rapid movement of the parts is prevented.

The operation of my improved electric-arc lamp is as follows: For supplying the required current and obtaining the corresponding size of arc when used in an incandescent circuit the current is first passed through a resistance-coil, so that a current of the required strength is supplied to the electro-magnets as required by the arc to be formed. The tension of the spiral springs g^2 is then adjusted by the screw-nuts g^3 , so that the current is strong enough to attract the armature F' and form thereby the arc by the lowering of the lower carbon pencil. To produce the feed of the carbons, which is regulated by the shunt electro-magnet E , the set-screw i' is so adjusted that it forms contact with the spring i of the armature E' , so that the shunt-current is interrupted whenever the armature E is attracted. By the set-screw s^4 the flat spring s^2 is so adjusted that it retracts the armature F immediately, so that the shunt-circuit is closed again. The armature E' is thereby vibrated and the ratchet-wheel d^5 operated by the pawl f^2 , so that the carbons are fed toward each other. When the carbon-feeding mechanism is properly adjusted, a uniform size of arc is obtained and the irregular burning and flickering of the light prevented. When the carbon pencils are consumed, they are replaced by removing the glass globe, moving the carbon-holders C and C' away from each other, removing the carbon remnants from the sockets of the same, and inserting the new carbons by moving the springs away from the angular sockets of the carbon-holders. The lamp is then in condition for work as soon as the current is switched into the same.

The advantages of my improved electric-arc lamp are that the same is of a comparatively small size, being not longer than two feet, so that the same can be used in rooms and stores of comparatively small height. This is obtained by the enlarging of the cross-section of the upper carbon and suspending the carbon-holders from cords, whereby the long carbon pencils of the electric-arc lamps heretofore in use and the long racks for the upper-carbon holders are dispensed with and a flat top given to the lamp, which adapts the same for suspension in all cases where such a lamp is of advantage. My flat-top arc lamp

can also be used for street-lighting, on locomotives, and aboard of vessels, as vibratory movements exert no influence on the operation of the same.

5 The pencils burn from ten to twenty hours with a white, steady, and uniform light and retain the focus of the arc at uniform height, so that the lamp is adapted for many purposes for which the ordinary construction of
10 electric-arc lamps may not be advantageously employed.

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

15 1. In an arc lamp, the combination of a supporting-frame having slotted upright guide-tubes, upper and lower carbon holders guided by said tubes, cords connected to the ends of the lower-carbon holder and the center of the
20 upper-carbon holder, guide-pulleys for said cords, an electro-magnet located in the main circuit, and a spring-supported armature above the electro-magnet, one of the said guide-pulleys being attached to said spring-
25 supported armature and rising and falling therewith, whereby the arc is produced when the armature is attracted and the lower-carbon holder lowered on the switching in of the current, substantially as described.

30 2. In an electric-arc lamp, the combination of movable upper and lower carbon holders suspended by suitable cords, guide-pulleys for said cords, an electro-magnet having conically-tapering pole ends, an armature carrying
35 one of said guide-pulleys and having

apertures corresponding in shape to said pole ends, guide-posts for said armature, and tension-springs interposed between the armature and screw-nuts on the guide-posts, substantially as set forth.

3. In an arc lamp, the combination of a supporting-frame having upright guide-tubes, upper and lower carbon holders guided in said tubes, cords for supporting said carbon-holders, guide-pulleys for said cords, an electro-
40 magnet located in the main circuit, a spring-supported armature above the electro-magnet, one of the said guide-pulleys being attached to said spring-supported armature and rising and
45 falling therewith, an electro-magnet located in a shunt-circuit, an armature for said electro-magnet, and a pawl-and-ratchet mechanism operated by said armature and connected to the shaft of one of the guide-pulleys, where-
50 by the arc is produced when the armature carrying the guide-pulley is attracted and the lower-carbon holder lowered on the switching
55 in of the current and the carbon pencils fed toward each other and the proper size of the arc obtained by the electro-magnet and its ar-
60 mature operating the mechanism connected with the other guide-pulley, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOSEF RIEDEL.

Witnesses:

PAUL GOEPEL,
A. M. BAKER.