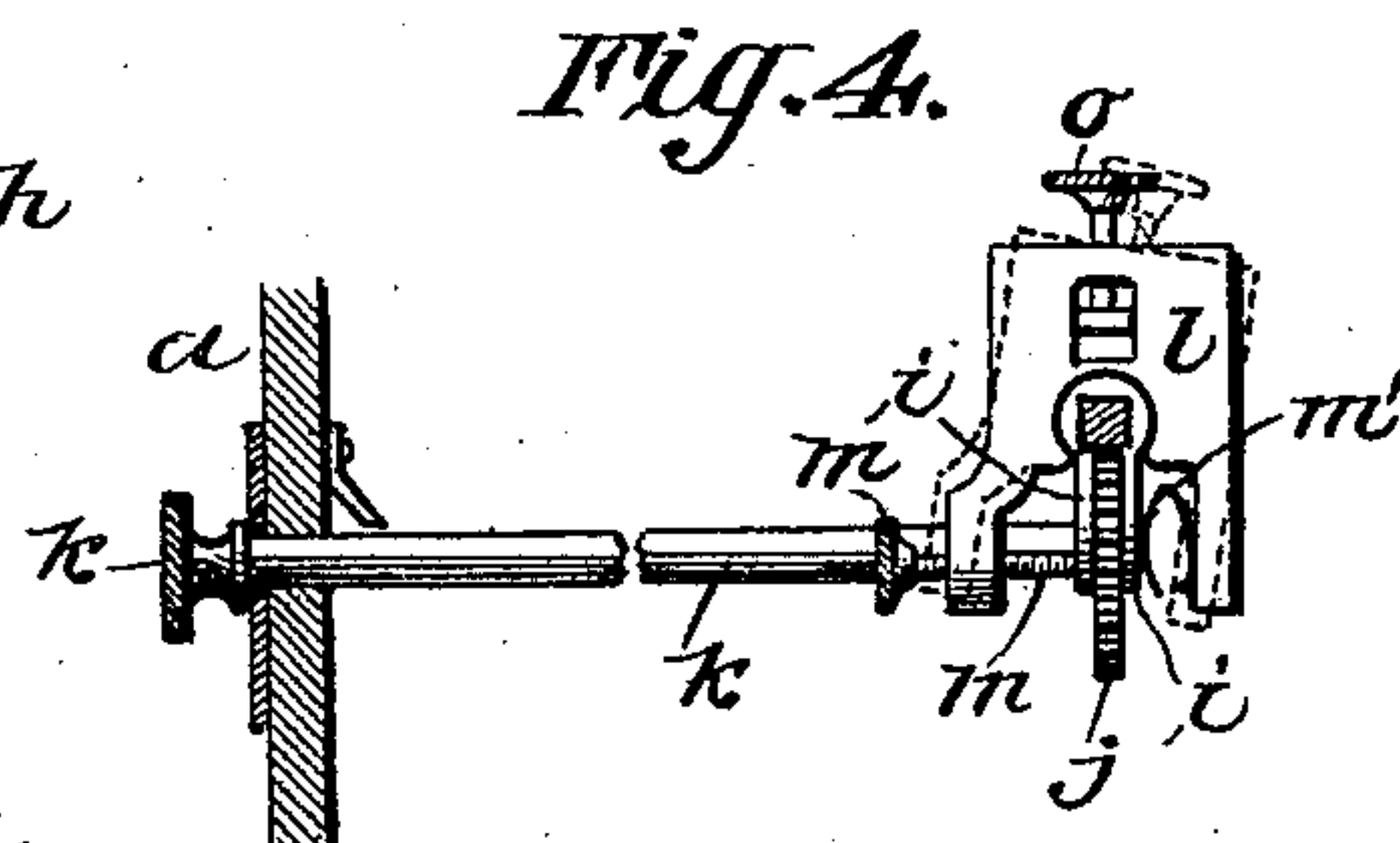
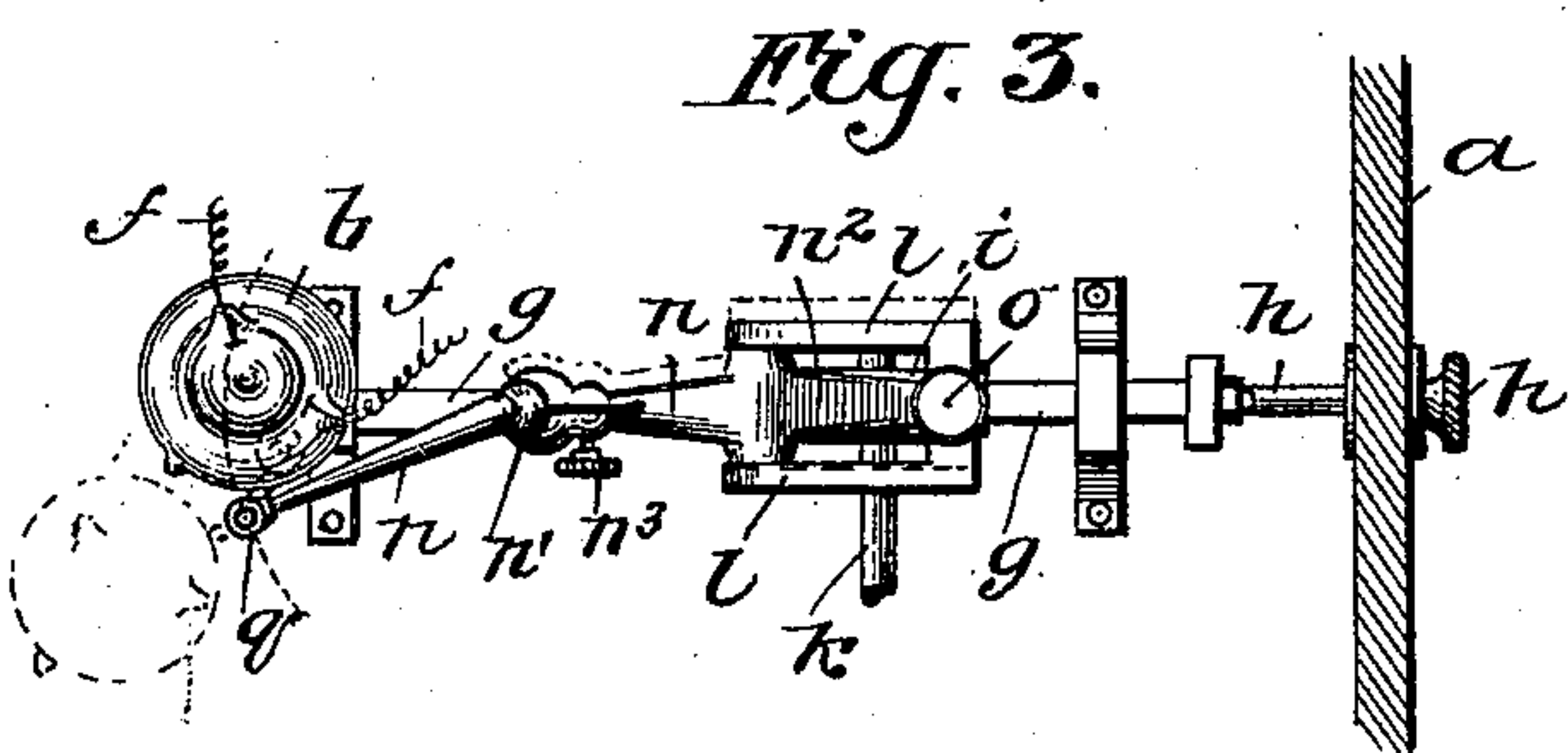
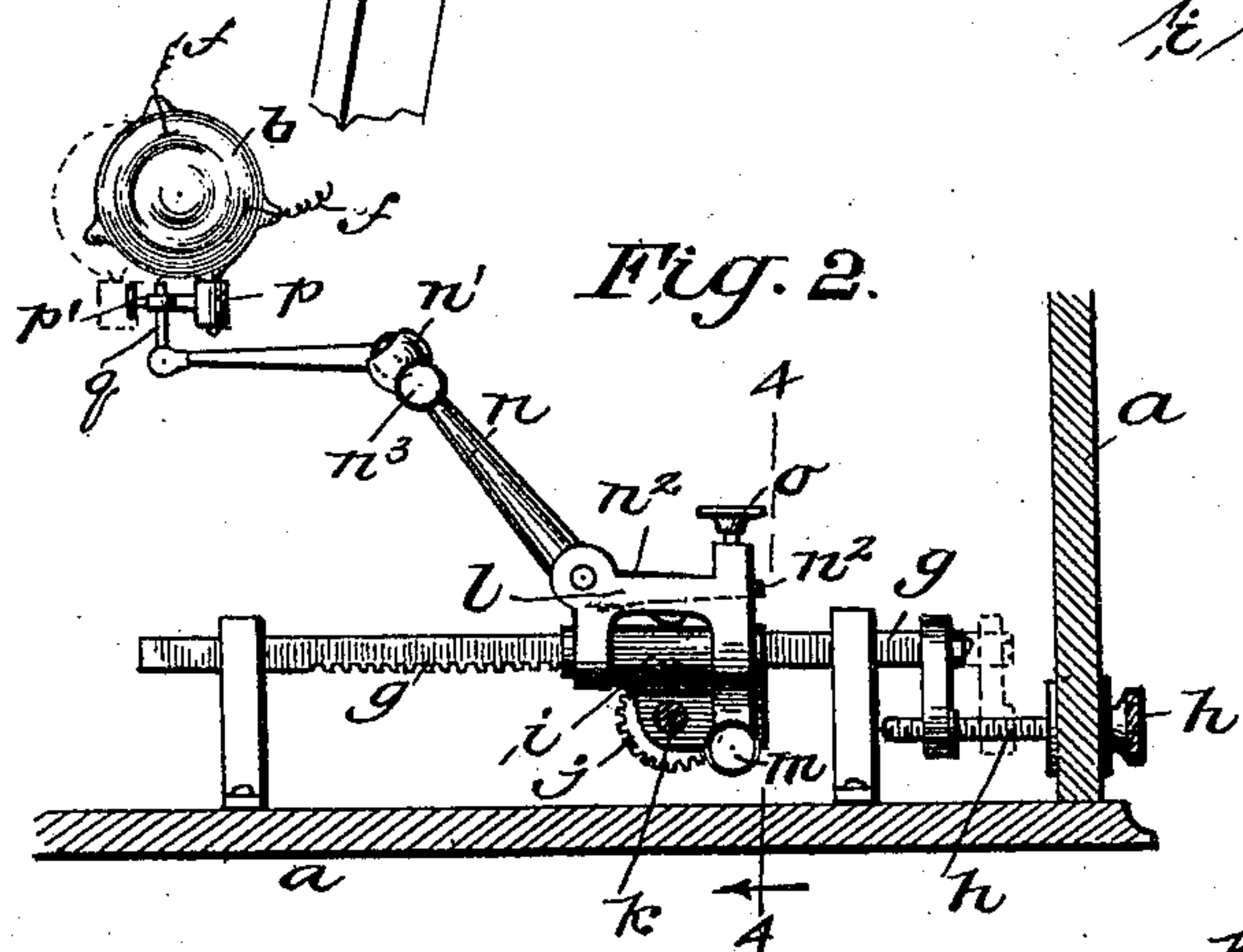
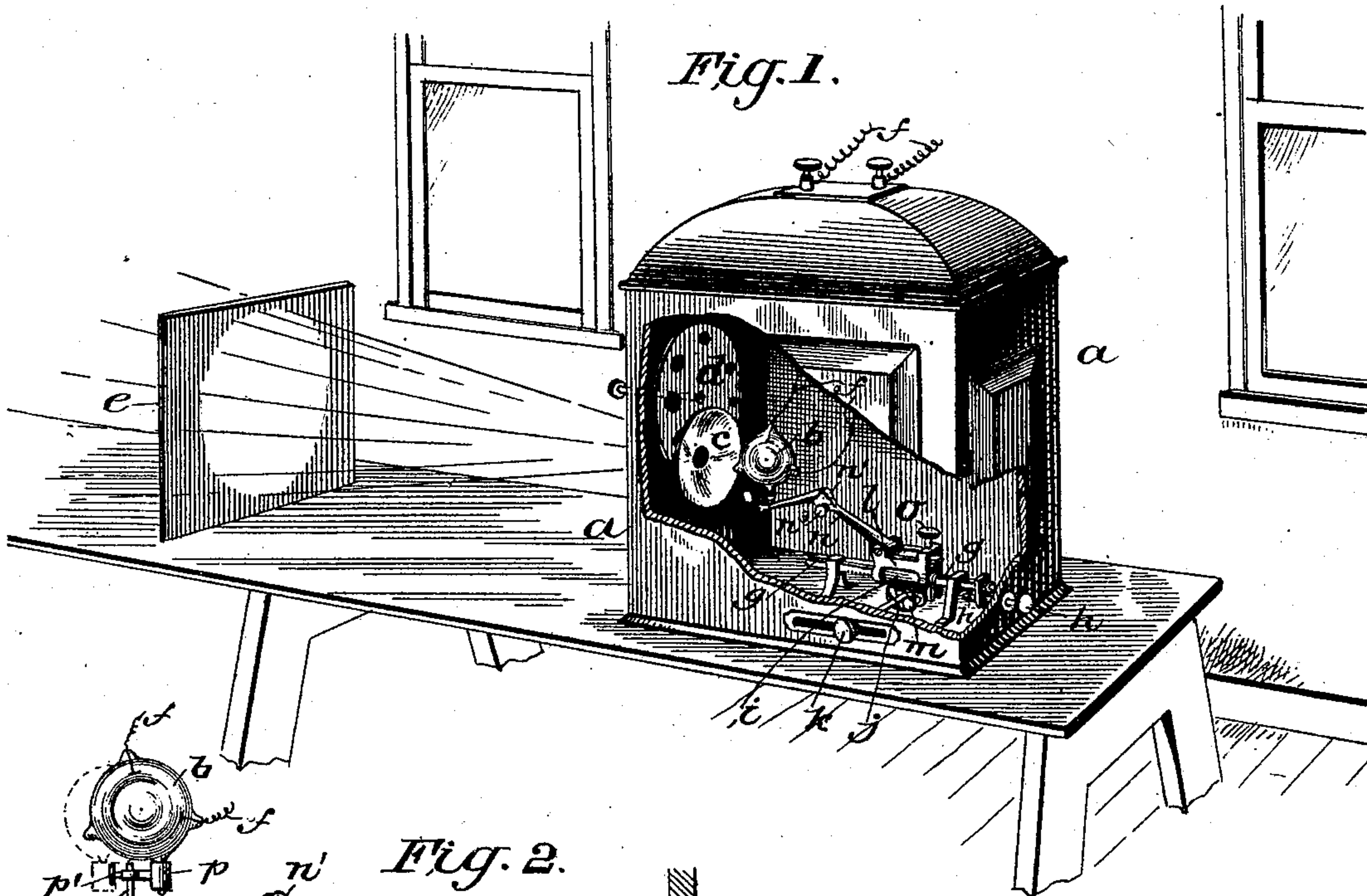


(No Model.)

C. F. EASTON.
APPARATUS FOR UTILIZING ROENTGEN RAYS.

No. 581,199.

Patented Apr. 20, 1897.



WITNESSES:

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CHARLES FINLEY EASTON, OF WALLACE, IDAHO.

APPARATUS FOR UTILIZING ROENTGEN RAYS.

SPECIFICATION forming part of Letters Patent No. 581,199, dated April 20, 1897.

Application filed June 1, 1896. Serial No. 593,897. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FINLEY EASTON, of Wallace, Shoshone county, Idaho, have invented a new and Improved Apparatus for Utilizing Roentgen or X Rays, of which the following is a specification.

My invention is an original apparatus in the nature of an improved lantern for employing the Roentgen or X rays for experimental, demonstrative, or practical purposes. For convenience, by way of reference, I have styled the apparatus a "radiopticon."

The construction and operation of parts are hereinafter described, and the novel features specified in the claims.

In the accompanying drawings, Figure 1 is a perspective view of my apparatus arranged as required for practical use, a portion of the lantern-case being broken away. Fig. 2 is an enlarged sectional view of the means for supporting and adjusting the Crookes tube. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is a vertical section on line 4-4 of Fig. 2.

The case or lantern-body *a* is an ornamental rectangular box having a dome-like top and provided with doors on at least two sides, also with a light or ray aperture in the front. It is so constructed that its walls are opaque. It may be supported by any suitable means. It incloses a Crookes tube *b* or other instrument for producing Roentgen or X rays and is adapted to practically seal up or confine such rays or prevent their escape save through the aperture in front.

A stationary disk *c*, Fig. 1, is arranged parallel to the front of the case *a* and fixed in position within the latter. In the center of such disk *c* is an opening for passage of rays from the Crookes tube *b*, the said opening being coincident with another in front of the case *a*.

A larger rotatable disk *d* is pivoted to the front of the case between it and the fixed disk *c* and above but parallel to the latter. It is provided with a circular row of apertures which are graduated in diameter from a minimum to a maximum. The said disk *d* is so arranged that when rotated its apertures are brought successively in register with the eye or opening of the fixed disk *c* and the opening in the front of the case *a*. The means

for rotating it, *d*, may be a crank and gear shaft or any other preferred apparatus.

It is apparent that the diameter of the aperture of rotatable disk *d* which may be brought in registration with the eye of the fixed disk *c* will determine to a certain extent the lateral divergence of the X-rays or, what is the same thing, the field covered by them exteriorly to the case *a*, and that the other feature controlling such divergence is the distance of the Crookes tube *b* from said disk *c*. By the conjunction and coöperation of the rotatably-adjustable apertured disk *d* and a micrometer adjustment of the tube *c* the regulation of the field covered by the radial dispersion of the rays may be controlled with great exactness, and thereby, also, the definition of the image or shadow and its depth or intensity.

The rays are received upon and arrested by a fluorescent screen *e*, and the person or object to be exposed to them stands or is set between it and the lantern.

The Crookes tube *c* has electric conductors *f* attached and arranged to form anode and cathode terminals, as usual. The support for said tube is capable of manifold adjustment. A horizontal rack-bar *g* is arranged longitudinally of the case *a* and supported in brackets fixed on the bottom thereof, and it may be adjusted longitudinally by means of a screw *h* passing through the end of the case *a* and provided exteriorly with an enlarged milled head. Upon this rack-bar *g* is placed a sleeve *i*, Fig. 2, that is slidable freely thereon. The means for sliding or adjusting it is a gear *j*, that meshes with the rack-bar *g* and has its lateral axis *k*, Fig. 4, extended through a slot in the side of the case *a*, so that it may be conveniently manipulated from the outside. Upon the sleeve *i* is mounted a device *l*, that for convenience may be termed a "saddle." The same is adapted to be rocked and inclined laterally in either direction, the degree of inclination being regulated by a thumb-screw *m* passing through one of its pendent wings or sides and bearing against the sleeve *i*, as shown in Fig. 4. A spring *m'*, Fig. 4, is arranged on the other side of the saddle to aid in holding it steady. It is apparent that the sliding sleeve *i* serves to

adjust the Crookes tube *b* toward or from the apertured front disk *c* and that the rack-bar *g* and its screw *h* provide for further and finer adjustment of the same kind independently of sleeve *i*.

The two-part lever-arm *n*, supporting the tube *c*, has a universal joint *n'*, provided with a clamp-screw *m*³, and is pivoted to the saddle *l* and has a short extension *n*², that projects rearward and is acted on by a screw *o*, which works in the top portion of the saddle *l*. By this means a nice vertical adjustment of the tube *c* is provided for. The tube is adapted to swing or to be adjusted in a circle around its point of support on the extremity of the lever-arm *n*—that is to say, the tube has a pendent pivot or pintle portion that seats, Fig. 2, in a vertical socket *p*, whose horizontal arm is rotatable around a vertical post *q*, fixed on the extremity of the lever-arm *n*, and is provided with a clamp-screw *p'* for holding it fixed in any position in which it may be set. Thus by the means described every required or possible adjustment—horizontal, vertical, or lateral—of the tube *c* relative to the front aperture of the case *a* may be effected with ease and despatch—that is to say, the same may be quickly adjusted forward or back horizontally by the sleeve *i*, gear *j*, and shaft *k*, coacting with the rack *g*, and a finer but slower adjustment of the same kind may be effected by the rack *g* and screw *h*. A vertical or lateral adjustment is effected by the jointed lever-arm *n*, oscillating saddle *l*, and screw *m*, while adjustment in a circle is obtained by the parts *p p' q*. It is therefore obvious that the Crookes tube *c* may be placed in any position that can possibly be required to secure any desired effect in regulating the direction or field of the X-rays emitted from the case *a*.

It may be further stated that the opacity of the case *a* to invisible Roentgen or X rays protects photographic sensitive plates and fluorescent material brought within its vicinity without requiring the usual precautions observed by experimenters, and it also cuts off fluorescent radiation that may be emitted from the bulb.

The rotatable diaphragm *d*, with graduated apertures, serves as a means for stopping down the X-rays to any required degree. By the combination of the three parts or features named—the opaque case, the graduated diaphragm, and the adjustable carriage on which the tube *c* is supported—it is practicable to secure the very best results practicable in this class of apparatus.

What I claim is—

1. The improved apparatus for the purpose

specified, which consists of the lantern-body or case, opaque to X-rays, and having a front aperture, a fixed disk, whose central opening registers with such front aperture, a rotatable disk arranged parallel and adjacent to the fixed disk and provided with a series of graduated apertures which may be brought into coincidence with those in the fixed parts, a Crookes tube arranged within the case, a sliding carriage therefor, and means for adjusting it, as shown and described.

2. In an apparatus for the purpose specified, the combination with a case which is opaque to X-rays, of a Crookes tube arranged within the latter, and a vertically-adjustable lever-arm, of an extension-arm pivoted on said lever-arm, to rotate horizontally, and having a socket in its free end to receive the said tube, and means for clamping the extension-arm in any desired position, as shown and described.

3. In an apparatus for the purpose specified, the combination with a case which is opaque to X-rays, a Crookes tube, arranged within it, of a vertically-adjustable arm supporting the tube, and means for adjusting said arm horizontally and laterally, as shown and described.

4. In an apparatus for the purpose specified, the combination with a case which is opaque to X-rays, and a Crookes tube arranged within it, of an arm supporting the tube, a carriage to which the arm is attached, said carriage being slidable on a horizontal bar, means for adjusting the carriage on the bar, and means for adjusting the bar with the carriage, whereby a rapid and slow and fine adjustment of the tube is provided, as shown and described.

5. The combination of an arm for supporting a lamp, or ray-emitter, a rack-bar, a sleeve slidable on the latter and a saddle to which said arm is attached, the same being mounted and adapted for lateral inclination on said sleeve, a gear and shaft for adjusting the sleeve, and a screw for regulating the lateral adjustment of the saddle, as shown and described.

6. The combination of a lamp or ray-emitter, a pivoted arm supporting it, and having a lever extension, a screw bearing on such extension, for the purpose of adjusting the arm vertically, and means for adjusting horizontally the part to which said arm is pivoted, as shown and described.

CHARLES FINLEY EASTON.

Witnesses:

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GEORGE M. TURNER.