

F. VON MADALER.

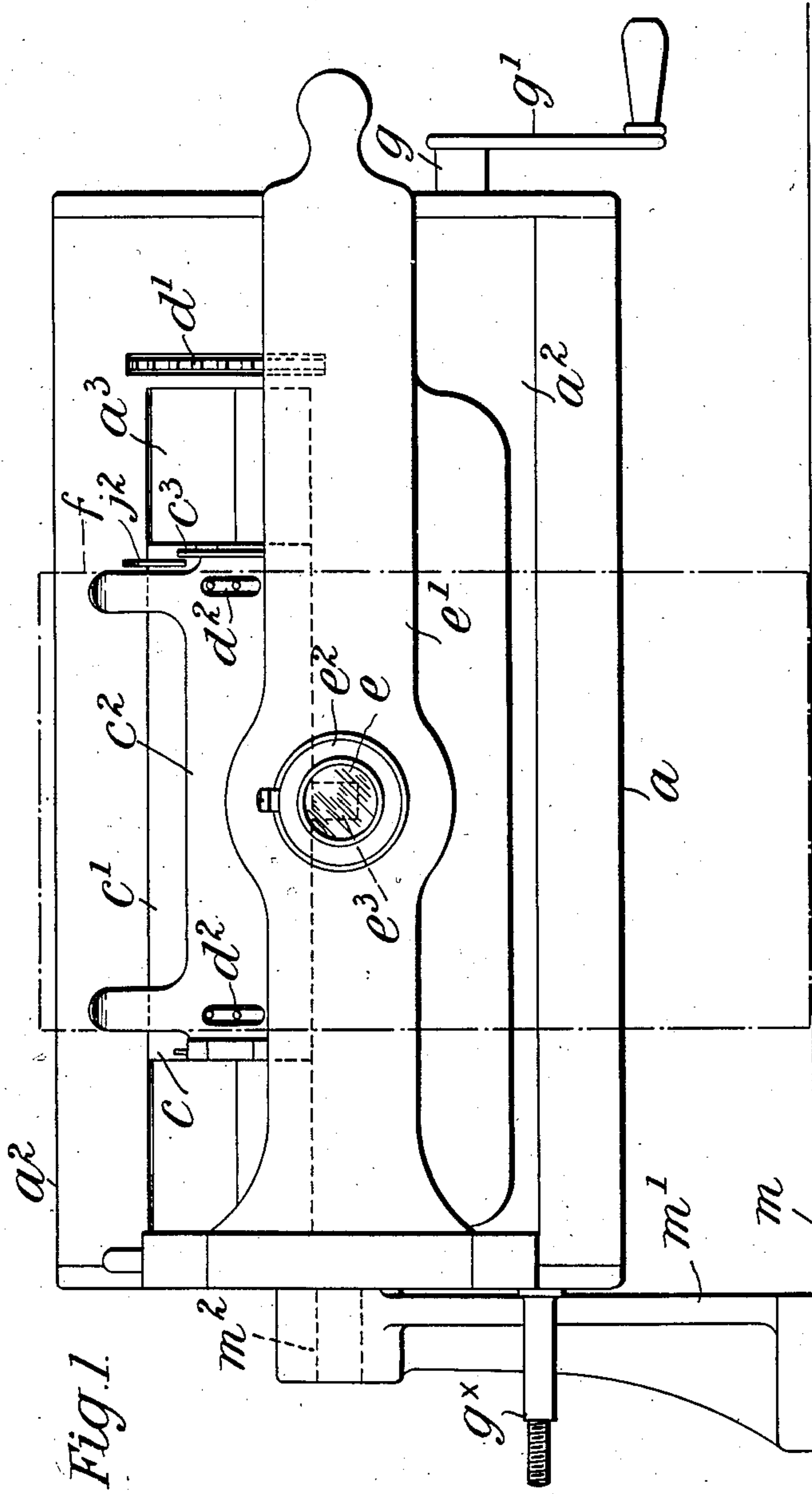
MOVING PICTURE TAKING, VIEWING, OR PROJECTING APPARATUS.

APPLICATION FILED MAY 28, 1909.

966,342.

Patented Aug. 2, 1910.

8 SHEETS—SHEET 1.



WITNESSES.

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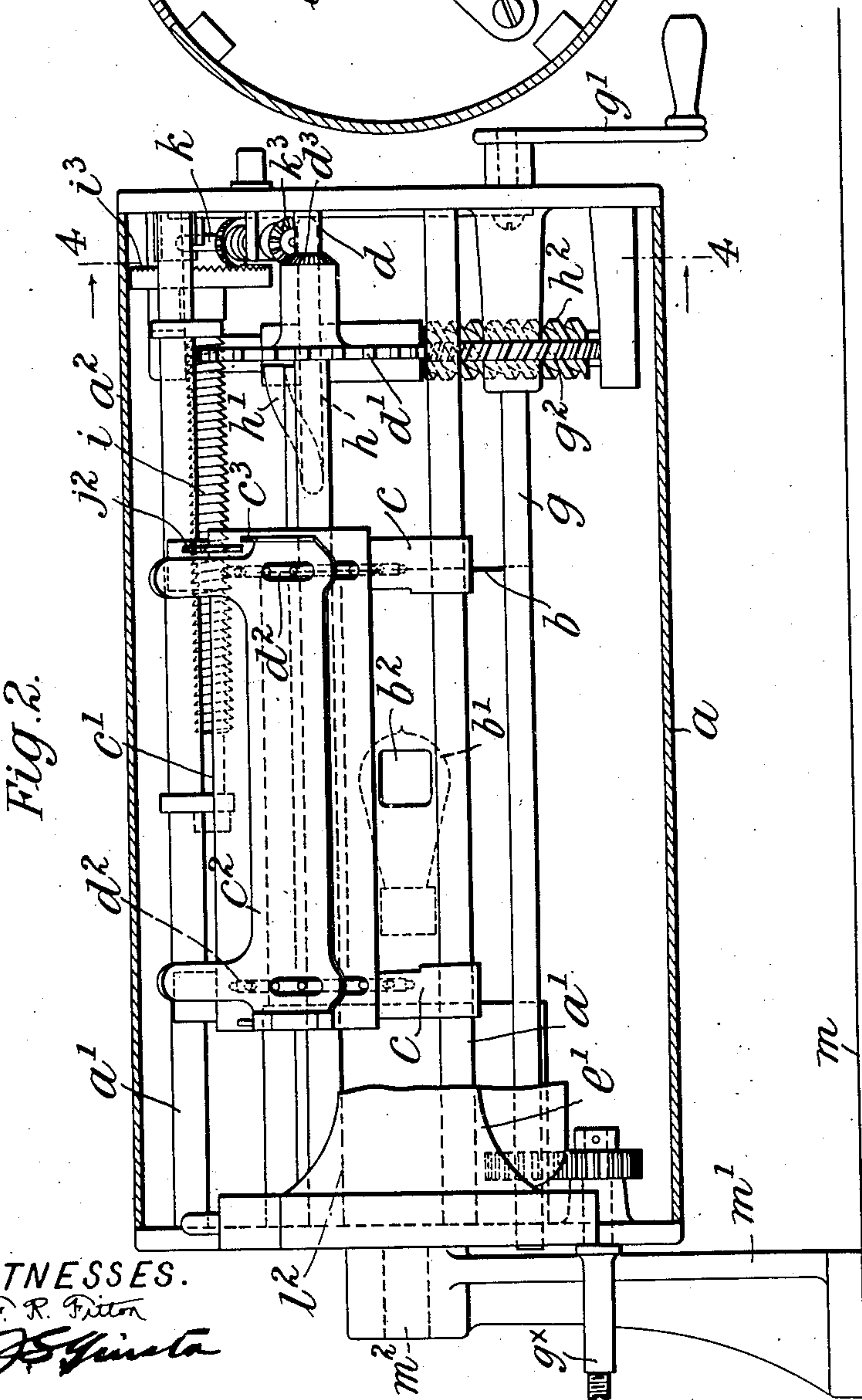
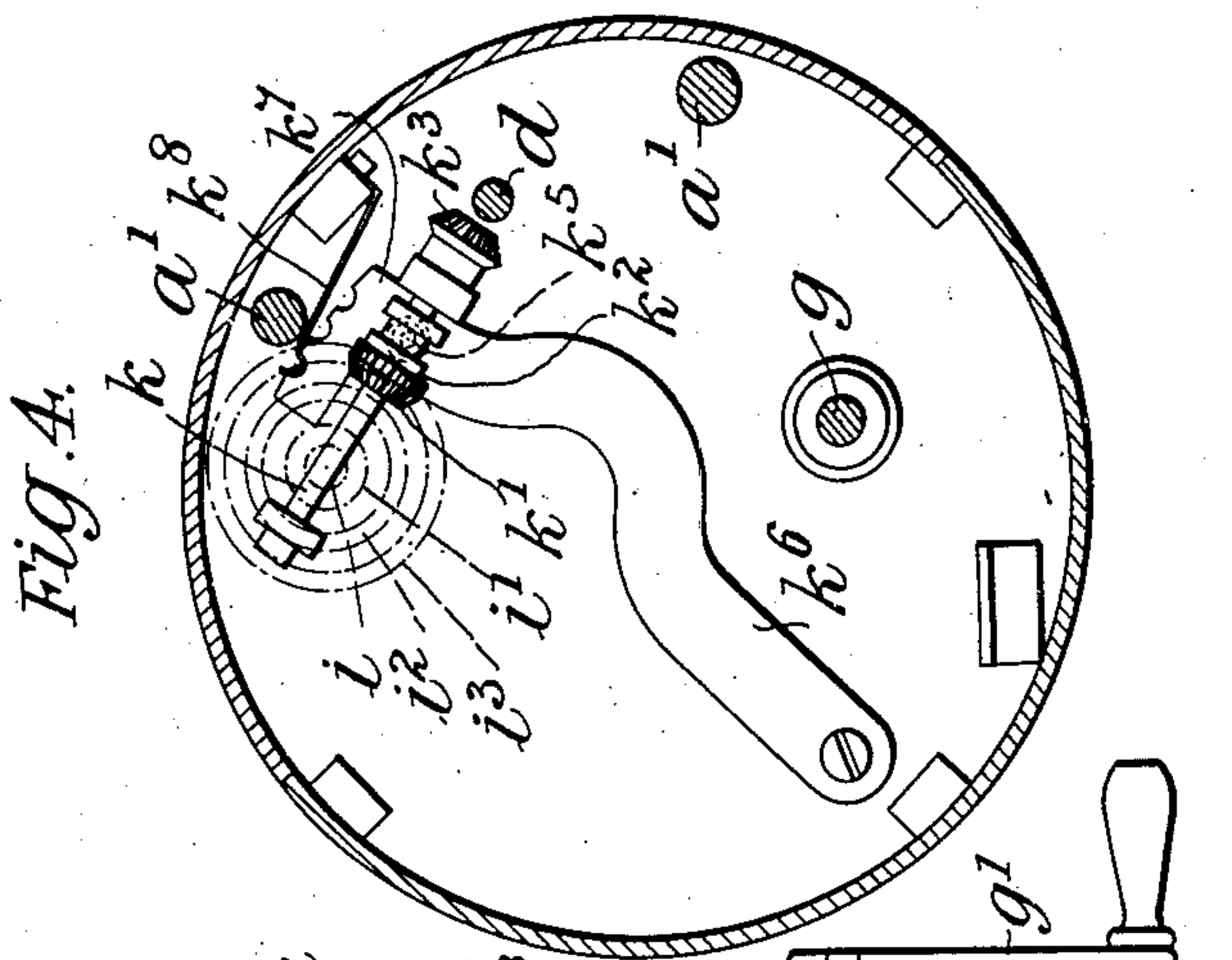
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MOVING PICTURE TAKING, VIEWING, OR PROJECTING APPARATUS.

Patented Aug. 2, 1910.

8 SHEETS—SHEET 2.

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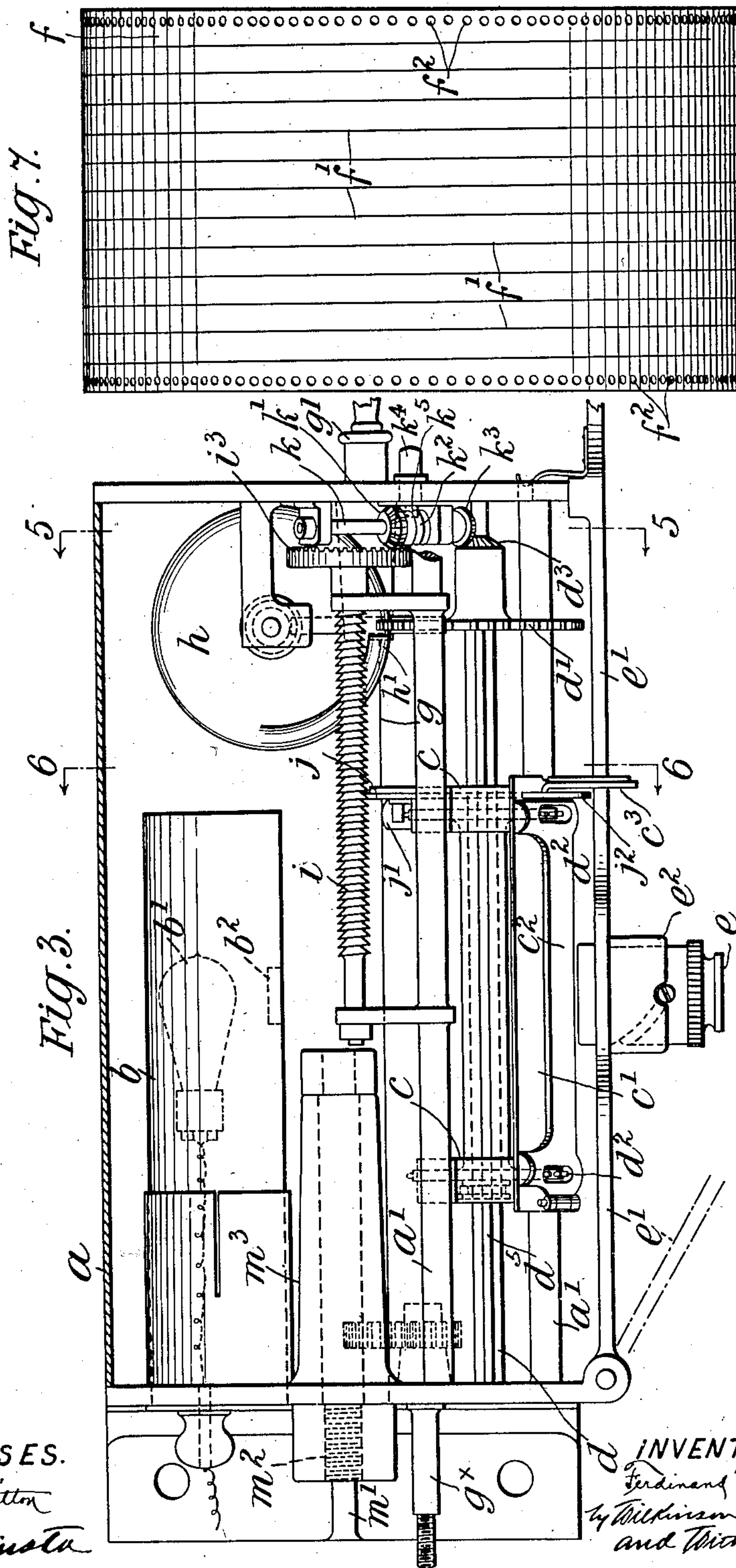


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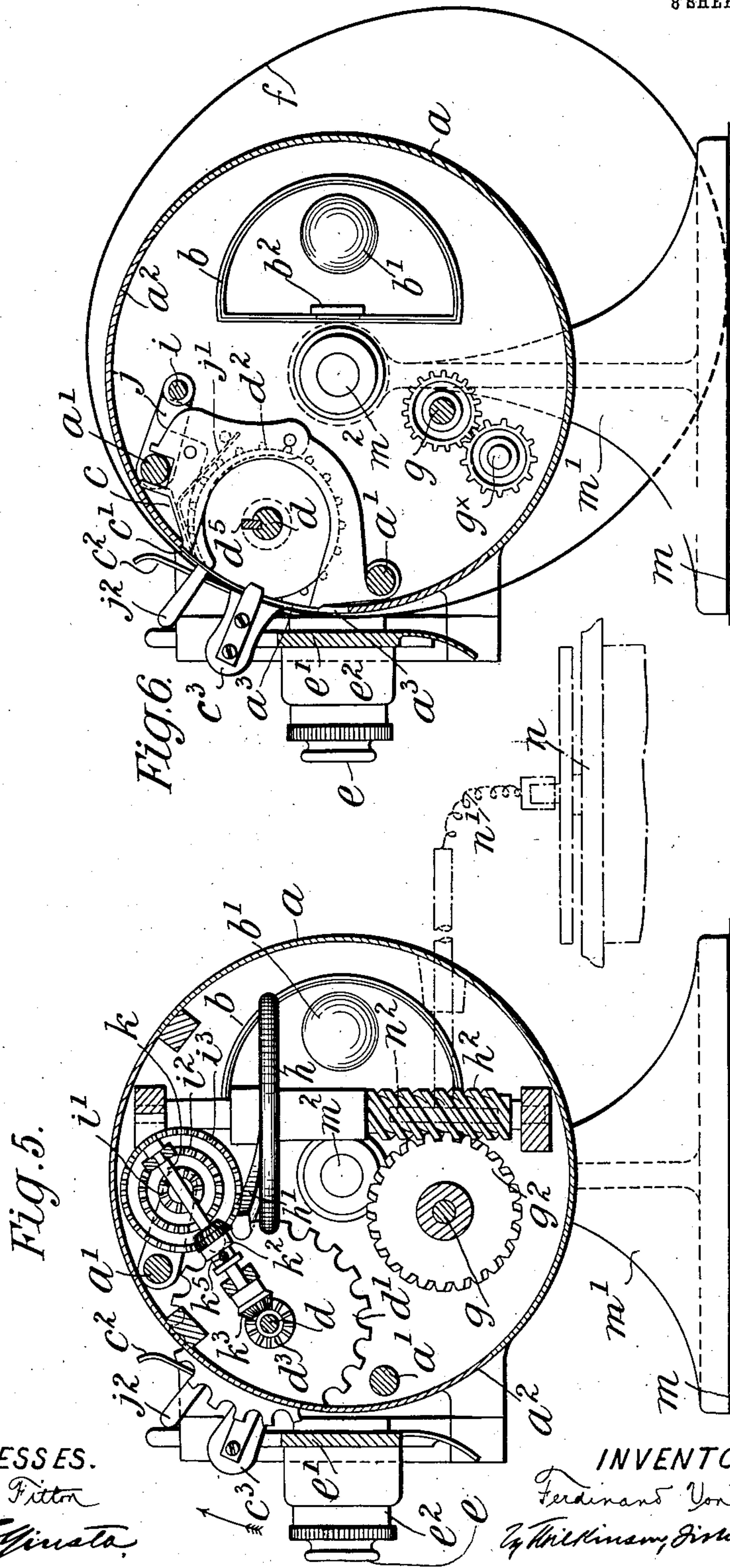


WITNESSES.

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MOVING PICTURE TAKING, VIEWING, OR PROJECTING APPARATUS.

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8 SHEETS—SHEET 5.

Fig. 15.

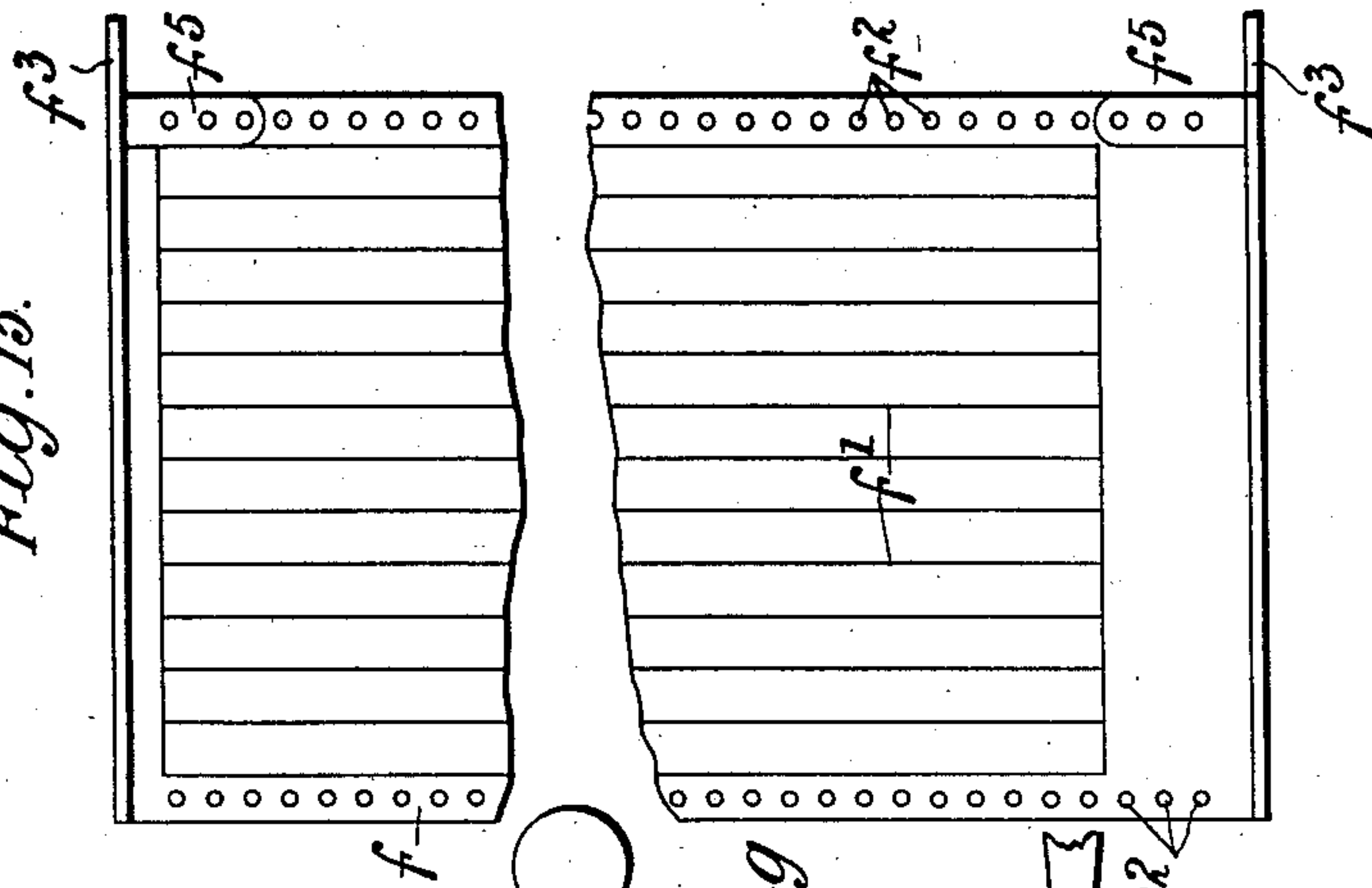
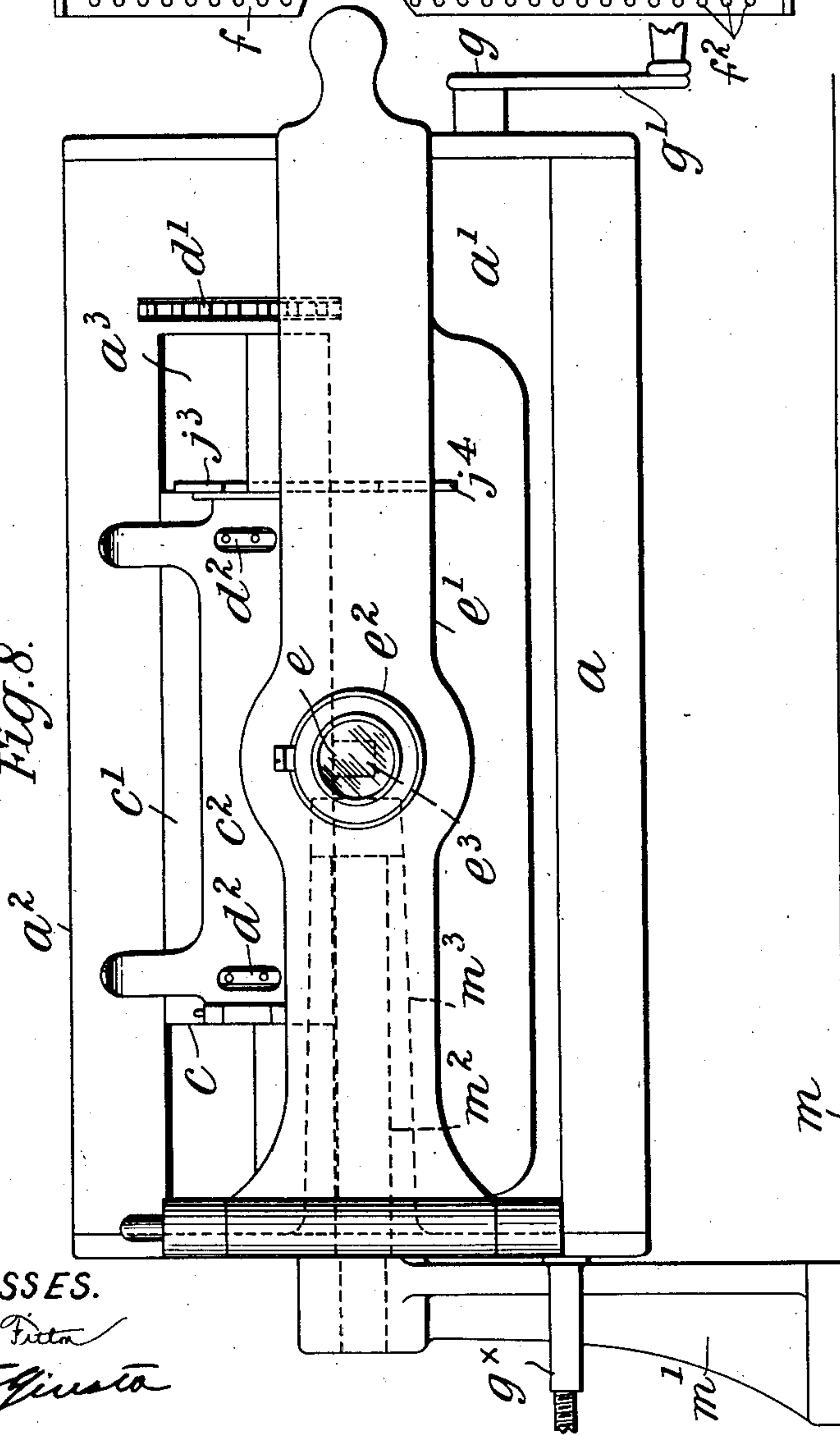


Fig. 8.



WITNESSES.

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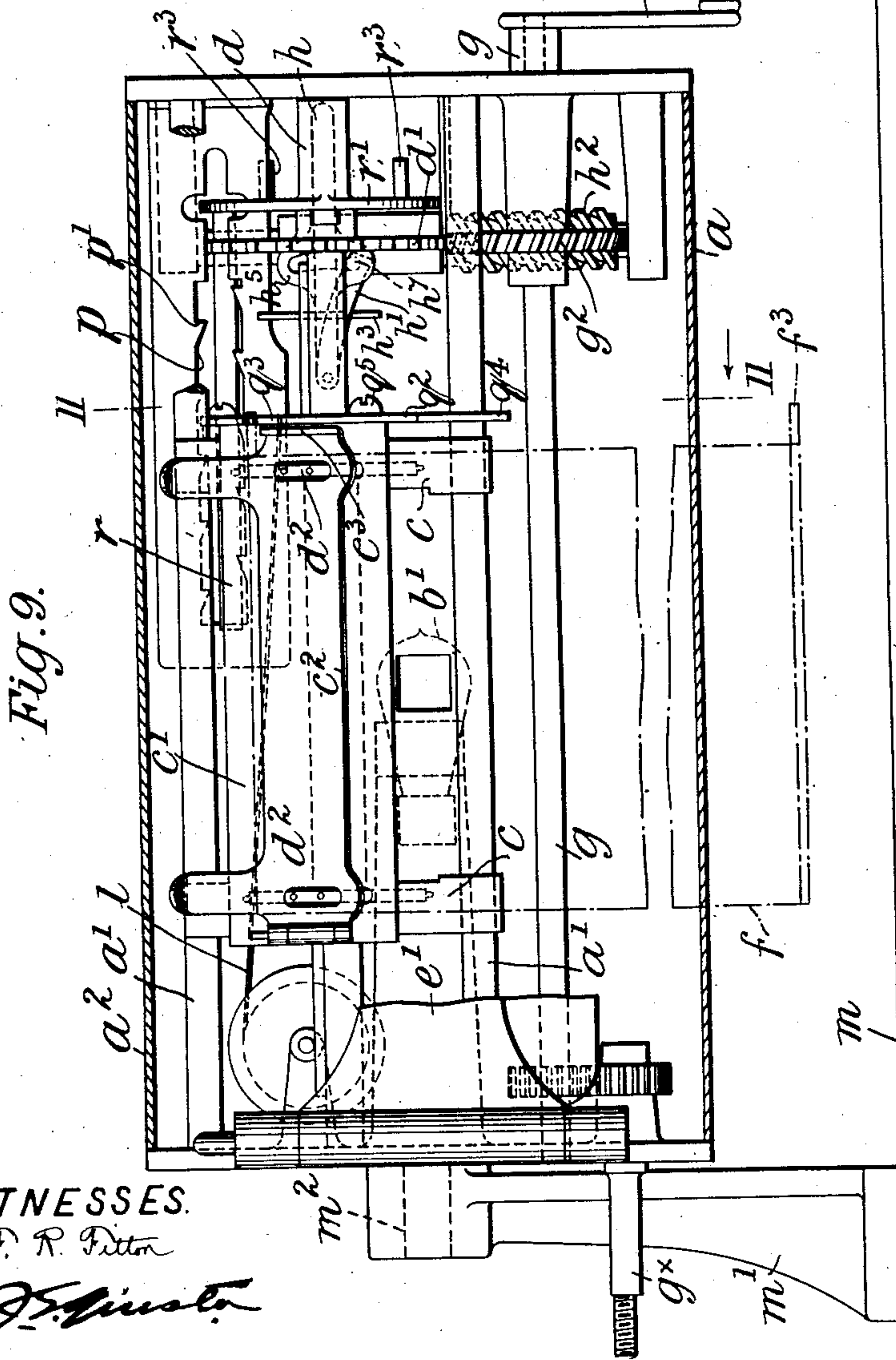
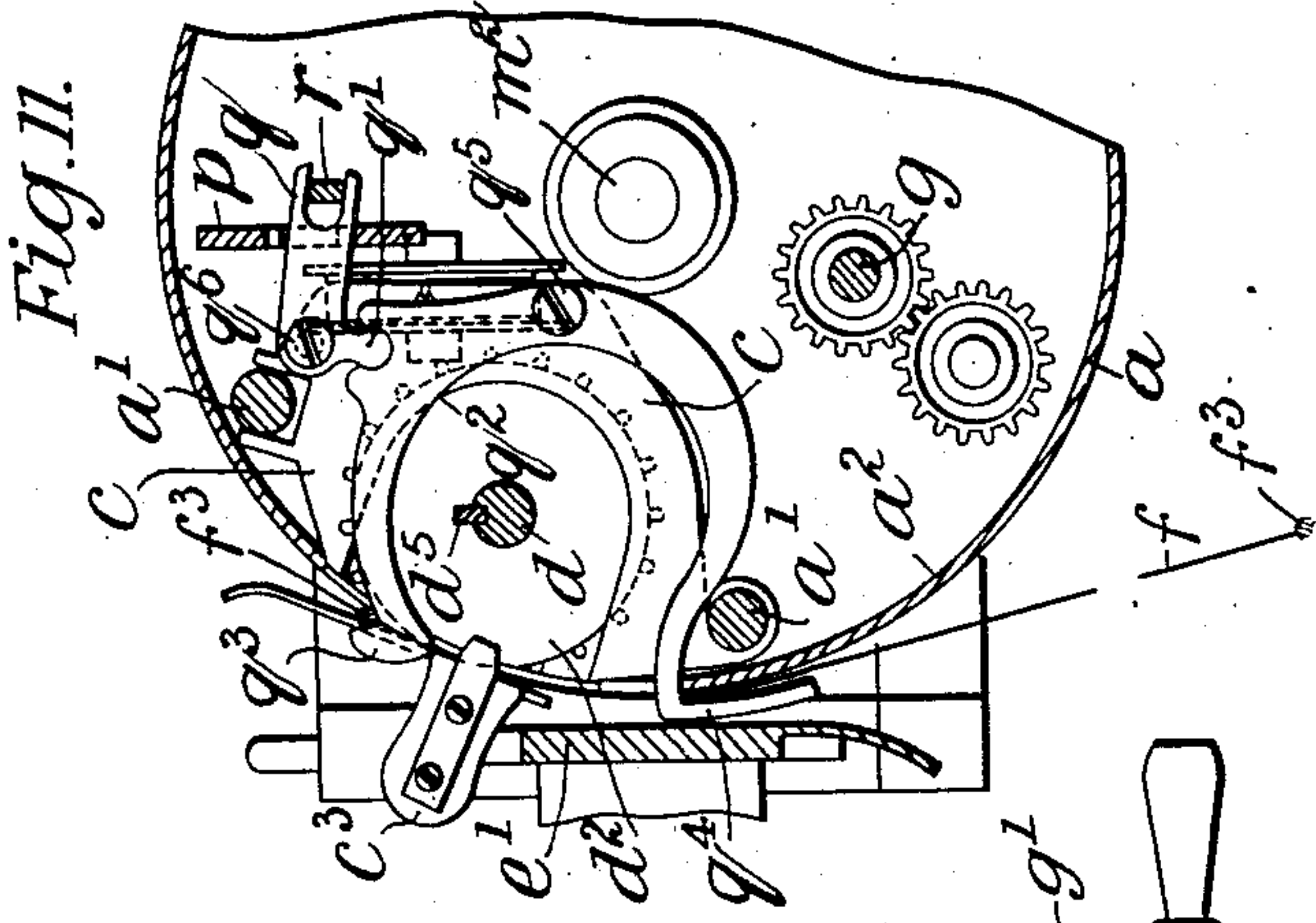
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8 SHEETS—SHEET 8.



WITNESSES.

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MOVING PICTURE TAKING, VIEWING, OR PROJECTING APPARATUS.

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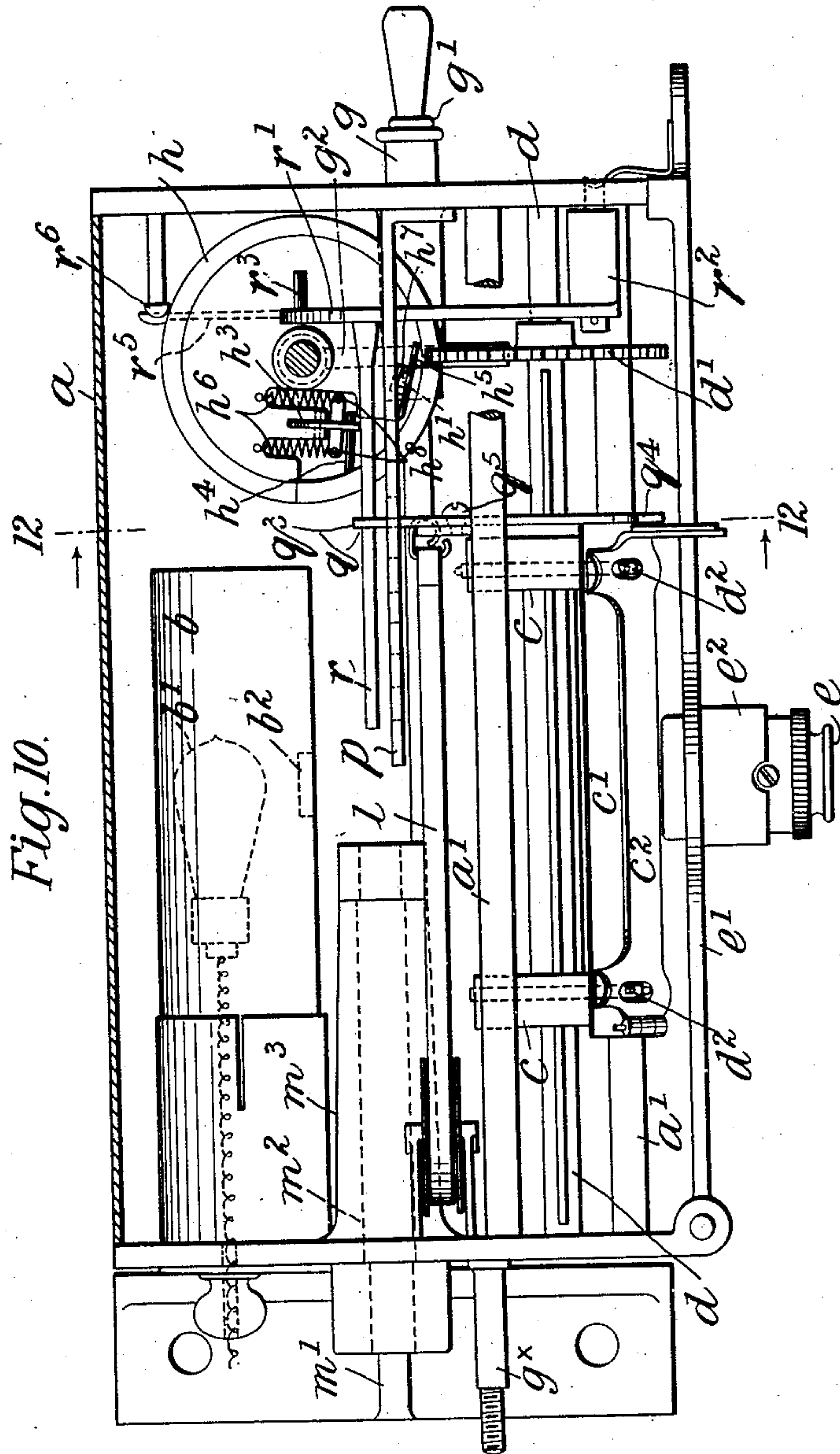


Fig. 10.

WITNESSES.

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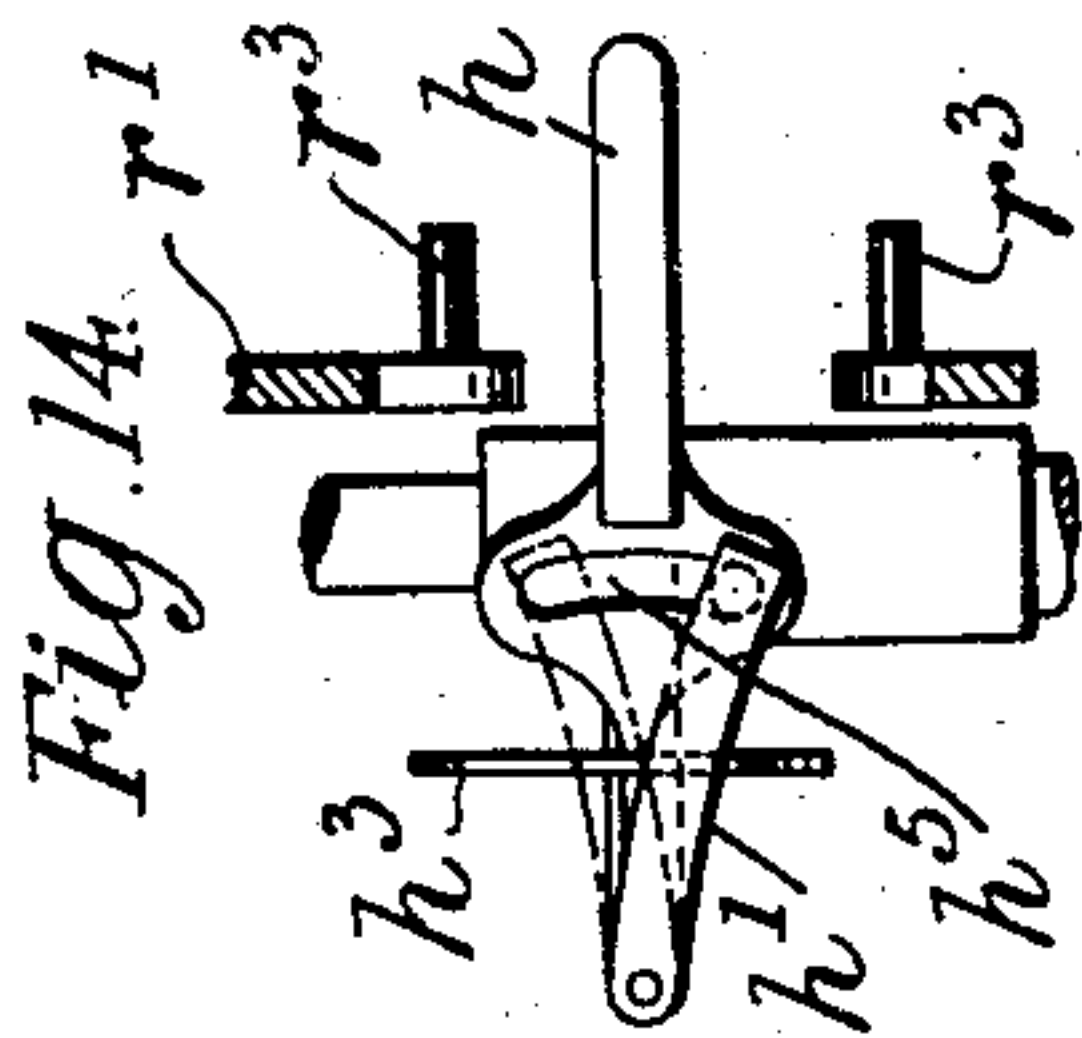
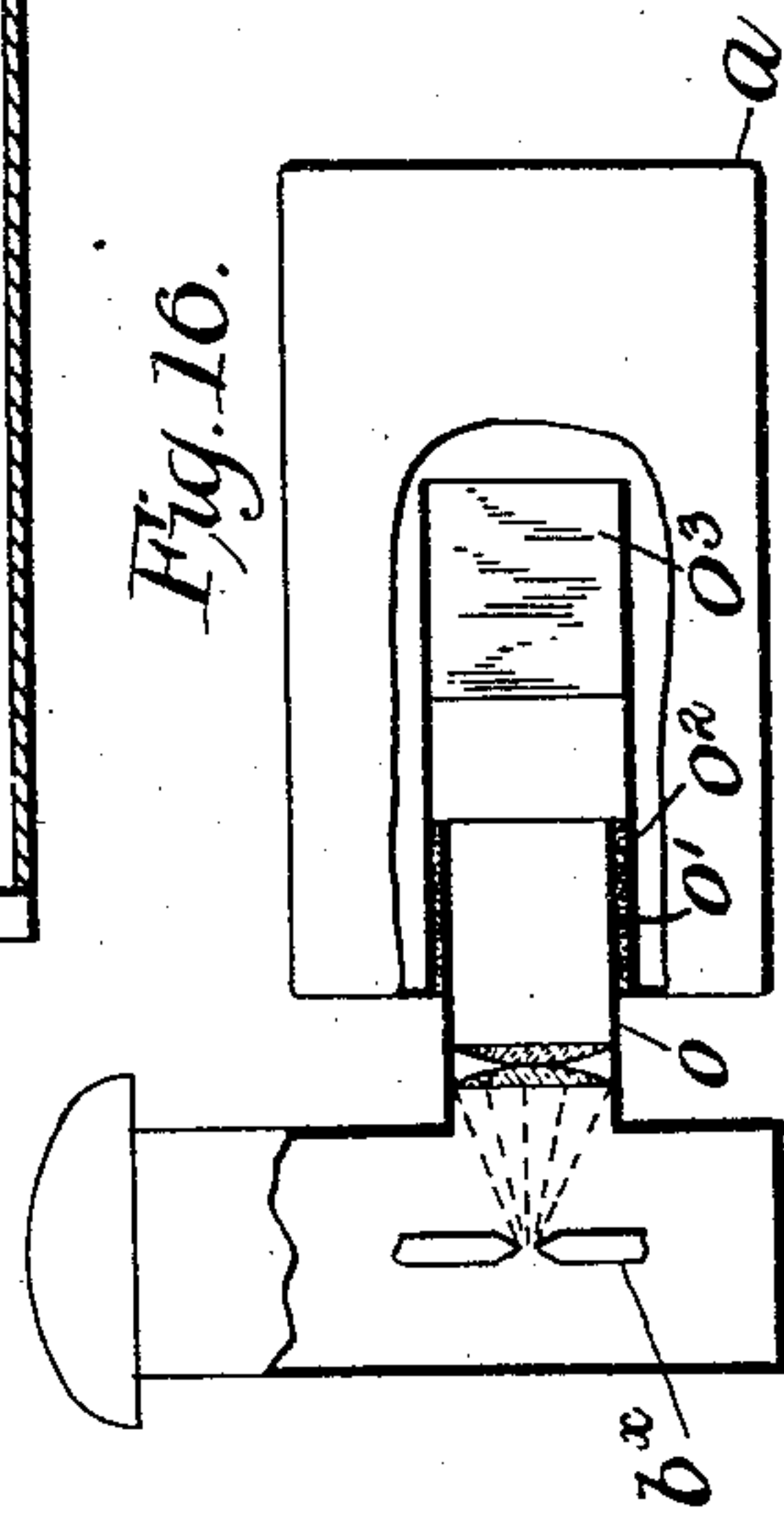
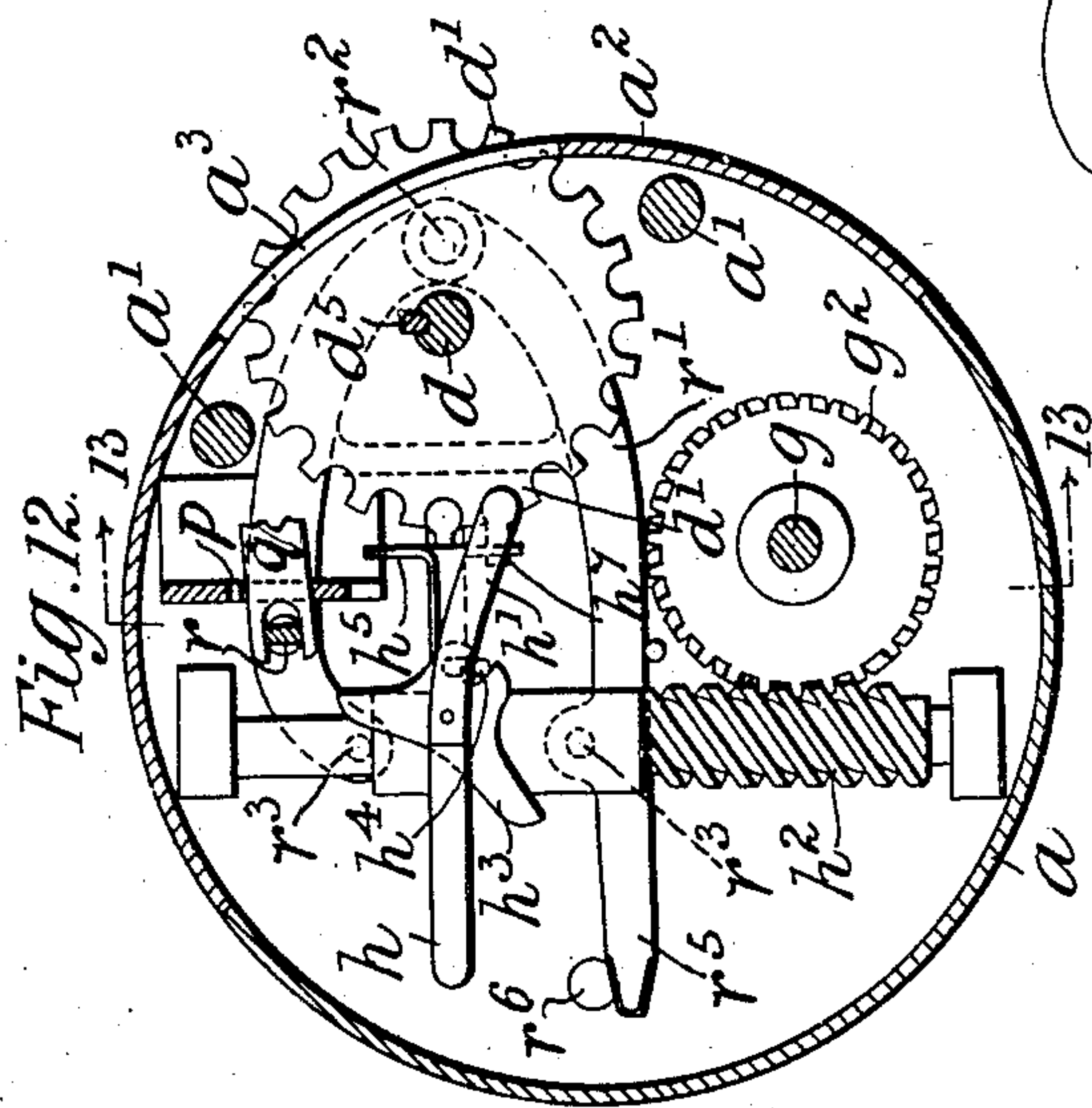
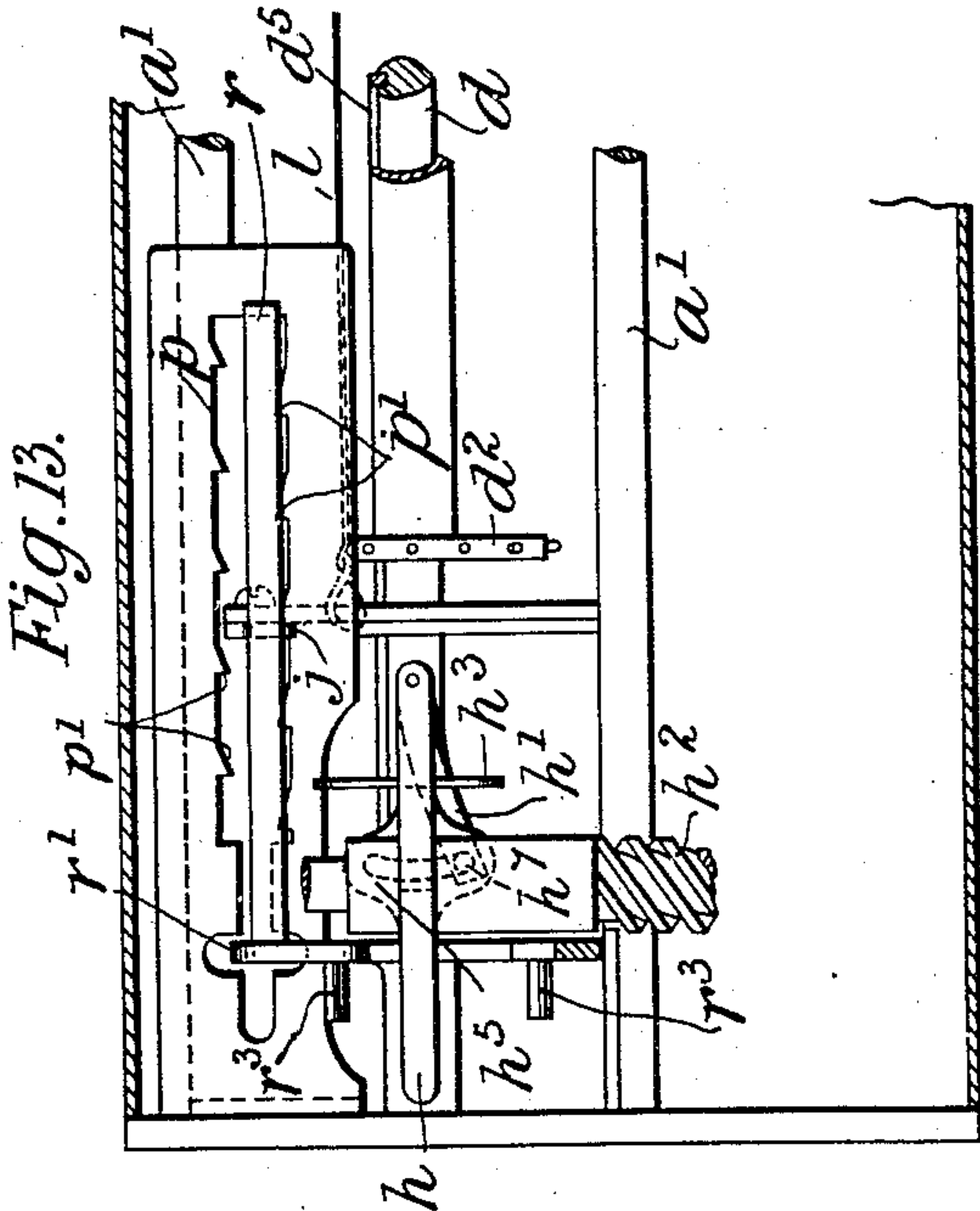
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8 SHEETS—SHEET 8.

966,342.



WITNESSES.

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UNITED STATES PATENT OFFICE.

FERDINAND VON MADALER, OF LONDON, ENGLAND, ASSIGNOR TO THE ROTARY PHOTOGRAPHIC COMPANY LIMITED, OF LONDON, ENGLAND, A CORPORATION OF GREAT BRITAIN AND IRELAND.

MOVING-PICTURE TAKING, VIEWING, OR PROJECTING APPARATUS.

966,342.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed May 28, 1909. Serial No. 498,872.

To all whom it may concern:

Be it known that I, FERDINAND VON MADALER, a subject of the Austrian Emperor, residing at London, England, have invented
5 a new and useful Improvement in Moving-Picture Taking, Viewing, or Projecting Apparatus, of which the following is a specification.

This invention relates to improvements in
10 moving picture taking, viewing, and projecting apparatus particularly adapted for home or like use.

The apparatus is adapted to take the pictures for same directly from the moving
15 subject or to reduce the image from an ordinary cinematograph film; but its principal purpose is to provide a convenient apparatus for projecting or viewing pictures from a reduced or microscopic presentation there-
20 of on a flexible film or the like, which may be conveniently obtained by reproduction from an ordinary cinematograph film.

The invention and apparatus are also adapted for the production of the reduced
25 image pictures from such film on to a flexible miniature film or strip, or a flexible cylinder, the pictures forming preferably a series of subjects following one another in rows, preferably longitudinally of the strip
30 and in a spiral or continuous line or in a number of closed circumferential lines. Or, a straight or two-ended flexible film may be used, having a number of parallel rows or columns of pictures. Such strips, which are
35 of course moved during display or during the taking of the picture, are preferably sensitized films carrying positive pictures, where they are to be projected, or sensitized bromide or like paper where they are to be
40 viewed. It is known to reduce ordinary cinematograph film pictures on to a plate in parallel lines obtained by a zig-zag motion of the plate so that they can be projected by imparting a like motion to the plate, and to
45 obtain, by means of a similar movement, a series of pictures arranged in parallel lines and adapted to be directly viewed, by a zig-zag motion; and it is likewise known to obtain such pictures in a spiral form or in the
50 form of rings on a disk; but the present invention provides for the arrangement and display of the pictures on flexible films or strips in more than one line by means of a longitudinal in conjunction with a lateral

movement. This mode of arrangement pos- 55 sesses considerable advantages in the way of saving of material and for packing and like purposes, and also permits of the use of picture series of practically any length that may be desired. When taking a series of
60 the film pictures directly, negatives are produced from which transparent films or bromide or other paper pictures can be printed by contact.

Where the taking of a series of pictures is 65 herein referred to, it will be understood that the display of same by projection or by direct viewing is equally possible, provided that the apparatus is modified for the purpose by being furnished with suitable pro- 70 jecting or viewing devices and vice versa in fact this is the purpose for which the apparatus is principally intended, and in this connection it will hereinafter be described.

The present invention further aims at im- 75 parting to the film or strip during its display a movement which will be free from wobbling or gyration so that the moving picture as seen by the spectator will remain stationary as to locality and will not dance 80 about from place to place on the screen (where projected) or in the tubular device or funnel in which, in the alternative, it is viewed. To this end the apparatus is provided with or comprises a rounded outer 85 part carried by or forming a portion of a casing and over which, by means of feeding mechanism in the interior of the casing, the film or strip is fed between guide bars or front and back plates arranged behind the 90 projecting or viewing lens. The feeding device or carriage operates in such manner as to impart to the film a longitudinal movement in conjunction with a lateral or transverse movement, the aforesaid guide bars or 95 plates traveling with the film or strip for the transverse or lateral movement, but remaining fixed as regards the longitudinal movement thereof so that for the latter, the film or strip slides freely between the guide 100 bars or plates.

The invention will now be described more fully with reference to the two examples thereof illustrated in the accompanying drawings, in which Figures 1 to 6 illustrate 105 one of the above mentioned forms of apparatus, employing an endless band film with the pictures arranged spirally thereon, and

Figs. 8 to 14 illustrate the other form of apparatus, employing a straight or two-ended film with the pictures arranged in parallel columns.

5 In the said drawings:—Fig. 1 is a front elevation of the said first-named form of apparatus, Fig. 2, a similar view but with the casing and other parts partly broken away, and Fig. 3 a plan but with the casing partly
10 removed; Figs. 4, 5 and 6 are transverse sections taken approximately on the lines 4—4, 5—5 and 6—6 respectively of Figs. 2 and 3, Fig. 5 showing also, diagrammatically, and on a reduced scale, a gramophone coupled to the apparatus; and Fig. 7 represents a portion of a film forming part of the subject of the invention and suitable for use with apparatus of the type represented by Figs. 1 to 6.
15 Fig. 8 is a front elevation, of the said second-named form of apparatus, Fig. 9 a similar view, but with the casing and other parts partially broken away, and Fig. 10 a plan, but with the casing partially removed; Fig. 11 is a partial transverse section on the
20 line 11—11 of Fig. 9. Fig. 12 a transverse section, taken approximately on the line 12—12 of Fig. 10, and Fig. 13 a partial longitudinal section, taken approximately on the line 13—13 of Fig. 12; Fig. 14 is a detail of the reversing mechanism; and Fig. 15 represents a portion of a picture film or strip suitable for use with apparatus of the type represented by Figs. 8 to 14. Fig. 16 is a
25 modified detail of the illuminating arrangements, suitable for use with either of the above types of apparatus.

In the above examples the principal difference is in that portion thereof relating to the lateral feed; for the most part the rest
30 of the apparatus is similar for both forms.

Referring to either of the sets of drawings—Figs. 1 to 6 or 8 to 14:—*a* indicates the casing of the apparatus, inclosing the motor which latter may be driven by elec-
35 tricity, by a spring or, as in the present instance, by hand; or by other convenient means. Within said casing is a chamber comprising a hood or bonnet *b* for an electric light *b'*, or for directing the light from a
40 gas, oil or other illuminating burner, such hood or bonnet being provided with a window, preferably lenticular, *b''*.

c is the film carriage, which moves longitudinally of the casing along fixed guide rails *a'*, *a''* in the casing *a* and along an intermediate rail *d* which latter serves also as the feed shaft as hereinafter described. The front part of the casing is removable, and comprises a rounded or semi-cylindrical
45 plate *a''* having a slot *a'''* over which the film is moved as hereinafter explained and between it and a lens *e* carried by a hinged bar *e'* which can be turned back out of the way of the strip.
50

65 *f* is the film, the longitudinal, or picture-

to-picture, movement of which takes place between guide bars comprising a curved back plate or platen *c'* of the carriage *c* and a front plate *c''*, the latter of which is hinged at one end to the plate *c'* and is provided at the opposite end with a spring snap or other fastening to keep it in place when closed, and with a handle *c'''* for manipulating it with, such handle extending, when the front part *a''* of the cover is closed, through the slot or opening *a'''* in the latter. 75

The hand motor above referred to comprises a main shaft *g* adapted to be turned by a handle *g'* and carrying a worm wheel *g''* which by means of a worm *h''* rotates a disk *h* having a turned-up portion or cam *h'*. The periphery of this disk engages with the teeth of a wheel *d'* fast on the carriage shaft *d* to rotate same step-by-step. On the same shaft *d* and projecting slightly through slots in the back plate *c'* of the carriage, are two star or pin wheels *d''* adapted to engage with feeding holes *f''* in the film. The elevation of the disk *h* is such that during the greater portion of its revolution its plane portion remains in engagement with the adjacent tooth of the wheel *d'* and holds said wheel and with it the pin wheels *d''* stationary during such interval of time as is necessary to expose any individual picture or part of the film, but when the raised or cam portion *h'* of the disk reaches the wheel *d'* it engages the next tooth thereof and on the further movement of the disk turns said wheel and with it the wheels *d''*, rapidly through an angle corresponding with the distance between one picture and the next. To provide for the other or lateral movement of the strip carriage, the pin wheels, which are keyed to the shaft *d* by the key *d'''*, are nevertheless capable of sliding thereon. 85 90 95 100 105

The lens *e* is mounted in a focusing tube *e''* carried by the hinged bar *e'* which has an opening *e'''*, Figs. 1 and 8, of the size of the reduced pictures of the film and which opening is opposite the slot *a'''* of the removable plate *a''* which slot itself is in turn opposite the lens *b''* so that light can be projected through these openings, through the film which passes between said openings *e'''* and *a'''*, and through the lens. The focusing tube can be telescoped by any suitable means as for instance by providing one section of same with a helical slot and the other with a pin and by partially rotating one of such sections until the required focus is obtained. From this tube the picture is projected in an enlarged form or, if desired, may be viewed directly or through a further lens or lenses, including if desired a long focus lens, through which latter a very small picture can be made to appear on an enlarged scale. 110 115 120 125

It will be noticed that, as exemplified in the drawings, the casing is mounted upon a base or bed plate *m* from which it is raised 130

by a single standard m' from which rigidly extends a horizontal stud or rod m^2 which passes into a sleeve m^3 of the casing a and supports it. Said casing is thus capable of a partial revolution on the rod m^2 so that, if the operator desires to make a change from projecting the pictures on to a screen to showing them to the spectators direct, the whole casing a and its contents can be turned over on the rod m^2 as a pivot, this being necessary because the projected pictures are run through upside down to provide for reversal during projection while no such reversal occurs in viewing and hence it is necessary to view the pictures from the opposite side to that from which they are projected as they are arranged on the film for traveling in one direction only.

To enable the operator to use the right hand for the handle g' when the casing is turned over, such handle is removable from the outer end of the shaft g to a shaft g^x at the other end of the apparatus, the shaft g^x being geared with the shaft g . For the purpose of viewing transparent positives on a film a piece of opal glass is preferably interposed between the lens b^2 and the slot a^3 so that a brightly lighted white background is obtained.

The freedom of one end of the casing from connection with the base or bed plate m enables the loop-shaped film f to be very readily passed over same and put in place on the carriage, the slack of the film hanging down between the casing and the base plate.

To bring the above apparatus into joint action with a talking machine such as n (Fig. 5) there may be geared with the worm h^2 a wheel n^2 conveniently supported as by a bracket on the casing, and fast on a shaft n' either flexible or adjustable which may connect with the driving spindle of the talking machine n so that the latter may be revolved at about its usual speed of say 80 revolutions to the minute to say about 950 revolutions of the picture machine. In such a case the talking machine record must of course have been produced synchronously with the film or strip being exhibited.

In a slightly modified form of the apparatus, shown in Fig. 16, in place of an electric glow lamp within the horizontal hood or bonnet b , an arc lamp b^x , or a gas, oil or other burner may be arranged to project its light through a hood or bonnet o , which is wrapped, at the part that enters the casing, in asbestos or the like o' surmounted by a metallic sleeve o^2 to protect the film and the mechanism from the heat of the lamp. The sleeve in this case carries an angle mirror o^3 for projecting and the like.

There only now remain the feeding mechanism to be described.

In apparatus of the type illustrated by Figs. 1 to 7, the film f is in the form of an

endless strip or closed loop carrying the pictures. These pictures, which are reduced to a very small size, are preferably arranged as shown in Fig. 7, in a row or column extending helically around the loop of the strip, as many times as desired, the pitch of the helical line, which is represented at f' , being determined by the length of the series of pictures relatively to the length of the strip. Or such pictures may be arranged if desired in a number of parallel rows or columns, each one extending circumferentially of the loop and ending where it began.

In the example illustrated, where the film has its pictures arranged in a single continuous helical line, the lateral traverse of the carriage is effected not in steps or jumps but continuously. For this purpose there is provided, parallel with the guide rails a' , a screw shaft i with the thread of which engages a tooth j or half nut carried by a bell crank lever on the carriage. Said bell crank lever has one of its arms held normally in engagement with the feed screw by a spring j' and its other arm j^2 projects forward through the platen c' so that it can be actuated by the finger of the operator to disengage the tooth j from the feed screw when it is desired to return or otherwise move the carriage by hand. The feed shaft is rotated preferably from the feed shaft d , by means of gearing such as a shaft k carrying a combined gear and miter wheel k' on a sleeve or hub k^2 the miter portion meshing with a miter wheel i' on the screw shaft i , the other end of the shaft k being provided with a miter wheel k^3 meshing with a like wheel d^3 on the carriage shaft d .

To allow of the different films employed having helical lines of different pitch, so as for instance to accommodate longer or shorter series of pictures by means of a closer or more open arrangement of the convolutions, the traversing feed of the carriage is made variable. For this purpose the gearing which drives the screw shaft i is preferably of the variable speed kind; in the present instance three speed ratios are provided for; one by means of the small miter wheel i' , another by a larger concentric gear wheel i^2 with which the gear wheel portion of k' engages and the third, or slowest speed ratio, by means of a still larger gear wheel i^3 with which the gear wheel portion of k' can also engage. The sleeve or hub k^2 carrying the wheel k' is slidable on its shaft k by means of a handle k^4 projecting through an elongated hole or slot in the end wall of the casing and engaging by its reduced end k^5 a groove in the hub k^2 to enable said wheel k' to be thrown into mesh with any one of the wheels i' , i^2 . To insure these wheels always meshing properly, the sleeve k^2 and its handle k^4 are connected to

a lever h^6 terminating at its free end in a segment h^7 provided with three notches, as shown in Fig. 4, one or another of these notches being engaged by a spring catch h^8 which prevents accidental displacement of the lever h^6 but insures its desired throw when shifted for the purpose of changing the gear. In apparatus of the other type, viz. the one illustrated by Figs. 8 to 15, the miniature flexible film has its series of pictures arranged in parallel rows or columns extending longitudinally of the film and beginning alternately at opposite ends thereof so that by imparting to the film a to-and-fro end-to-end movement coupled with an intermittent or periodic sidewise movement all the pictures can be viewed or projected one at a time. In this form of construction $f^3 f^3$ (Fig. 15) represent projections in the form of end bars on the film f which control its reversals and its lateral feed; p , q , and r represent parts of the escapement and reversing mechanism and l is the carriage feeding spring.

p is a fixed double rack comprising two sets of oppositely facing teeth of which the teeth in one set are opposite to the spaces in the other set.

q is a pawl pivoted on the carriage c at q^6 (Fig. 11) and having a finger q' which is engaged constantly in a recess of a C-shaped or bell crank trip lever q^2 also pivoted to the carriage c at q^5 . Said trip lever is provided with oppositely disposed, forwardly projecting horns $q^3 q^4$ the upper one of which lies in the path of the upper end bar f^3 of the film on the downward motion of the latter, while the lower horn lies in the path of the lower end bar f^3 on the upward motion of the film.

r is a throw-over or reversing bar which lies parallel with the line of travel of the carriage c and is at all times loosely engaged by a forked end of the pawl q . Said bar is carried by one of the limbs of a C-shaped or bell-crank reversing lever r' which is pivoted at r^2 with one limb above and the other limb below the driving disk h (Fig. 10) and is provided on each of said limbs with a stud or like projection r^3 . Said driving disk h is provided with a three-limbed trip device h^3 pivoted therein for tripping or throwing over the pivoted cam h' , one limb of such trip device which is forked, see Fig. 12, constantly engaging a pin h^4 on said cam while the other limbs project vertically on both sides of the disk h for such a distance as to insure that each time the crank lever r' is thrown over in either direction the corresponding stud r^3 on said lever will lie in the path of the adjacent limb of the trip device h^3 as the disk h revolves. This will trip the device h^3 and then both limbs of the latter will clear the studs r^3 until the next reversal of the crank

lever r' . To hold the crank lever r' in either of the positions into which it is moved it has a spring-like prolongation r^5 which passes over the rounded head of a stud r^6 which holds it on either side until force is exerted to move it.

h^5 is a fixed, segmental slotted part on the body of the wheel h for guiding the movements of the free end of the cam h' , the latter being provided with a screw or stud h^7 sliding in said slotted part. $h^8 h^8$, Fig. 10, are springs pulling constantly on pins $h^8 h^8$ projecting from each side of the trip device to insure its always being fully thrown over on one side or the other.

The rack members p have between them at least as many teeth p' as there are rows f' of pictures to be exhibited, and it will be seen that on the film reaching either end of its travel the corresponding end bar f^3 will trip a horn q^3 and thereby bring a stud r^3 into the path of the trip device h^3 . This will rock the crank lever r' and also through the pin h^4 throw over the cam h' so that it enters the teeth of the wheel d' with its angle reversed and so will reverse the drive of the wheel d' and consequently the feed of the film. The rocking of the lever r' moves the bar r and thus removes the pawl q out of the tooth of the rack p so that under the pull of a spring l , attached at one end to the carriage c and at its other end to the drum on which it is wound, the carriage is moved forward until the next tooth of the rack p on the opposite face of same catches the pawl q .

The strip f is provided in the example shown at the ends or where the turning and shifting occurs with a metal or other strengthening edging f^5 , perforated or serrated to correspond with the perforations in the film or strip, such edging being on one side in the illustration. Said edging may extend the full length of the film or strip if desired, or in the loop form it may further serve the purpose of indicating the point for starting the film or strip.

The apparatus may be used as a camera or picture taking machine if desired instead of for projecting or showing pictures; in which case of course the moving object which is being photographed would be illuminated instead of the film, and the apparatus would be provided with a sensitive film and be inclosed, except the lens, which must be protected by a shutter, in a dark casing.

A convenient term for designating equally well either the transparent film or the paper or like strip consists in the word "web" or the word "ribbon" and by these words the film and the strip will be referred to in the claims appended hereto.

A convenient mode of referring to the arrangement of the pictures in any of the various forms of web or ribbon herein described is by using the expression "rows or

columns." In the two-ended form of web or ribbon there are distinct rows or columns, in the strictest sense of the term; and even in the endless band form, where the so-called
 5 rows or columns are in reality only convolutions of a single spiral line, they nevertheless present to the eye, which cannot take cognizance of the whole line at one glance, the effect of separate rows or columns. Similarly, in the case where the pictures are arranged in a number of closed cycles or loops placed side by side, such cycles or loops may be called rows or columns, and moreover the
 10 whole series of the cycles or loops can fairly be regarded as a spiral seeing that, although no single cycle or loop is, separately considered, helical, yet the series as a whole commences near one lateral edge of the band, passes around and around same, being further removed from said edge at each complete turn, and finally, ends near the opposite edge of the band.

As already stated, the apparatus is suitable either for taking a series of pictures or
 25 for displaying (by projecting or by directly exhibiting, magnified) a series of pictures: that is to say it is capable either of transmitting said pictures on to the web or ribbon or of transmitting them from the web or
 30 ribbon to a screen or to the eye. For this purpose it would of course be provided with what may be termed a picture transmitting device, by which term is implied whatever may be necessary for this purpose as is well
 35 known in the art, such as a focusing tube, a lens or lenses and the like for taking or projecting, or a funnel for viewing, the pictures.

What I claim as my invention and desire
 40 to secure by Letters Patent is:—

1. In moving picture apparatus the combination of a casing, a rounded outer part thereon adapted to support a picture web or ribbon, and means within said casing for
 45 engaging and feeding a web or ribbon laid on said rounded part.

2. Moving picture apparatus for utilizing a loose, flexible picture web or ribbon, comprising means for supporting a portion of
 50 such web or ribbon, the remaining portion thereof being permitted to hang by gravity, means for directly engaging said web or ribbon and feeding same, and means for shifting said engaging means transversely
 55 of the direction of feed.

3. Apparatus for utilizing a loose, flexible picture web or ribbon, comprising means for supporting said web or ribbon by loosely suspending same, feeding wheels adapted to
 60 directly engage said web or ribbon, means for driving said feeding wheels, means for guiding the web or ribbon over said feeding wheels, and means for shifting said engaging means transversely of the direction of
 65 feed.

4. Apparatus for utilizing a loose, flexible picture web or ribbon, comprising feeding means for said web or ribbon movable in two directions at right angles to each other, and adapted to directly engage said web or
 70 ribbon, means for imparting rotary motion to said feeding means, means for imparting the other motion to said feeding means transversely to the rotary motion, and stationary means for supporting said web or
 75 ribbon during said feeding motions, said web or ribbon moving slidably over and relatively to said supporting means.

5. In moving picture apparatus the combination of a stationary support adapted
 80 for loosely hanging a flexible picture web or ribbon, a picture transmitting device, and means for feeding said web or ribbon relatively to said support and past said transmitting device in two directions, said means
 85 including means for effecting said feed in a direction longitudinally of the web or ribbon and means for feeding it in a direction transversely thereof.

6. In moving picture apparatus the combination of means for loosely supporting a
 90 flexible web or ribbon, a carriage, means on said carriage adapted to have a loose, feeding engagement with said web or ribbon, means for driving said engaging means for
 95 effecting a driving motion, means including a screw for shifting said carriage laterally and means for continuously operating said screw synchronously with the aforesaid driving motion.
 100

7. In moving picture apparatus the combination of means for loosely supporting a flexible web or ribbon, a carriage, means on said carriage unattached to the said web or ribbon but adapted to feedingly engage
 105 same, means for driving said engaging means, means for feeding said carriage transversely of the first mentioned feed, and means for operating said second mentioned feed continuously and synchronously with
 110 the first mentioned feed.

8. In moving picture apparatus adapted for utilizing a loose flexible picture web or ribbon having a row of feeding perforations adjacent each lateral edge thereof, the combination of a lens, a plurality of pin or star
 115 wheels adapted to engage the aforementioned perforations, means for actuating said pin wheels to feed the web or ribbon longitudinally past the lens, means for feeding
 120 ing the web or ribbon transversely past the lens, and means for slidably guiding said movements of the web or ribbon.

9. In moving picture apparatus the combination of a casing, a rounded outer part
 125 thereon adapted to support a picture web or ribbon, a plurality of guide bars having a sufficient space between them to permit said web or ribbon to be passed therethrough, a picture transmitting device adjacent thereto,
 130

and means for feeding pictures through the aforesaid space and past said transmitting device.

10. In moving picture apparatus the combination of a casing adapted to support a picture web or ribbon on its exterior and to contain the feeding mechanism therefor in its interior, a front plate exterior to the casing, a back plate also exterior to said casing spaced from said front plate sufficiently to form a path for a web or ribbon

between it and the front plate, a movable arm or bar extending across said path and a projecting lens carried by said arm or bar.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FERDINAND VON MADALER.

Witnesses:

EDUARD HAENEL,

ALBERT OLIVER HOWES.