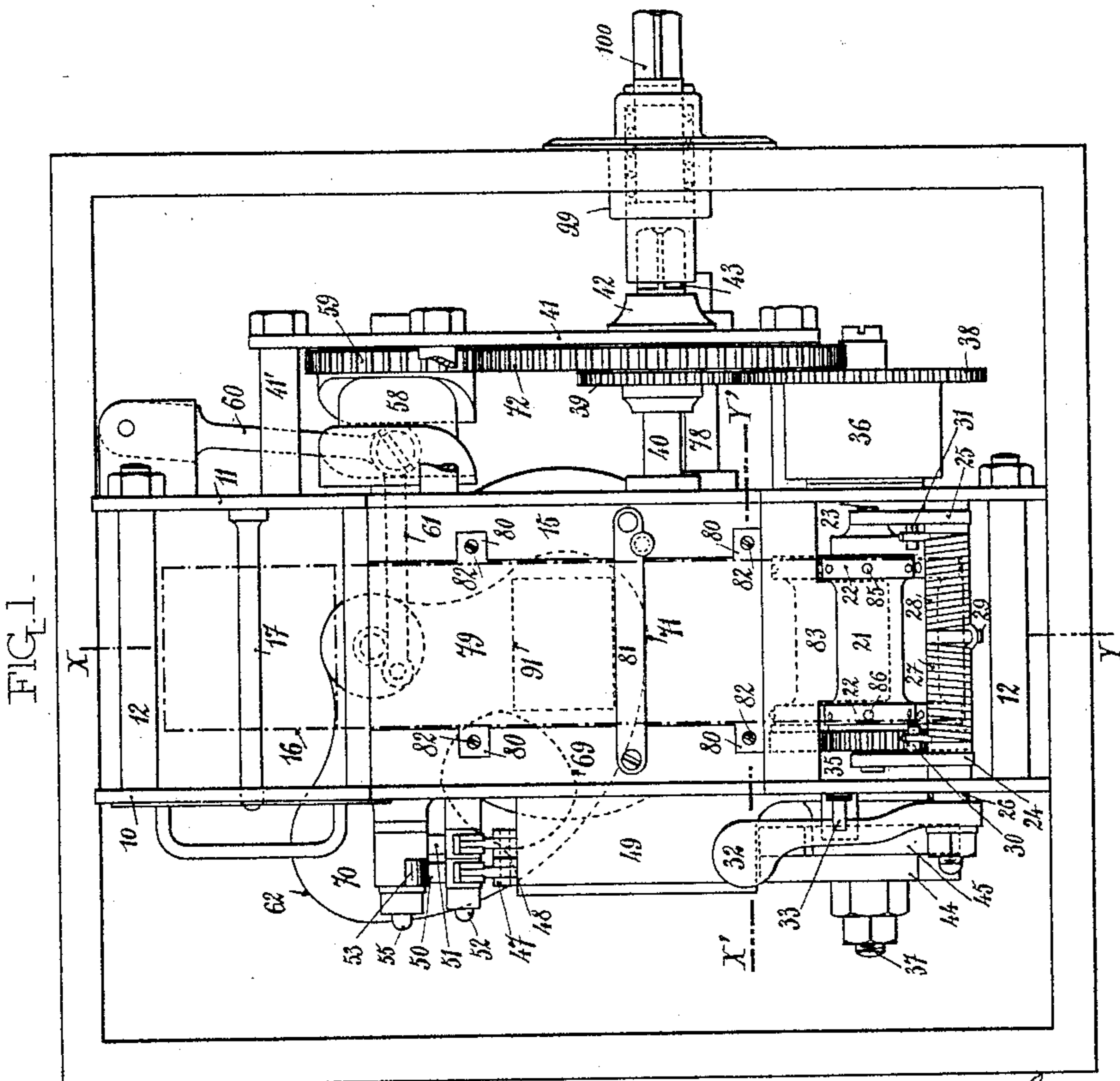
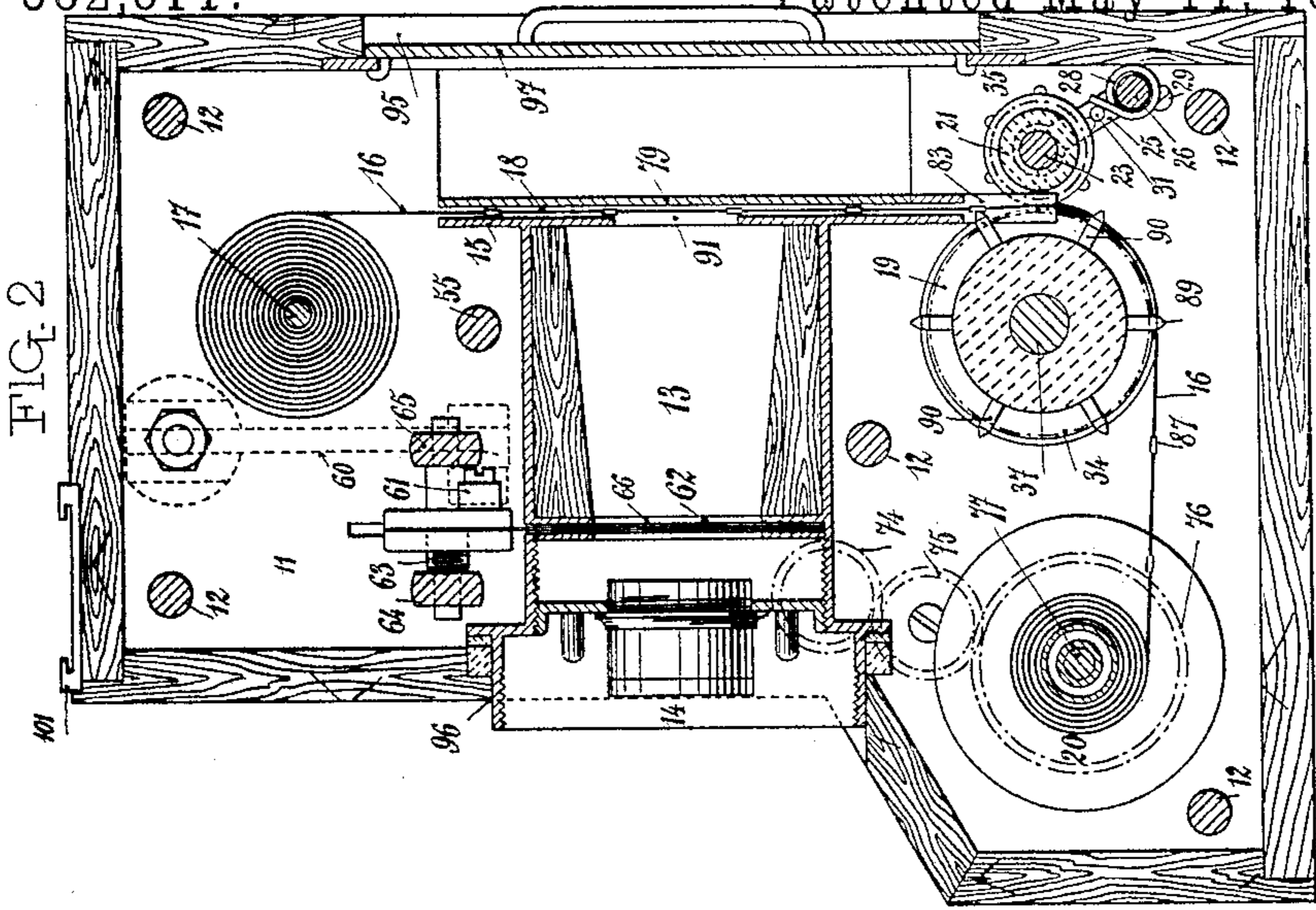


A. F. PARNALAND.
KINETOGRAPHIC CAMERA.

No. 582,311.

Patented May 11, 1897.



Witnesses
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FIG. 4.

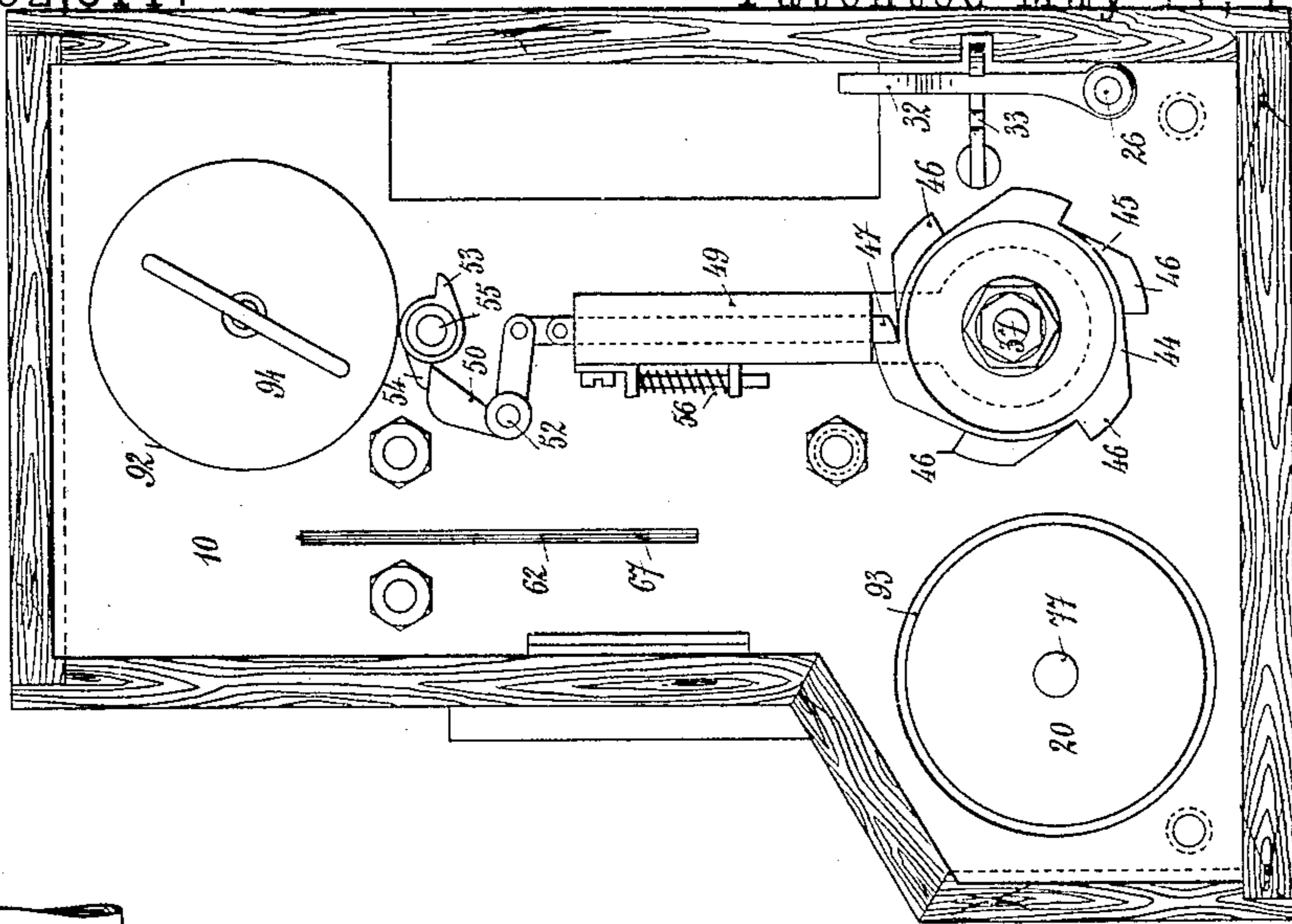


FIG. 5.

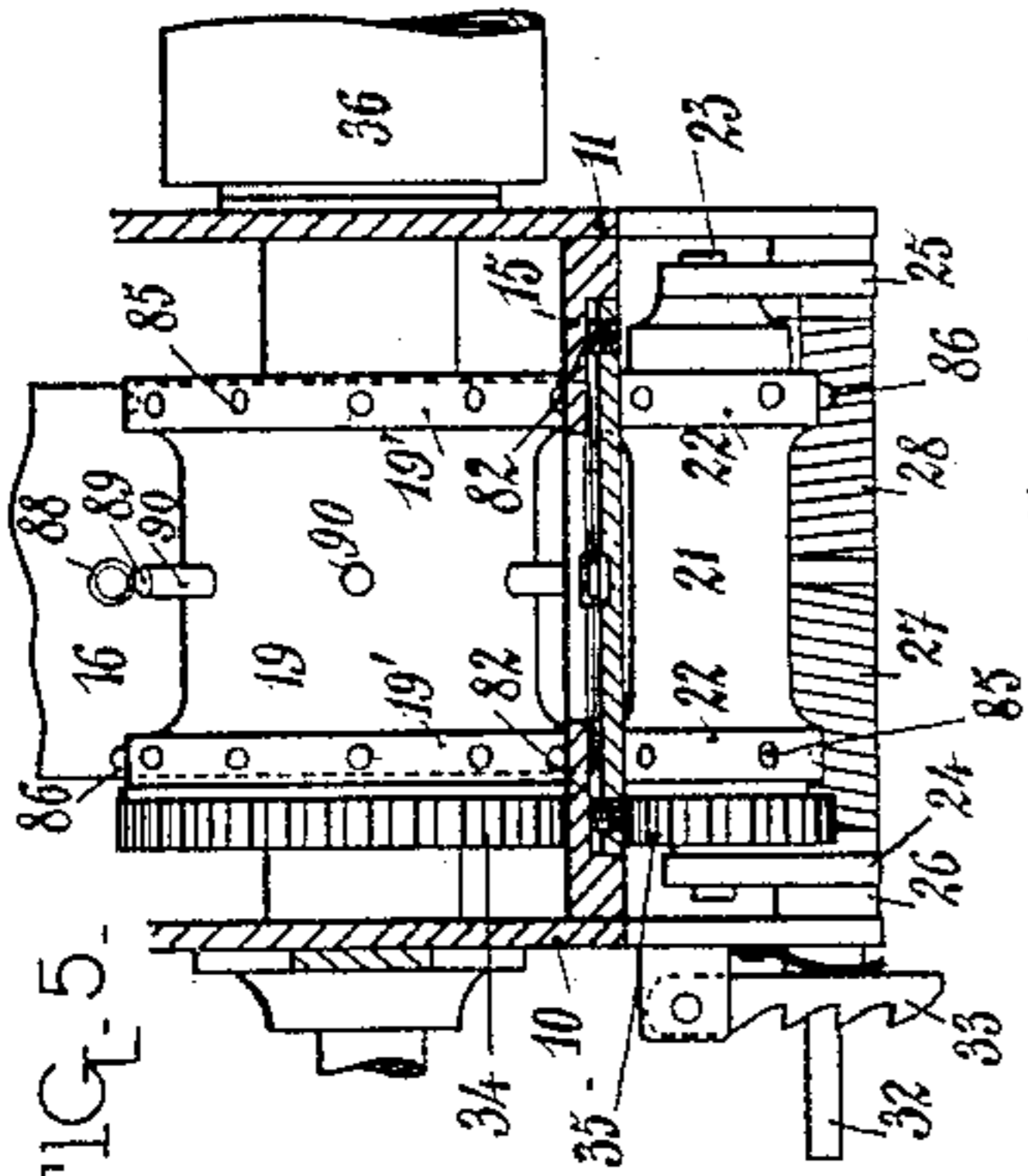


FIG. 6.

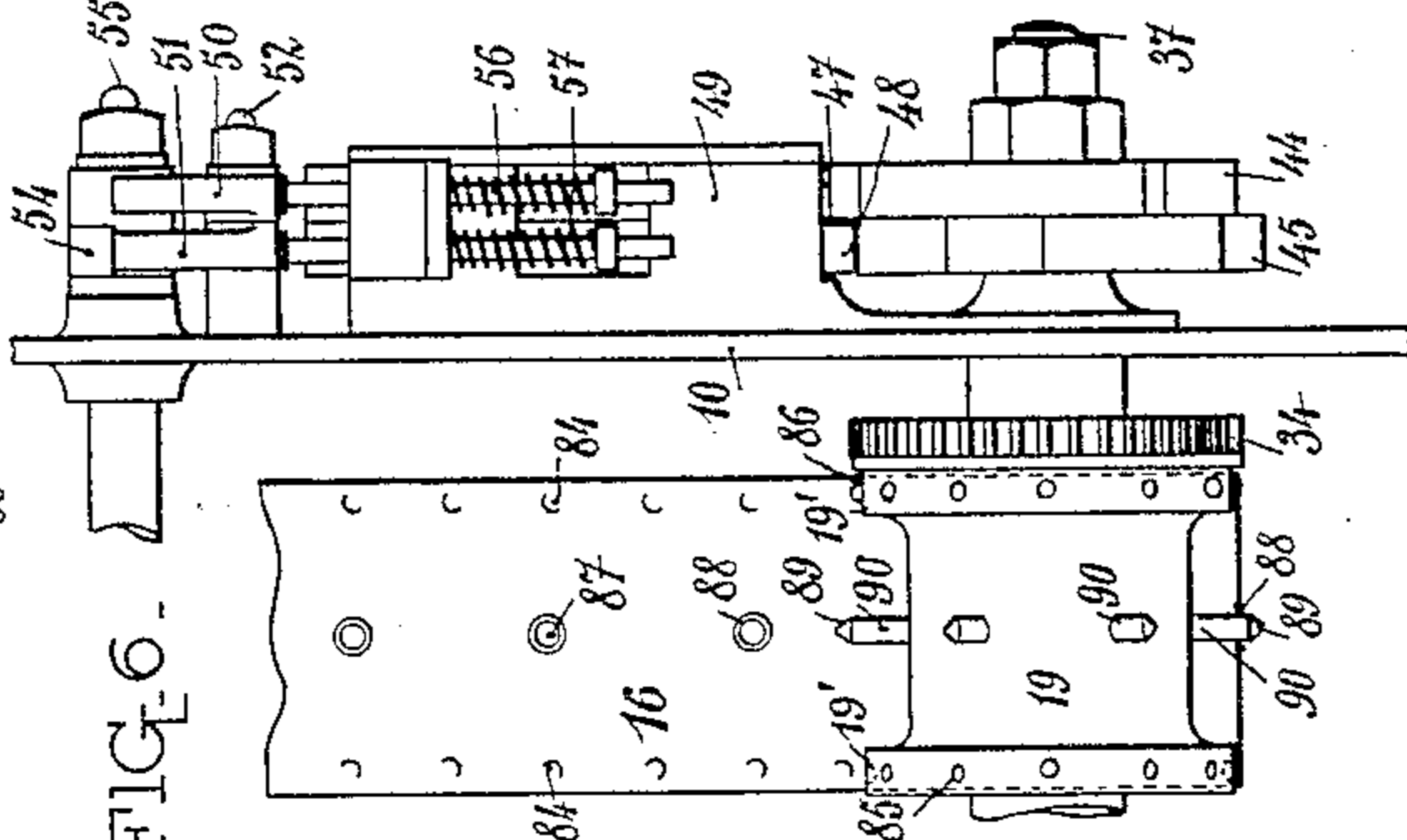
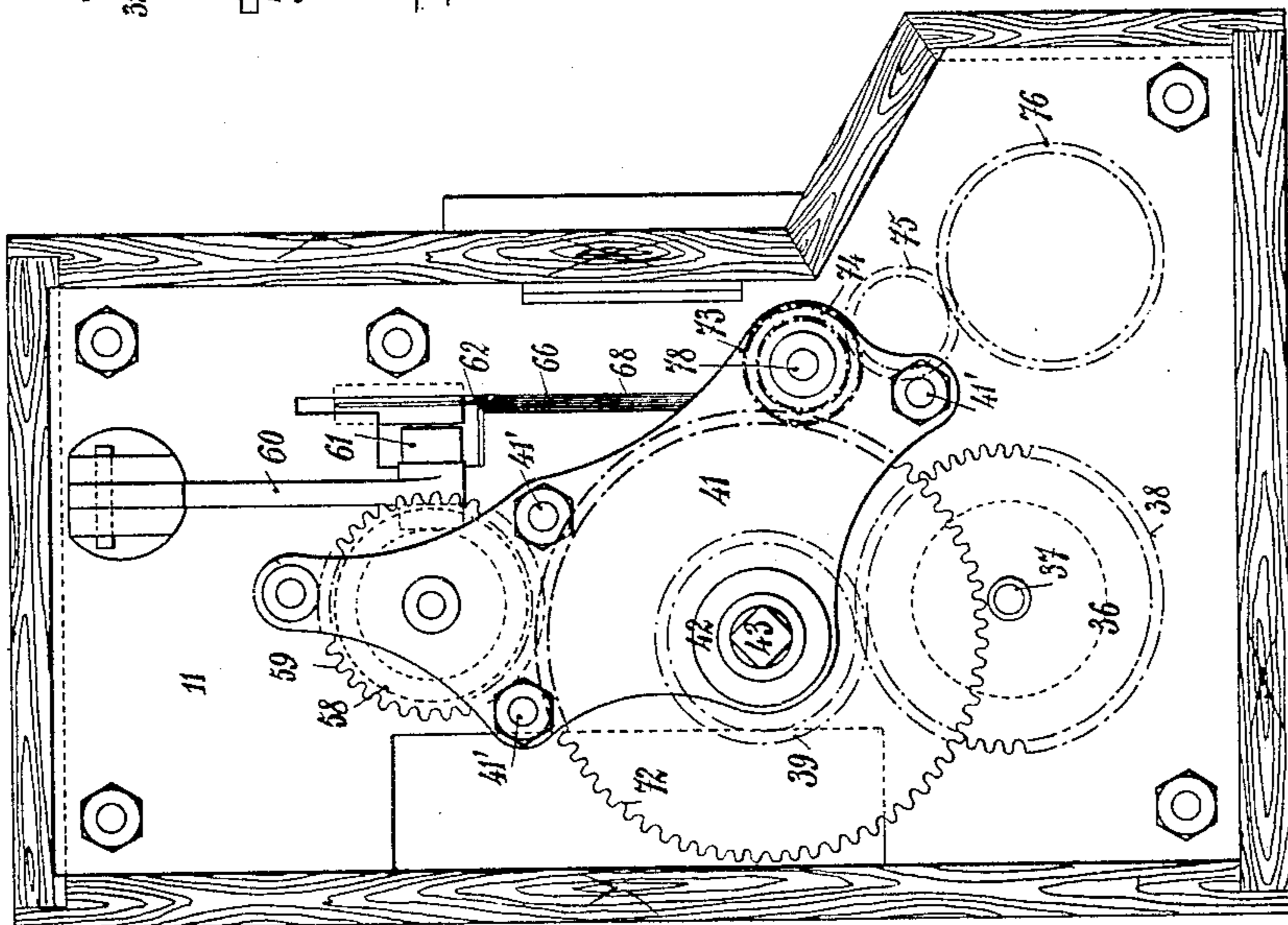


FIG. 3.



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UNITED STATES PATENT OFFICE.

AMBROISE FRANÇOIS PARNALAND, OF PARIS, FRANCE.

KINETOGRAPHIC CAMERA.

SPECIFICATION forming part of Letters Patent No. 582,311, dated May 11, 1897.

Application filed May 25, 1896. Serial No. 592,939. (No model.)

To all whom it may concern:

Be it known that I, AMBROISE FRANÇOIS PARNALAND, a citizen of the Republic of France, residing at Paris, in the Republic of France, have invented certain new and useful Improvements in or Relating to Apparatus for Use in Receiving and Projecting Photographic Images, of which the following is a specification.

10 The apparatus forming the subject-matter of the present invention is destined to be used as a chromophotographic apparatus for registering or recording different movements or positions of living subjects, as well as for
15 the projection of such scenes, in order to give an illusion of movement.

The construction and the mode of working of the apparatus will be better understood from the following description, with reference
20 to the accompanying drawings, in which—

Figure 1 is an elevation of the whole apparatus seen from the back with the back cover removed. Fig. 2 is a side view, in vertical section, on the line X Y of Fig. 1, showing
25 the right-hand portion of said Fig. 1. Fig. 3 is an elevation of the outside of certain parts of the apparatus at the right-hand side of Fig. 1. Fig. 4 is a similar view of the parts shown at the left-hand side of Fig. 1. These views
30 are supplemented by detail views, viz: Fig. 5, a partial view in horizontal section on the line X' Y' of Fig. 1, and Fig. 6 a view comprising parts of the apparatus seen from a position at right angles to that from which
35 they are viewed in Fig. 4.

Like reference-numerals indicate like parts throughout the drawings.

The mechanism is mounted on and between two vertical side plates 10 11, parallel to each
40 other and connected to each other by cross-pieces 12, which at the same time keep them at a certain invariable distance from each other. A horizontal tube 13 is securely held in the apparatus at a suitable height, as
45 shown in Fig. 2, being held between the two side plates 10 11. It affords at its front end—*i. e.*, its left-hand end as it appears in Fig. 2—a support for the photographic objective 14 and at its rear end a support for a vertical
50 guide 15 for the film 16 at the back of the objective 14.

The film 16, unwound from a fixed upper spindle 17, which supports it, passes through the space 18 in the guide 15, over a driving-roller 19, placed at the bottom of the apparatus, and then is wound on a lower spool 20,
55 which is caused to rotate at a desired speed by driving mechanism, as will be hereinafter described.

The driving-roller 19 has two concentric
60 side flanges 19', against which rest the corresponding edges of the film 16. At the back of the roller 19 there is arranged another and smaller roller 21, having, like the roller 19, two concentric side flanges 22, corresponding
65 exactly to those 19' of the said roller 19 and combining with the latter to take the film between them and cause its movement by their rotation.

The spindle 23 of the roller 21 is held in
70 the upper part of supports 24 25, which are mounted so as to be capable of oscillating on a spindle 26, carrying two spiral springs 27 28, the inner ends of which are fixed to that spindle at 29, while their opposite ends are
75 straightened so as to press on corresponding fingers 30 31, provided on the supports 24 25, respectively. The result of such arrangement is that the roller 21 is pressed against the roller 19 by the action of the springs 27
80 28, the tension of which can be regulated by a handle 32, by means of which the spindle 26 can be sufficiently turned in one or the other direction to vary the tension of the
85 springs 27 28 as desired, this handle 32 being then fixed in its position on a toothed pivoted catch 33, secured to the outside of the side plate 10, Figs. 1, 4, and 5.

One end of the roller 19 carries a toothed wheel 34, engaging with a wheel 35, carried
90 by the corresponding side of the roller 21, in such manner that the rotation of the one produces the rotation of the other in the opposite direction, and thus they cause the film 16 to move between their side flanges 19' 22.
95

The roller 19 is placed under the direct control of a spring-drum 36, mounted on the end of the spindle 37 of the said roller outside the side plate 11. The toothed wheel 38 of this drum 36 is geared to a toothed wheel 39, keyed
100 on the main driving-shaft 40, revolving horizontally and supported on one side on the

outer face of the side plate 11 and on the other side in a secondary side plate 41, connected by stays 41' to the plate 11, this shaft 40 passing through a boss 42 in the plate 41 and ending in a square portion 43, receiving the handle or other part for controlling the apparatus.

The end of the spindle 37 of the roller 19 opposite to the drum 36 passes outside the plate 10 and carries a ratchet-gear constituted by two disks 44 45, exactly alike and having each on their periphery three teeth 46 at equal intervals, both disks being secured on the spindle 37 in such a manner as to bring the teeth 46 of one disk midway into the intervals of the other. In combination with the disks 44 45 and their teeth 46 work, respectively, two vertical rods 47 48, held and guided vertically in a common slide 49, the lower ends of these rods forming stops for these disks 44 45, while their upper ends are hinged to the corresponding ends of bell-crank pawls 50 51, oscillating around a pivot 52 and acted upon by corresponding cams 53 54, secured at the end of a spindle 55, driven, as will be hereinafter described, by the driving mechanism of the motor.

The combination of the latter parts of the apparatus is such that the cams 53 54, mounted on the spindle 55, so as to project in opposite directions to each other, act, in consequence of the rotation of this spindle, successively and alternately on their corresponding pawls 50 51, so as to cause successive and alternate raising of the rods 47 48, the lower ends of which release successively and alternately the disks 44 45 by releasing their teeth 46, so that these disks can turn under the action of the spring-drum 36, acting on their spindle 37. Under such circumstances, if the rod 48, for instance, is raised and releases its disk 45, it will enable the spindle 37 to turn, which rotation will stop as soon as the rod 47, which at the start was not against a tooth of its disk 44, is met by the tooth 46 of the latter, which comes immediately after the tooth 46 of the disk 45 which has just been released. The springs 56 57 are arranged and combined, respectively, with rods 47 48 and their common slide 49, so as to always hold the lower ends of these rods in contact with the periphery of the disks 44 45 when they are not raised by the action previously explained of the cams 53 54.

In the apparatus illustrated, with the given arrangement and combination of the disks 44 45, having together six teeth 46—that is to say, three each—the rotation of the spindle 37, and consequently of the driving-roller 19, is effected to the extent of a sixth of a revolution and causes, therefore, successive movements of the film, each of these movements corresponding exactly to placing in front of the objective of the portion of the said film carrying the image or on which the photographic image is to be produced.

At its end opposite to the fingers 53 54 the shaft 55 has keyed on it between the two plates 11 41 a cam 58 in one piece with a toothed wheel 59, by which latter the movement of the shaft 55 is effected, the said cam causing, by means of intermediary articulated links 60 61, the alternate transversal movements of a closing shutter 62, supported on a spindle 63, arranged over and parallel to the tube 13 and held so that it can oscillate in its transversal supports 64 65, secured on and between the plates 10 and 11.

The tube 13, as well as the plates 10 and 11, are provided with slots, a slot 66 (for the tube 13) and slots 67 68 (for the plates 10 11) permitting free working of the shutter 62, which has near its outer edge an opening 69, the dimensions and the position of which are such as to correspond, as desired, to the opening in the objective. This opening 69, the purpose of which is to open the objective relatively to the film moving at the back of the objective, is combined with non-perforated parts 70 71, causing successive closing of the objective relatively to the film alternately with opening the film to the objective by the opening 69. The groove of the cam 58 is so disposed that when the opening 69 passes before the objective it corresponds to the position of absolute rest of the film, whereas the passage of each full part 70 71 of the shutter across the objective corresponds exactly to the movements of the film, and consequently to the working of the parts causing that movement.

The toothed wheel 59 is driven by another toothed wheel 72, keyed on the driving-shaft 40, which carries also the wheel 39, driving the wheel 38 of the spring-drum 36. The wheel 72 drives, moreover, by means of pinions 73, 74, (carried by a shaft 78,) and 75, the toothed wheel 76 of the spindle 77 of the winding-spool 20.

The space 18 in the guide 15, in which the film 16 travels, is formed by a rectangular vertical opening in the said guide 15, Fig. 5, with which is combined a back plate 79, supported by lugs 80 and pressed by a transverse spring-blade 81, forming a latch. Screws 82 pass through lugs 80 and rest with their inner ends on the bottom of the guide 15. They permit an absolutely exact adjustment of the pressure of the plate 79 on the film, in order to hold it absolutely exact, which is aided by the continuation 83 of the guide 15 in between the rollers 19 and 21.

In order to prevent any sliding of the film and to secure an absolutely exact movement of it by the action of the parts controlling it, the said film is provided at the edges with punched "tabs" and corresponding recesses 84 at equal heights on both sides. Recesses 85 and projections 86, Fig. 5, are formed on the flanges 19' and 22 of the rollers 19 21. These recesses and projections 85 86 are arranged in opposite directions—that is to say,

the flange 19' on one side of the roller 19 has projections 86, to which correspond recesses 85 on the flange 22 of the roller 21, whereas the other flange 19' of the roller 19 has the recesses 85, to which correspond projections 86 on the other flange 22 of the roller 21. Moreover, the film 16 is provided along its longitudinal axis with holes 87 equidistant from each other, the distance between them being exactly equal to the amount of successive advances of the film. These holes 87, provided with eyelets 88, which strengthen the edges of the holes, and thus prevent damaging of the film, cooperate with the points 89 of radial pins 90, arranged on the roller 19. These points enter successively the holes 87, whereby the film 16 is maintained in proper position while traveling, the above-mentioned impressions or tabs 84 cooperating for a like purpose with the recesses 85 and projections 86 of the flanges 19' 22 of the rollers 19 21.

By inverting the position of the impressions 84 on the sides of the film edges it is possible, given an equally inverted arrangement of the projections and recesses 85 86 on the flanges 19' 22 of the rollers 19 21 to present either face of the film 16 to the back of the objective which is necessary if it is desired to use the apparatus both as a chromophotographic apparatus and as an apparatus for projecting the scenes registered by it chromophotographically.

For the chromophotographic operations the back pressure-plate 79 is without openings, whereas for optical projecting operations this plate is provided with an opening corresponding to the opening 91 in the front plate of the guide 15 and permitting the passage of the rays of light from the source of light thus projecting the pictures from the film. The apparatus comprises, therefore, two plates, which can be exchanged, one not perforated and the other with an opening, thus enabling the apparatus to be used for either of the before-mentioned purposes.

The plate 10 is provided with holes 92 93, enabling the rolls of film to be put in. Covers 94 with handles cover these openings.

The whole mechanism thus arranged and mounted on the main plates 10 and 11 is inclosed in a casing of special shape, from which it can be easily removed. This casing has in front a circular hole for the passage of the tube of the objective and at the back a movable cover with a circular opening 95, which is covered by a cover 97 for chromophotographic operations, but which, on the contrary, is left open for the projection operations in order to allow the passage of the rays of the luminous source from behind the apparatus. The casing carries besides a socket 99 for supporting a coupling for the square portion of the driving-shaft, which socket has a spindle in it with an exterior square 100, on which the action for causing working of the apparatus is exercised by means of a crank-handle or any other suitable device. The

top of the casing is besides provided with sliding support 101 for receiving the usual prism or other sighting device in order to secure proper setting of the apparatus.

The construction of the apparatus being now explained it is easy to understand its working.

The film 16 being placed in it as shown in Fig. 2, the spring of the drum 36 is wound up to a desired extent. It is sufficient for this purpose to raise both the stops 47 48, so as to allow the disks 44 45 to rotate and to turn the spindle 37 till the desired tension of the spring in the drum is obtained. Then the stops 47 48 are released and return to their working position on the disks 44 45, one tooth 46 of which is stopped by a corresponding stop, whereby the action of the spring-drum 36 and therefore the rotation of the spindle 37 are prevented, the result of which will secure the immobility for the time being of the film 16. Then the pressure of the roller 21 on the roller 19 is regulated by adjusting the tension of the springs 27 28 by means of the handle 32, which is secured in its position on the rack 33 with a spring, as aforesaid. It is sufficient now to turn the driving-shaft 40 in order to make the apparatus work. The rotation of the shaft 40 will cause, by the aid of the parts operatively connected to it, the combination of which has been mentioned previously, the alternate raising and lowering of the rods 47 48, and consequently corresponding disengaging of the disks 44 45, the result of which, in consequence of the action of the spring-drum 36, will be the successive rotating and stopping of the rollers 19 21, and consequently the advance in the desired direction and successive stoppages of the film 16 behind the objective. It is important to point out here that the continuous rotation of the driving-shaft 40 causes an equally continuous movement of the spring-drum 36 in the direction necessary to the winding up of the spring within it, and the relation between these rotations is such that the partial winding up produced will correspond exactly to the amount of unwinding by the disks 44 45 and stops 47 48 causing the rollers 19 21 to act. Thus the tension of the spring in the drum 36 always remains the same, and also, therefore, the impulse given by that spring to the spindle 37, so that there naturally follows an absolutely normal and uniform working of the parts, causing a uniform and regular advance of the film 16, whatever the length of time of working of the apparatus, at any given moment. All these parts cooperating, as has been previously described, with the shutter 62, the result is that recording or projecting of the photographic images will be effected when the objective is opened, and when this occurs the film 16 stops, whereas closing of the opening by the shutter corresponds to the advance of the said film.

The speed of the apparatus being suitably

regulated the successive advancing and stopping of the film 16 will be effected, so that all the movements of any desired scenes can be recorded and projected in a manner which gives a complete illusion of movement.

I claim—

1. In a kinetographic camera, the combination with an objective, of a driving-roller over which the film passes, means for operating said roller, toothed disks mounted upon the spindle of the roller, as described, the vertical sliding rods, oscillatory bell-crank pawls to which the rods are hinged, a rotatable spindle, and cams mounted as described on the latter, all arranged as and for the purpose specified.

2. In a kinetographic camera, the combination with the side plates, the horizontal tube slotted as described, and the objective, of the closing-shutter having an opening, the spindle 55, the toothed wheel 59, the cam integral with the latter, the jointed links and means for driving the said toothed wheel, all arranged for coöperation as specified.

3. In a kinetographic camera, the combination with the film-guide provided with a vertical film-opening, a back plate, lugs supporting the latter, a spring-blade acting upon the back plate, and screws passing through the lugs and resting on the bottom of the guide, all as and for the purpose specified.

4. In a kinetographic camera, the combination with the film-guide provided with a vertical film-opening, a back plate, lugs supporting the latter, a spring-blade acting upon the back plate, screws passing through the lugs and resting on the bottom of the guide, the rollers 19, 21, and the said guide having a continuation or extension between said rollers.

5. In a kinetographic camera the combination with the rollers 19, 21 having correspond-

ing side flanges provided with recesses and projections arranged as described, for coöperation with recesses and projections on a movable film.

6. In a kinetographic camera, the combination with an objective, and a film-guide, of a winding-spool for a film, a driving-roller over which the film is adapted to pass, said roller having side flanges, a second roller having side flanges corresponding to those on the driving-roller, a spindle carrying the second roller, a second spindle, arms or supports mounted for oscillation on the second spindle, and in the outer ends of which arms the spindle of the second roller is supported, and springs one end of which is secured to the said second spindle, and the other end bearing upon the arms, the flanges of the driving-roller and the said second roller being provided with coöperating recesses and projections, arranged as described, and radial pins on the driving-roller for the purpose specified.

7. The combination with the driving-roller spindle, and the driving-roller thereon, of two disks mounted on one end of the spindle, and having a corresponding number of teeth arranged to alternate with each other as described, sliding rods adapted to alternately engage and release the teeth of the disks as set forth, a driven spindle, and means intermediate the latter spindle and the sliding rods to alternately raise the latter in the manner and for the purpose set forth.

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

AMBROISE FRANÇOIS PARNALAND.

Witnesses:

LOUIS SULLIGIE,

CLYDE SHROPSHIRE.