

No. 890,936.

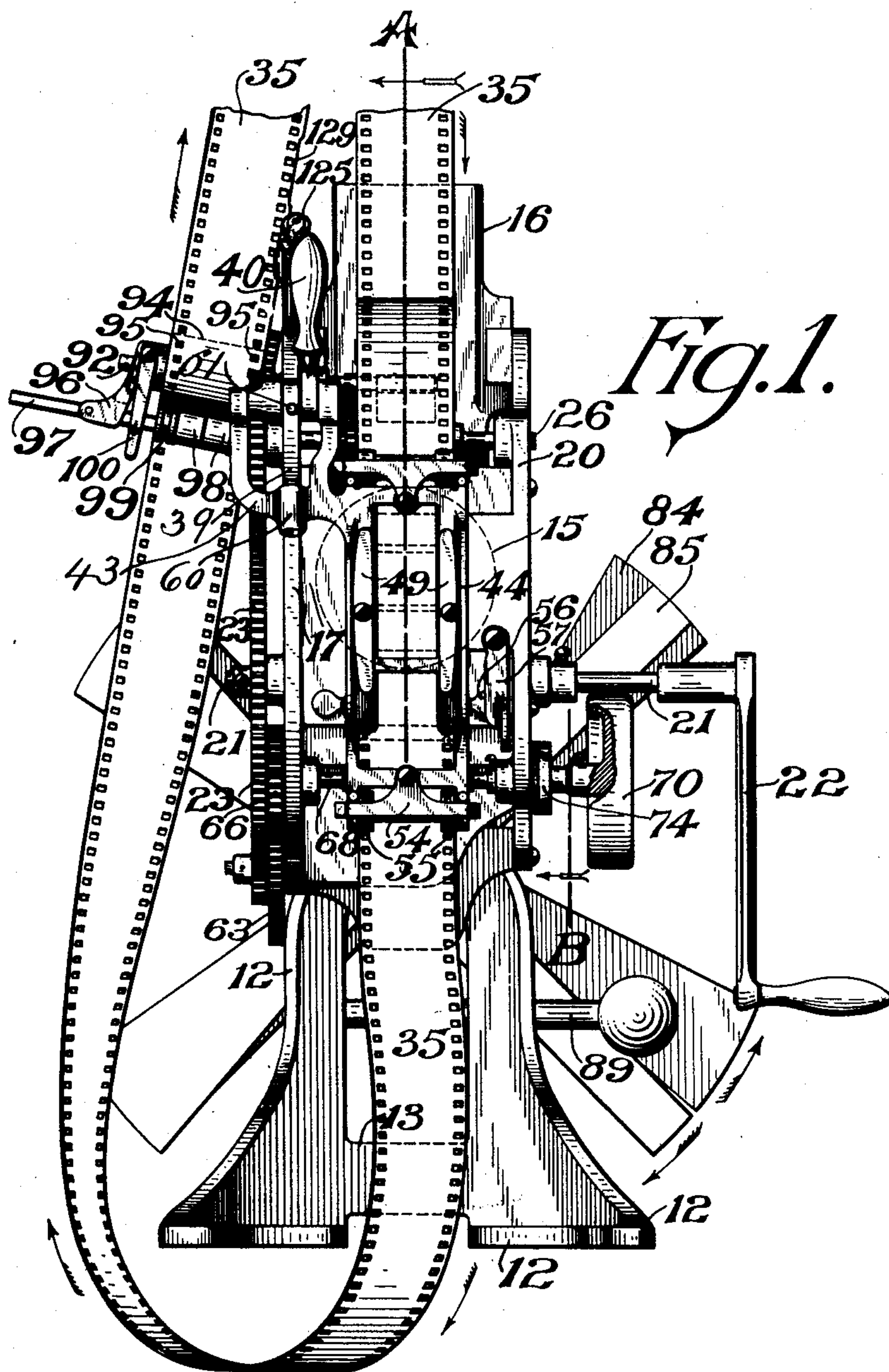
PATENTED JUNE 16, 1908.

H. K. SANDELL.

MOVING PICTURE MACHINE.

APPLICATION FILED SEPT. 25, 1907.

7 SHEETS—SHEET 1.



WITNESSES.

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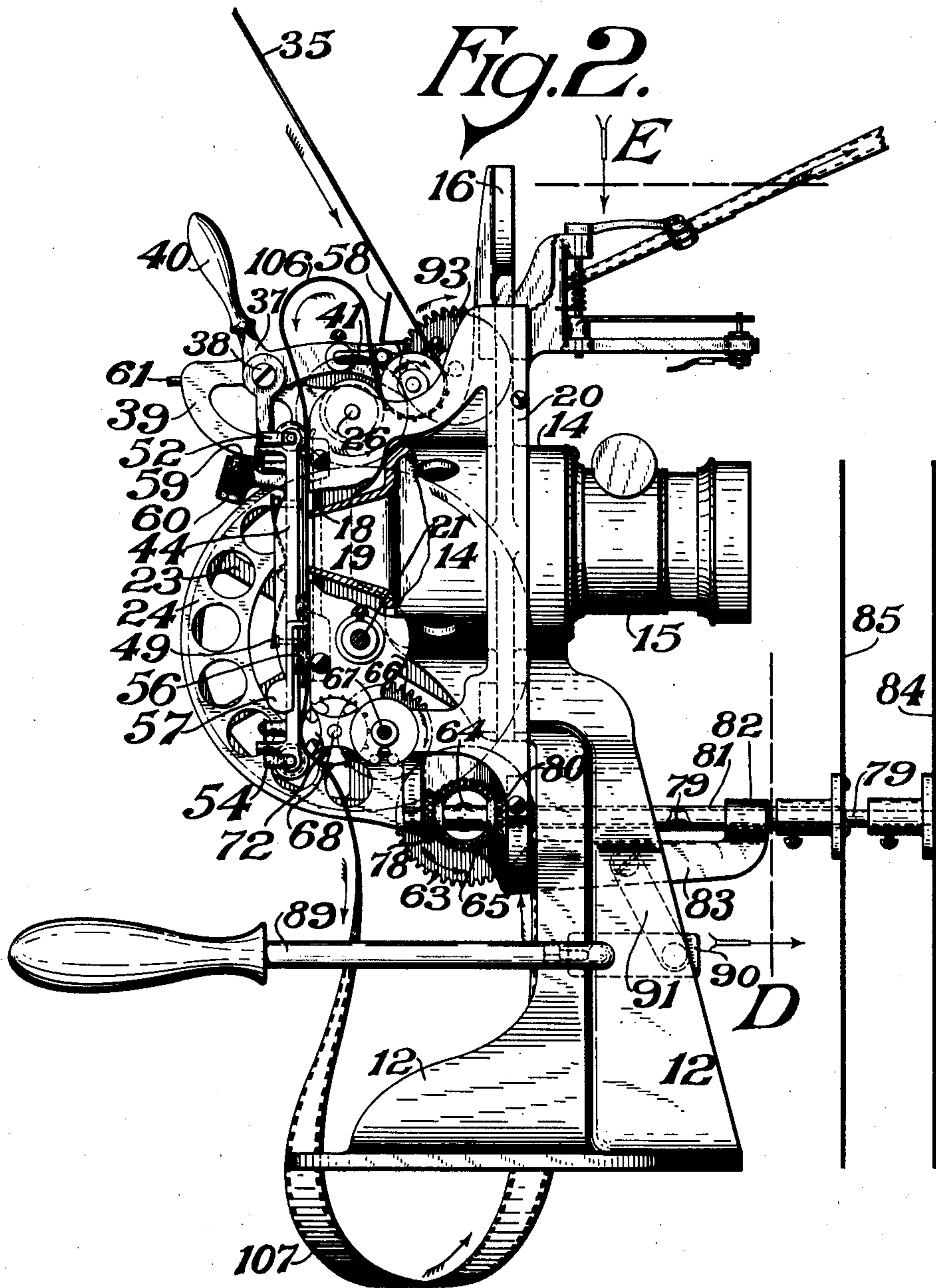
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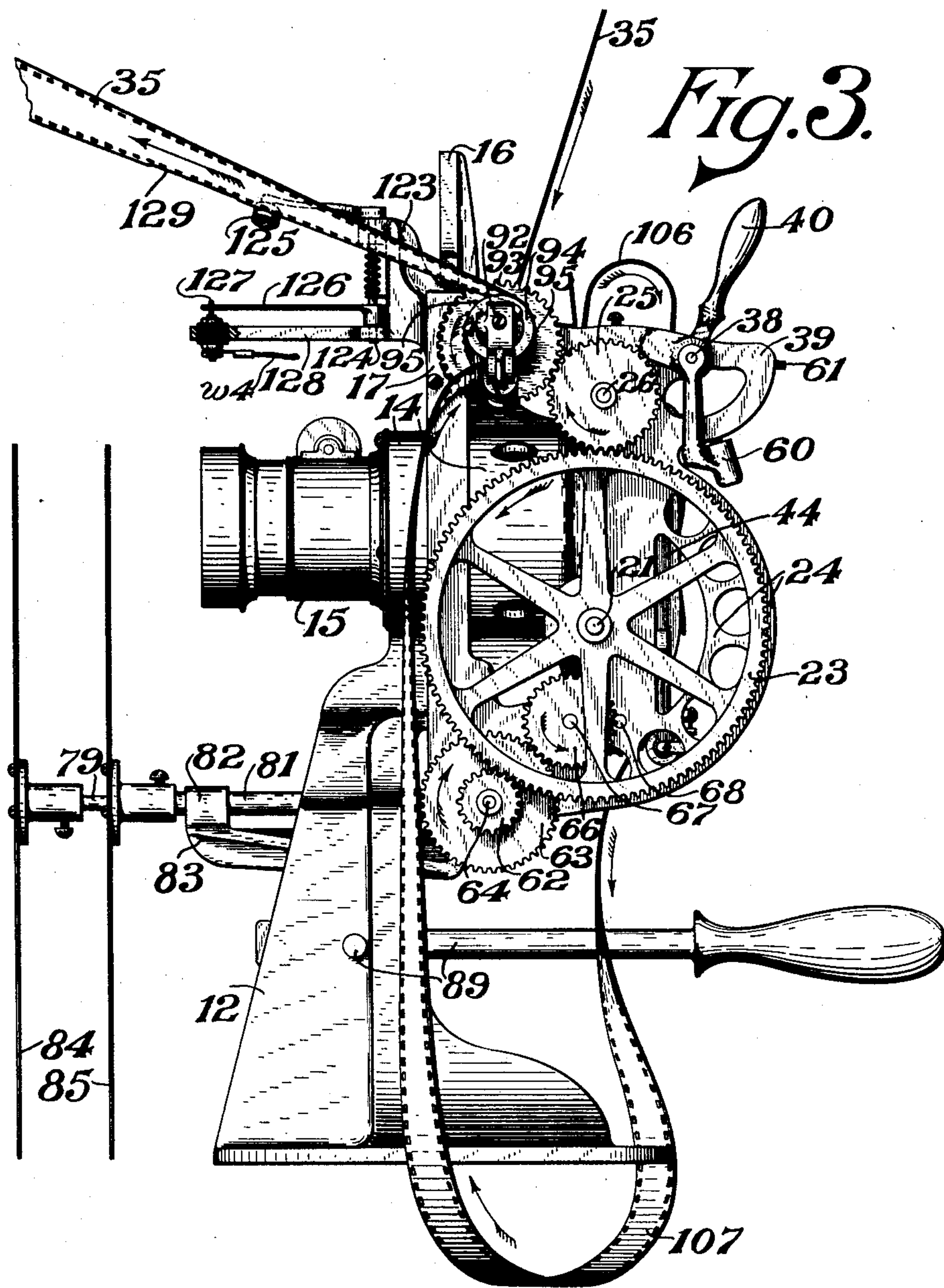
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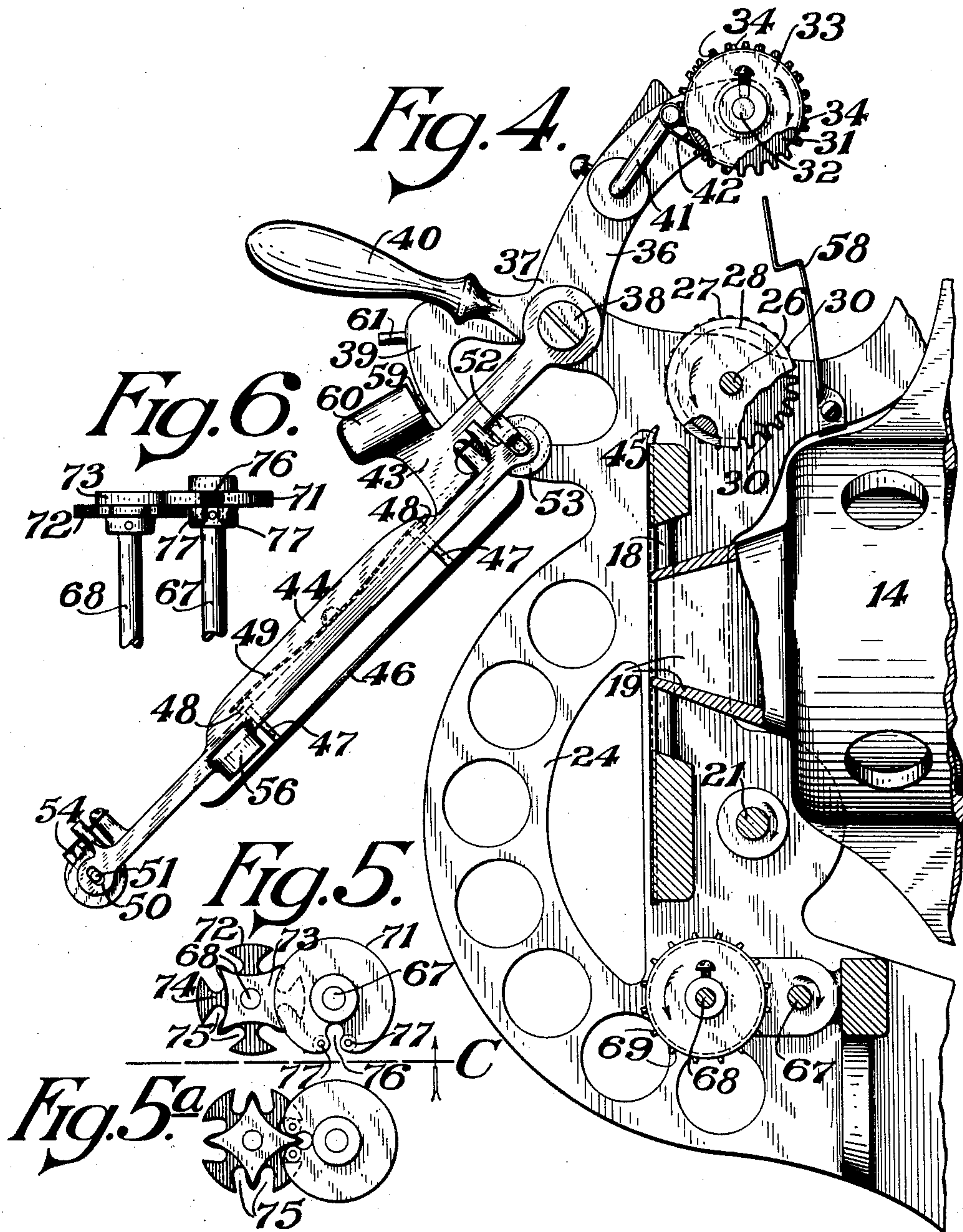
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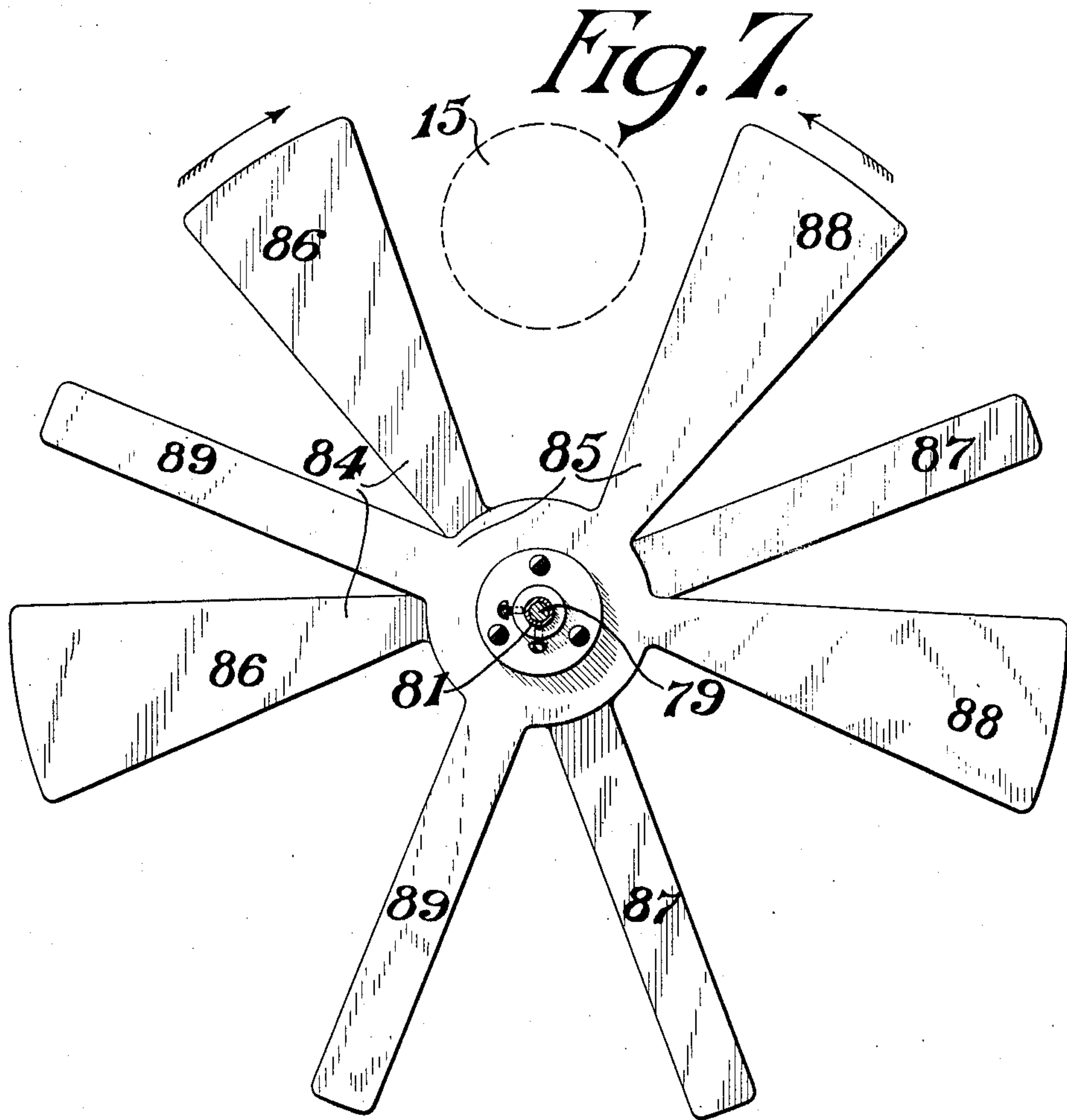
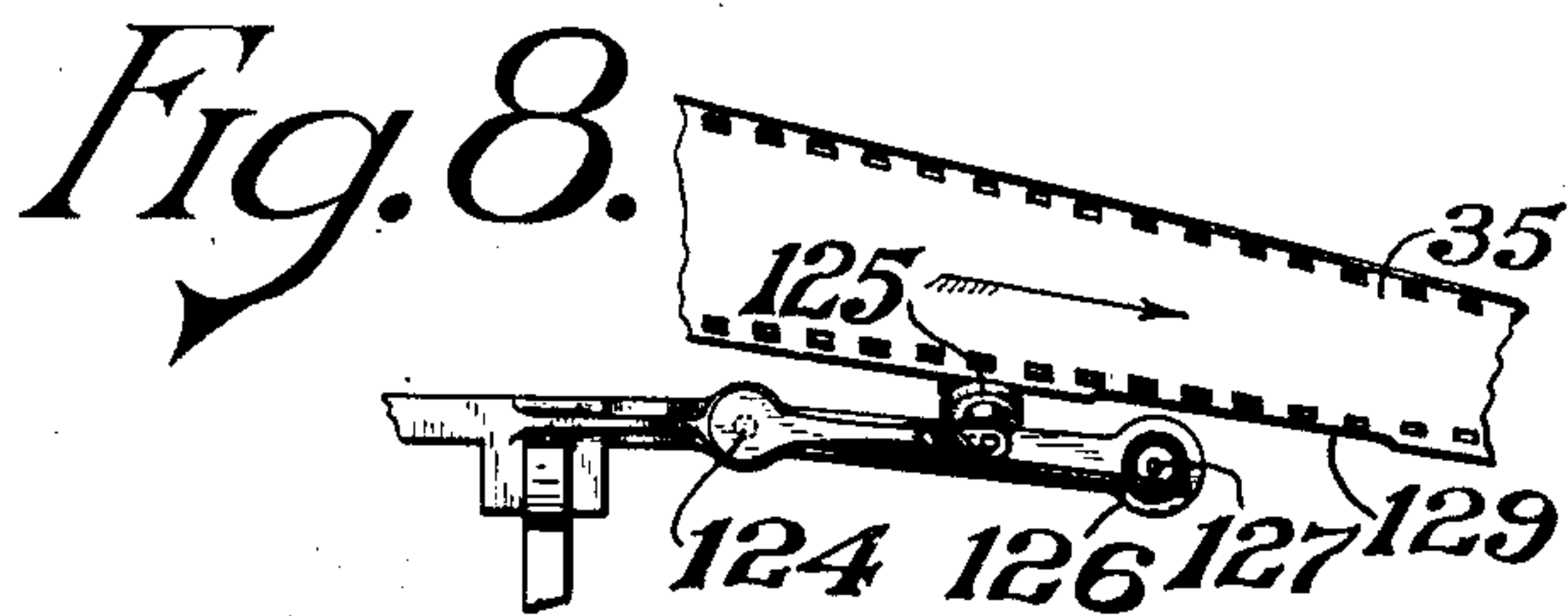
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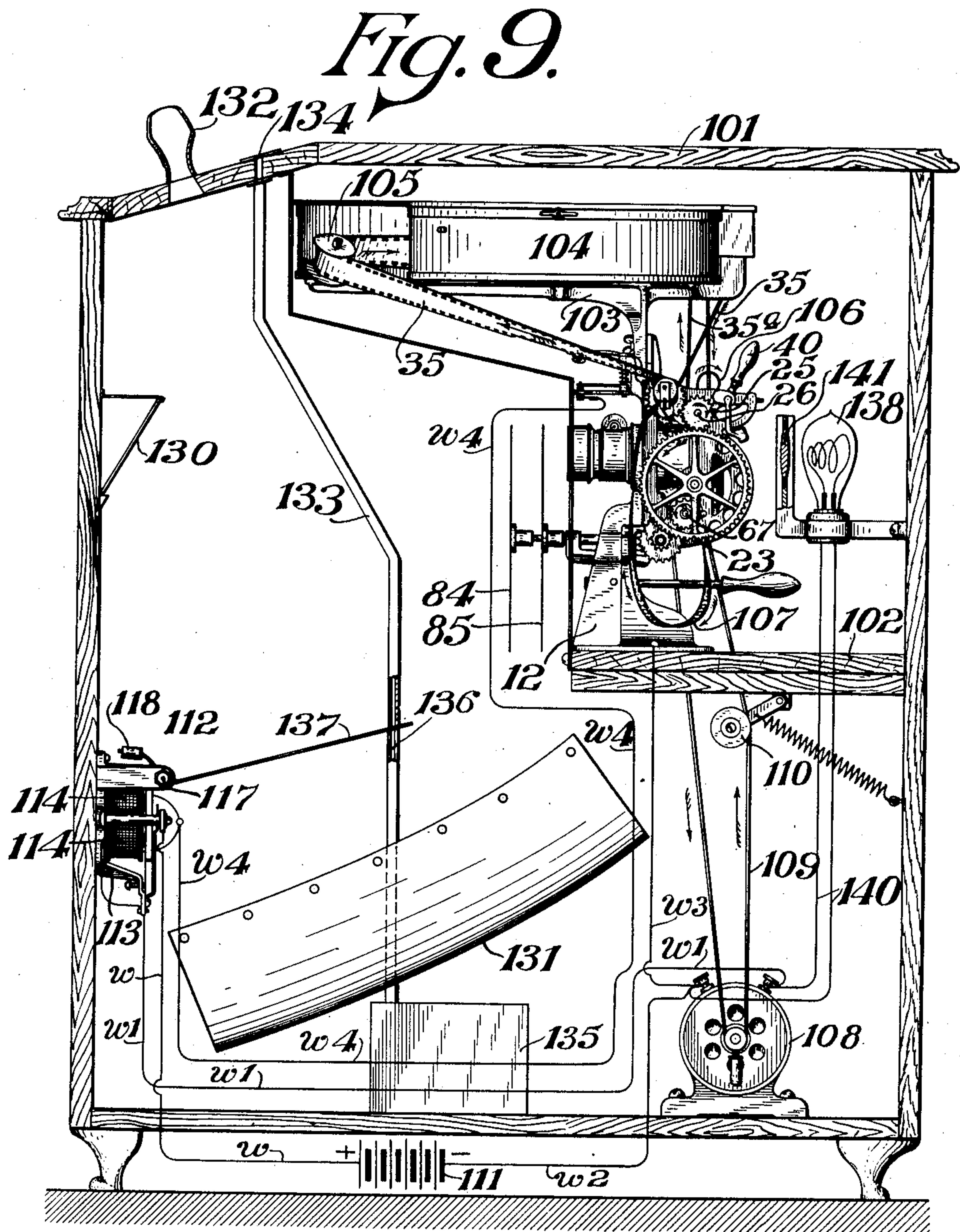
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7 SHEETS—SHEET 6.



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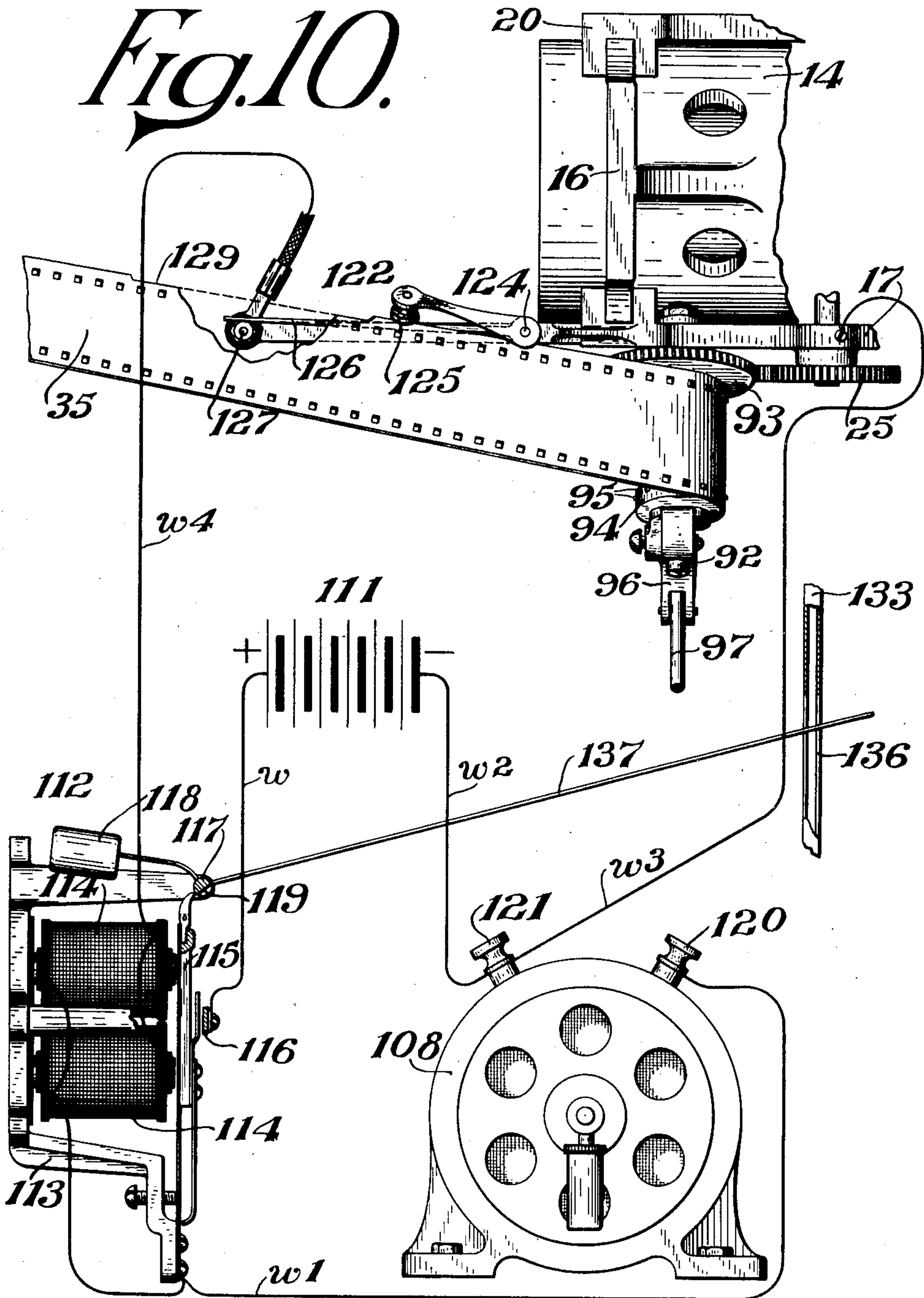
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7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

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MOVING-PICTURE MACHINE.

No. 890,936.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed September 25, 1907. Serial No. 394,473.

To all whom it may concern:

Be it known that I, HENRY K. SANDELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Moving-Picture Machines, of which the following is a specification.

My invention has for its object the improvement of different features of a moving-picture machine as also of the general construction of the machine, to attain the advantages hereinafter explained.

In the accompanying drawings, Figure 1 shows the improved machine by a view in rear elevation; Fig. 2 is a view of the same in side elevation; Fig. 3, a similar view showing the side opposite that presented in Fig. 2; Fig. 4, an enlarged broken section on line A, Fig. 1; Figs. 5 and 5^a are sections on line B, Fig. 1, of the intermittently-operated film-feeding movement showing the same in two different positions; Fig. 6 shows the said movement by a broken view in elevation, regarded from the line C, Fig. 5; Fig. 7 is a view in elevation of the shutter-device showing the shaft by a section taken at the line D, Fig. 2, and indicating its position relative to the lens by a dotted representation of the latter; Fig. 8, an enlarged broken section on line E, Fig. 2; Fig. 9, a view showing the entire mechanism in side elevation within a casing equipped with coin-controlled electric-motor mechanism, and with the screen and reflector features of the improvement, and Fig. 10, a broken view in the nature of a diagram showing the coin-controlled electric-motor mechanism of the apparatus when employed in accordance with the representation in Fig. 9, and particularly illustrating the feature of the improvement which relates to the action of the film in opening and closing the motor-circuit.

For the attainment of simplicity of manufacture and strength and durability of construction and freedom from vibration, the entire frame is formed of only three rigid parts, preferably castings. The part 12 forms the bifurcated base, reinforced by a strengthening rib 13 at its inner side and having cast as part of it the barrel 14 for supporting the lens 15 of the device, the barrel being in an upright flat or plate-section 16 of the casting, the lateral edges of which form vertical guides for the two united vertically adjustable sections of the frame, which afford

bearings for and carry all of the operating mechanism, except the view-framing mechanism hereinafter described. Of these two frame-sections, that shown at 17 is an open-workside and a face containing the opening 18 (Fig. 4), into which a tapering rear extension 19 of the barrel 14 projects for directing light into the lens. The third frame-section 20 is an open-work plate screwed to the edge of the face-plate of the section 17. Both sections 17 and 19 are formed on their free edges with inwardly-extending vertical guide-grooves to embrace the upright section 16 of the base-portion 12 of the frame, which thus forms a guide for the united vertically adjustable frame-members.

The drive-shaft 21 is journaled in bosses near the lower forward end of the two side frame-members, and is shown in some of the figures of the drawings as carrying on one end a crank 22 for operating the machine by hand, while in Figs. 9 and 10 an electric motor is applied to the operating purpose and arranged as hereinafter described. On the opposite end of the drive-shaft is secured a master-gear 23, covering and spaced from a curved cheek-extension 24 of the frame-side 17, shown to be numerously apertured for the sake of lightness. This gear meshes with a gear 25 on a shaft 26 journaled in the upper part of the frame centrally between the sides of which the shaft carries a film-guiding barrel 27 circumferentially grooved, as indicated by dotted representation at 28 in Fig. 4, near each end and at one end of which the shaft carries a gear 30. This last-named gear meshes with a similar gear 31 on a shaft 32 carrying, in engagement with the barrel 27 a barrel 33 provided near each end with a circumferential series of sprocket-teeth 34 to register with and enter the grooves 28 of the barrel 27 in protruding through the edge-perforations in the film 35, for which the toothed barrel 33 forms the continuous feed. The shaft 32, on which the barrel 33 is rotatably supported, is rigidly mounted in an arm 36 of a bell-crank lever 37 fulcrumed on a pin 38 in a bearing 39 on the frame-side extension 24 and provided with a handle 40; and this bell-crank further carries a rigid crank-arm 41 to extend lengthwise of and adjacent to the barrel 33 for presenting a stripper 42 to the surface of the barrel between the sprocket-teeth upon it to insure freeing from the latter of the film. On this same pin 38 is

pivotaly supported, at an extension 43 of general U-shape, a film-clamping spring-frame or gate 44 to extend over the light-admitting opening 18. This opening is
 5 flanked by inserts 45 formed of steel strips, shown curved at their upper ends where they overlap the end-portions of the barrel 27. The frame 44 coincides, as to its sides, with these inserts, the frame-sides carrying to extend along their inner faces, for coöperation
 10 with the inserts 45, steel strips 46 on studs 47 passing through the frame-sides, at the outer surfaces of which the studs are provided with projecting heads 48 supporting the strips 46 on the frame, and against which the ends of
 15 leaf-springs 49 bear to project the strips 46 resiliently against the inserts 45 for maintaining the film in taut condition where it traverses the opening 18.

20 In the upper end of the frame 44 are provided elongated bearing-openings 50 (shown dotted in Fig. 4), for a shaft 51, against the projecting ends of which the free ends of a leaf-spring 52, fastened between its extremities to the upper part of the gate 44, bear to
 25 tend to press it yieldingly forward and thus force a film-guiding roller 53, journaled upon it, into yielding engagement with the upper ends of the inserts 45. A similar contrivance
 30 is shown to be provided at 54 (Figs. 1 and 4) on the lower end of the gate 44, differing from that described on the upper end of the frame in having the guiding-roller provided near its opposite ends with circumferential grooves
 35 55, for the purpose hereinafter described.

To lock the gate 44 in its film-clamping position one of the laterally-projecting ears with which it is shown to be provided, namely the ear 56, is adapted to be releasably
 40 engaged by a latch 57 pivoted on the face of the machine-frame. The bell-crank lever 37 is locked in the normal lowered position of the barrel 33 by a spring-dog 58; and to hold the gate frictionally at any point to which it
 45 may be raised, a spring-stud 59 is provided in a boss 60 at the lower end of the extension 43 to engage with the curved edge of the frame-extension 39 on which a stop 61 is provided to be encountered by the boss 60
 50 and prevent undue raising of the gate.

The master-gear 23 meshes with a pinion 62 on the outer face of a gear 63 secured on a shaft 64 journaled in the lower rear part of the machine-frame and carrying on its inner
 55 end a beveled gear 65 for the purpose hereinafter explained in connection with the shutter-mechanism. The gear 63 meshes with a pinion 66 on the adjacent end of a shaft 67 journaled in the lower central part of the frame forward of another shaft 68 similarly journaled in the frame and carrying
 60 in engagement with the grooved rollers 55 a pair of sprocket-wheels 69, the teeth of which engage with the edge perforations in the film. On the opposite end of the shaft 67 is a fly-

wheel 70, and at the inner side of the latter is mounted on that shaft one member 71 of the "movement" for intermittently feeding the film, the other member, 72, of which, is on the adjacent end of the shaft 68. This
 70 "movement", which forms an important feature of the present invention, requires, for understanding its operation and the advantages thereof, comparison with the "star-movement" hitherto employed in moving-
 75 picture machines for the intermittent film-feeding purpose; and a brief description of the latter is as follows: The star-wheel, being that provided on a shaft corresponding with the shaft 68, contains four radial slots at
 80 equal distances apart, rounded at their inner ends, which reach close to the axis of the wheel's rotation, and a periphery of the star-wheel is concaved between the slots to present arcs conforming to the arc of the driving
 85 wheel on a shaft corresponding with the shaft 67 and having a stud projecting from a point beyond its periphery, whereby rotation of the last-named wheel introduces the stud successively into the slots of the star-wheel
 90 to drive it intermittently. This construction necessarily effects rotation of the star-wheel by a relatively-slow movement as the stud enters a slot, the speed of movement increasing as the stud approaches the inner end
 95 of the slot and decreasing as it moves from the inner end to clear the slot, since the driving-wheel is, essentially, of the same diameter as the star-wheel to enable the stud to engage with a slot at a right-angle to an imaginary line drawn from the axis of rotation
 100 of the driving-wheel through the center of the stud when the latter is at the point of entering the slot in the driven-wheel. Were the diameter of the driving-wheel greater
 105 than that of the star-wheel, the stud would enter the slots of the latter at an obtuse angle with the effect of starting the movement of the star-wheel with undue speed and with a sudden and knocking action which would
 110 not only be noisy but would tend to tear the film. While, therefore, with this old construction the correspondence of diameters of the two wheels is necessary, it is objectionable for the reason that each engagement of
 115 the stud with the slot moves the star-wheel through twenty-five per cent. of a complete revolution, leaving the film stationary during only the remaining seventy-five per cent. of the rotation, with the disadvantage of limiting
 120 the exposure of the picture upon the screen to seventy-five per cent. of the rotation of the driving-wheel. The construction illustrated in the drawings overcomes this objection by enabling the diameter of the
 125 driving-wheel to be increased to any desired extent over that of the driven-wheel and materially increase the time of exposure without departing from the required relatively slow starting and ending actions of the stud in the
 130

slot and its gradual speed increasing and decreasing actions therein, and following is a description of that construction:

The driven wheel on the shaft 68 is in the form of a four-pointed star 73 having its periphery concaved between the V-shaped points to conform to the arc of the member 71 for their mutual braking effect; and this star-section is integral with or secured to the face of a wheel 74 on the shaft 68 to turn with it, having points with which the points on the star-section coincide, and at opposite sides of each point two similar comparatively shallow slots 75 extend non-radially and at inwardly-diverging corresponding angles into the wheel from its periphery and are provided with rounded bases. The driving-wheel 71 on the shaft 67 contains a peripheral slot 76 adapted to receive the teeth on the member 72 in succession, and at opposite sides of the entrance to this slot are provided similar studs 77 projecting from the inner face of the wheel. As will thus be seen, in each rotation of the wheel 71 starting from the position represented in Fig. 5, first one stud 77 enters a slot 75 in its path at a right-angle to an imaginary line drawn through that stud from the axis of rotation of the wheel 71, with the effect of initially turning the member 72 slowly and increasing the speed of its rotation as the stud enters further into the slot. In the continued rotation of the wheel 71, while the first stud is in engagement with its slot, the second stud will enter the slot at the opposite side of the tooth dividing the two slots, the relative positions of which are such as to cause the two studs to act in unison while the members are attaining the relative positions represented in Fig. 5^a, with the respective tooth of the member 72 in horizontal alinement with the axis of rotation of both members, in fact, until the first stud withdraws from its slot, after which the second stud will continue the rotation of the driven member, at the slowing speed, until the second stud withdraws from its slot, when the periphery of the member 71 will coincide with the arc-shaped recess in the star 73 to lock it in position. As in moving-picture machines of the class to which this invention relates the intermittent feeding of the film is produced by the rotary action of the "movement", the time of exposure of the picture is the interval between the rotations, which, in the present instance, is greater in proportion to the increase in diameter of the driving-member over that of the driven-member. Whatever the extent of such increase may be desired, it has to be determined by the angle at which the slots 75 are arranged relative to the axis of rotation of the member 72. This must always be such as to cause the first of each pair of slots at the point of initial engagement therewith of the first stud 77 to enter at a right-angle

to an imaginary line drawn through that stud from the axis of rotation of the driving-member 71.

The bevel-gear 65 on shaft 64 meshes at one side with a bevel-pinion 78 on the end of a rotary shaft 79 and at its opposite side with a similar pinion 80 on a rotatable sleeve 81 about said shaft journaled at its rear end in the lower part of the movable portion of the frame and behind its forward end in a bearing 82 on the forward extremity of a rigid arm 83 extending horizontally forward from the lower end of the movable part of the frame. On the outer end of the shaft 79 is fastened one member, 84, of the two similar members forming the shutter-device, the other member 85 being secured on the sleeve 81, the gearing of which with the shaft 64 causes it to rotate in the direction opposite to that in which the member 84 rotates. The member 84 consists of a central disk having two flaring blades 86 extending adjacent to each other non-radially from its periphery and two similar and narrower rectangular blades 87, 87 extending radially from it. The member 85 is of precisely the same construction, its flaring blades being shown at 88, 88, and its rectangular blades at 89, 89.

The purpose and action of the shutter is to exclude the light from the screen in the initial slow movement of intermittent feed of the film and also just before the similarly slow stopping movement thereof, and to admit the light upon the screen at the fastest movement of the picture, this being the novel function of the shutter; another function, which, however, is not novel, being to shut off the light from the screen for two very brief intervals while the film is stationary, to moderate the intensity of the light upon the screen for preventing discomfort to the eyes of the observer, this last-named function being performed by the rectangular blades. The shutter-device is so arranged that in the rotation of the shaft 79 and sleeve 81 two blades 86 and 88 will overlap at their edges, substantially throughout their entire length, in the line of projected light at the beginning of the film-movement, the approaching edges of these blades meeting at a line perpendicular to the center of the lens, and the light is excluded until these two blades have passed each other, after which their light-obstructing function is withdrawn, permitting the light to be cast upon the screen while the film is undergoing its fastest movement, whereupon the other two blades 86 and 88 meet with their approaching edges at the aforesaid perpendicular line to exclude the light from the screen during the slower stopping movement of the film. While the film is stationary the members of each pair of the blades 87, 89, pass the lens, in opposite directions, the pairs passing it in succession, thereby partially excluding the

light at two intervals for the modifying purpose referred to. The described function would be performed, but not so perfectly, with only one shutter-member, so that the invention is not intended to be limited to the employment of the two members.

Where the light is shut off during the entire movement of the film, as hitherto, the resultant relatively-prolonged darkening of the screen causes vibration or flickering of the picture, which is avoided, or at least materially reduced, by the above-described improvement.

For raising and lowering the movable portion of the frame which carries all the operating parts, to adjust the framing of the picture, a crank 89 is journaled in the bifurcated frame-base to extend across it, and carries a transverse arm 90 connected at its forward end by a link 91 with the rigid bearing-arm 83. By depressing or raising the crank, the movable part of the frame is raised or lowered with the mechanism upon it, including the shutter-device, with relation to the stationary lens. Hence the purpose of the flaring shape of the shutter-blades 86, 88, since they have to control the exclusion of the light from the screen during uniform periods irrespective of their adjusted position relative to the lens; and by rendering them thus flaring their wider portions pass the lens in the lowered position of the mechanism in the same time that the narrower portions pass it in the raised position thereof.

On the frame-member 17, near its upper forward end is rigidly secured to extend in slightly inclined position, a stud 92 having rotatably mounted upon it a gear-wheel 93 meshing with the gear-wheel 25 and from the outer face of which there extends about the stud a barrel 94 like the barrel 33 and provided at each end-portion with a series of sprocket-teeth 95 to engage the edge-perforations in the returning section of the film.

On the outer end of this stud is secured a bracket 96, in which is journaled a stem 97 carrying a divided guide-roller 98, about the end-portion of which are formed grooves 99 to register with the teeth 95 when this roller is supported to extend parallel with the drum 94, as it is, releasably, by a spring-catch 100 provided on the bracket to hold it in that position by engagement with the rod 97. To permit the film to be removed from or adjusted upon the barrel 94, the catch 100 is disengaged from the stem 97 to permit it to swing the roller outwardly by gravity and thereby remove it from obstructing access to the barrel, to be replaced and held by the catch in its parallel relation thereto after the film has been adjusted.

The operation of the machine constructed as described and the further features of novelty may best be explained with relation to

its disposition in an inclosing cabinet 101, wherein it is shown in Fig. 9 to be operated by a coin-controlled electric motor, the circuits of which are diagrammatically represented in Fig. 10. As represented in Fig. 9, the machine is supported on a shelf 102 in the cabinet, extending from its back, the machine being surmounted by a bracket 103, attached to the upright plate-section 16, on which bracket is supported the film-winder forming the subject of my application for Letters Patent, Serial Number 390,098, filed August 26, 1907. The film 35 is supported in a coil on edge upon a rotary carrier in a casing 104 and driven from the machine by a belt-connection 35^a therewith, all as described in said application, and is paid out, by the rotation of the carrier, from the center of the coil through an opening in the casing, and wound about the exterior of the coil, the films entering the casing for the purpose through an opening suitably provided in it and to which it passes over an inclined guide-roller 105. From the center of the coil the film is passed from underneath about the barrel 33 and over the barrel 27 coöperating therewith, above which it forms the loop 106 for the intermittent feed, passing thence between the barrel 27 and upper gate-roller 53 downward across the light-inlet opening 18, against which it is clamped yieldingly by the gate 44, passing beyond the lower end of the gate between the sprocket-wheels 69 and lower gate-roller, below which the film forms an elongated depending loop 107 and is fed back to the exterior of the film-coil by passing across the sprocket-barrel 94 and the guide-roller 98 coöperating therewith. The continuous feed of the film between the barrels 33 and 27 is rendered positive by the engagement with its edge-perforations of the teeth 34, which protrude through them into the grooves 28 of the barrel 27, with the advantages of avoiding friction and drag on the film. As will thus be seen, the film is endless and is fed from the center of the coil and back about the exterior thereof by the action of the mechanism produced as follows:

An electric motor, represented at 108 as supported on the bottom of the cabinet, is geared by a belt 109, provided with a suitable tightener 110, with the shaft 67. The motor is contained in the circuit of a generator, indicated at 111, with a magnetic cut-out device 112 shown in the form of a bracket 113 fastened to the front wall of the casing and supporting a pair of electromagnets 114, the adjustable spring-armature 115 of which is normally held away from a contact-piece 116 connected with the positive pole of the generator by engaging at its upper free end with a rock-shaft 117 positioned by a weight 118 extending from it and provided with a flattened section 119 coincident with the free end of the armature. The current passes

from the generator 111 over a wire w connecting it with the contact-piece 116, thence through the armature and over the wire w^1 through the motor shown to be provided
 5 with the binding-posts 120 and 121, and from the last-named binding-post over the wire w^2 back to the generator. A second circuit is formed by a wire w^3 extending from the binding-post 121 to the metal frame of
 10 the machine, on which is provided a cut-out device 122 connected by a wire w^4 with the magnets 114. This cut-out device consists of a rigid bracket 123 (Fig. 3), projecting from the face of the upper end of the sta-
 15 tionary part of the machine-frame and having journaled in it a vertical spring-pressed shaft 124 carrying on its upper end a horizontal arm provided on its free extremity with a roller 125 to bear against an edge of
 20 the film; this vertical shaft carrying on its lower end a horizontal contact-finger 126 normally separated at its extremity from a contact-pin 127 on an extension 128 of the bracket 124, and from which the wire w^4
 25 leads, the contact pin being insulated from the bracket. At the end of the series of views for producing a picture on the moving film, the latter is provided in the edge against which the spring-pressed roller bears with a
 30 recess 129. While the unutilized portion of the said film-edge travels against the roller 125, the latter is held, against the tendency of the spring on its shaft, to maintain the finger 126 out of engagement with the
 35 contact-point 127; but when in the travel of the film the recess 129 therein encounters the roller, namely at the end of the series of picture-producing views, the spring controlling the roller turns it into the recess with the
 40 result of turning the finger 126 into engagement with the contact-point 127 to close the circuit for the purpose hereinafter described.

In alinement with the lens there is provided on the front wall of the cabinet a mirror, indicated at 130, disposed with reference
 45 to a screen, at 131, supported near the base of the cabinet in position to receive the reflections from the reflector of the pictures thrown upon it by the lens. By thus pro-
 50 viding for reflection of the pictures upon the screen, on which they are presented to an observer through a visor 132 in suitable position on the top of the cabinet, the advantage is afforded of enabling the moving-picture
 55 exhibition to be rendered in a cabinet of comparatively small, or normal dimensions.

A coin-chute 133 extends from an insertion-opening 134 in the top of the cabinet to a coin-receptacle in the latter at 135, and at
 60 an elongated opening 136 in the chute the path through it is crossed by a trip-finger 137 extending from the rock-shaft 117.

A coin of proper denomination dropped through the chute 133 trips the finger 137 to
 65 turn the rock-shaft and register its flattened

section with the free end of the armature 115, whereupon the latter springs into engagement with the contact-piece 116 to close the motor-circuit and drive the machine, at the same time lighting an electric lamp 138
 70 shown in Fig. 9 to be contained in a branch 140 of the motor-circuit and supported behind a lens 141 for directing the light through the lens 15 by way of the opening 18, and thus through the film. The motor
 75 drives the shaft 67 and by the described gearing with the latter of the master-wheel 23, it drives the barrel 33 to continuously feed the film from the center of the rotating coil in the casing 104, while the "move-
 80 ment," owing to the intermittent action of its member 71 on the member 72 and shaft 68, intermittently feeds, in the manner herebefore described, the film from the loop 106 past the opening 18, and the engagement of
 85 the master-gear with the gear 93 drives the barrel 94 to continuously return the film from the loop 107 to the exterior of the rotating coil thereof. In the travel of the film across the opening 18 the lens 15 under the
 90 described operation of the shutter-device throws the picture upon the mirror 130, which reflects it upon the screen 131 into the view of the observer at 132. The feeding of the film and burning of the lamp 138 con-
 95 tinue until a recess 129 in the film registers with the wheel 125, which, by then entering the recess, permits the finger 126 to close the circuit at 127 with the effect of energizing the magnets of the device 112 to attract the ar-
 100 mature 115, thereby opening the circuit at 116 and cutting out the motor and lamp. The obstruction which the shaft 117 presents to the armature in its retracted position prevents it from again closing the battery-cir-
 105 cuit at 116 until the stem 137 is again tripped by an inserted coin; and should the energizing of the magnets, owing to the cutting out of the motor, be insufficient to attract the armature into its circuit-breaking position,
 110 the current generated in the motor, after the battery-circuit is cut out, by its own inertia will supplement the energizing of the magnet for the purpose.

Providing the gearing of all the driven
 115 parts about a common driving center carrying the master-gear is of advantage in compacting and simplifying the construction of the machine.

What I claim as new and desire to secure
 120 by Letters Patent is—

1. In a moving-picture machine, the combination with a frame, of means thereon for continuously moving the film, consisting of a positively-driven rotary sprocket-barrel,
 125 and a similarly driven grooved guide-barrel cooperating therewith.

2. In a moving-picture machine, the combination with a frame, of means for inter-
 130 mittently feeding the film, consisting of a

star-wheel on a film-feeding shaft journaled in the frame and provided with a plurality of pairs of non-radial slots, the members of each pair diverging at corresponding angles
 5 on opposite sides of a star-point, and a driving-wheel on an adjacent shaft, containing a slot and provided on opposite sides thereof with studs adapted to engage successively the members of a pair of the star-wheel slots.
 10 3. In a moving-picture machine, the combination with a frame, of means for intermittently feeding the film, consisting of a shaft journaled in the frame and carrying sprocket-wheels in the path of the film, a
 15 star-wheel on said shaft, provided with a plurality of pairs of non-radial slots, the members of each pair diverging at corresponding angles on opposite sides of a star-point, and a driving-wheel on an adjacent
 20 shaft fitting against the concave periphery of said star-wheel and containing a slot to receive its points and provided on opposite sides of said slot with studs adapted to engage successively the members of a pair of
 25 the star-wheel slots.
 4. In a moving-picture machine, the combination with a frame carrying film-feeding mechanism and supporting the lens, across one end of the barrel of which the film is in-
 30 termittently fed, of a shutter-device comprising a shaft journaled on the frame and carrying blades turned by the rotation of the shaft across the opposite end of the lens-barrel, said shaft being coöperatively geared
 35 to said feeding mechanism, to turn said

blades past the lens and admit the light to the screen in the fastest movement of the film in the intermittent feeding thereof.

5. In a moving-picture machine, the combination of a frame comprising a stationary
 40 portion carrying the lens and a vertically-adjustable portion carrying the mechanism operating to feed the film across one end of the lens-barrel, and a shutter-device comprising a shaft journaled on said adjustable
 45 frame-portion and coöperatively geared to said feeding-mechanism and carrying at intervals about it outwardly-flaring blades and non-flaring blades to be rotated across the opposite end of the lens-barrel, for the pur-
 50 pose set forth.

6. In a moving-picture machine, the combination of a frame comprising a stationary
 55 portion carrying the lens and a vertically-adjustable portion carrying the mechanism operating to feed the film across one end of the lens-barrel, and a shutter-device comprising a sleeve journaled on the movable frame-portion and a shaft journaled in said
 60 sleeve, both being coöperatively geared to said feeding-mechanism to be rotated in contrary directions, and shutter-members on said sleeve and shaft each having a pair of outwardly-flaring, non-radially extending
 65 blades and a pair of non-flaring blades, for the purpose set forth.

HENRY K. SANDELL.

In presence of:

K. M. CORNWALL,
 R. A. SCHAEFER.