A. F. HAMACEK.

INTERMITTENT MOTION DEVICE.

APPLICATION FILED OCT. 8, 1909.

966,090.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

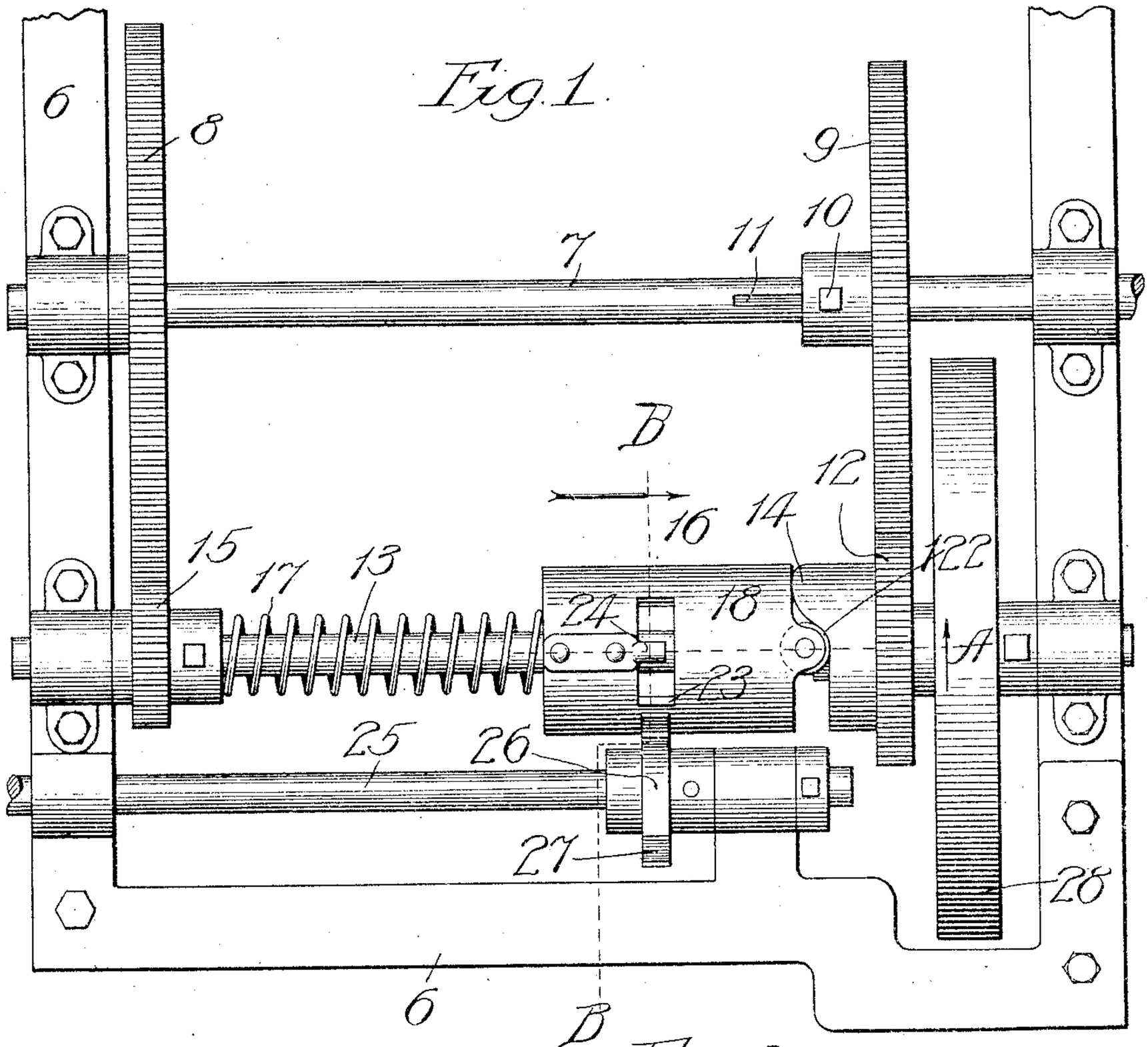


Fig. 2.

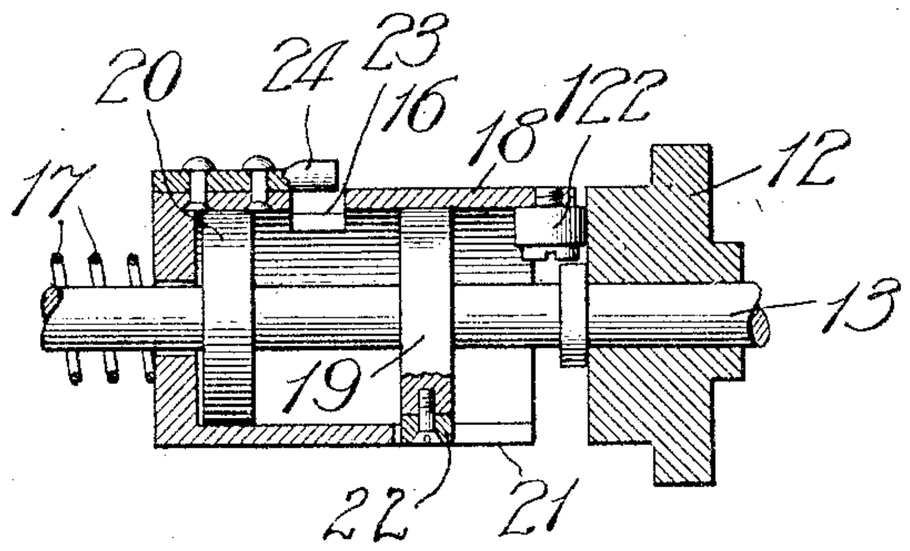
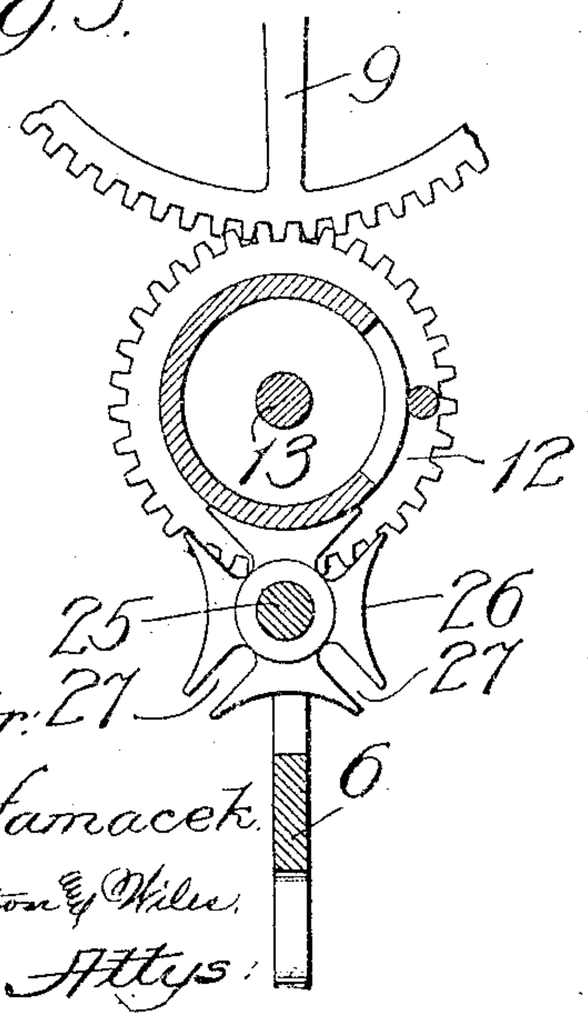


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

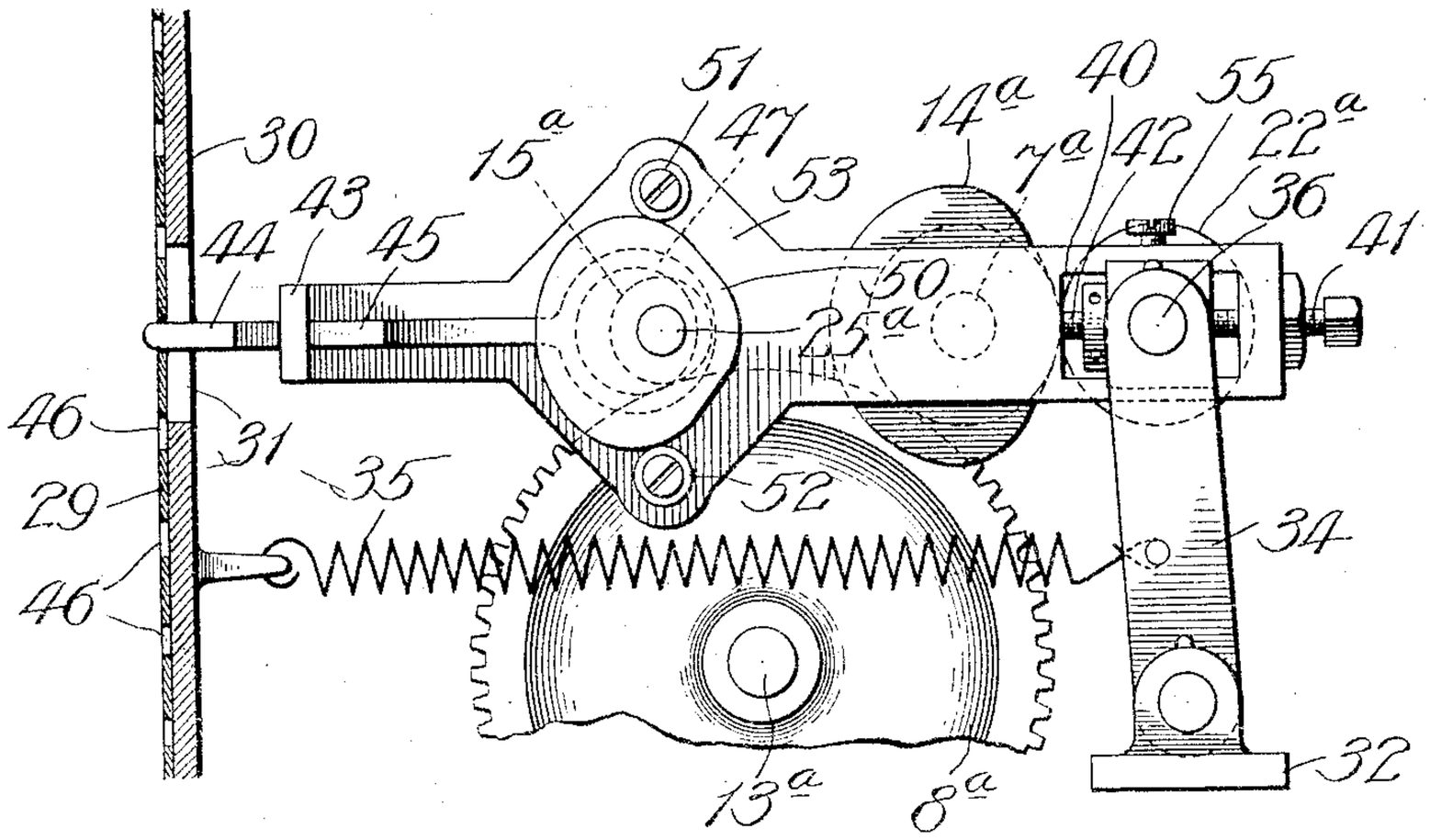
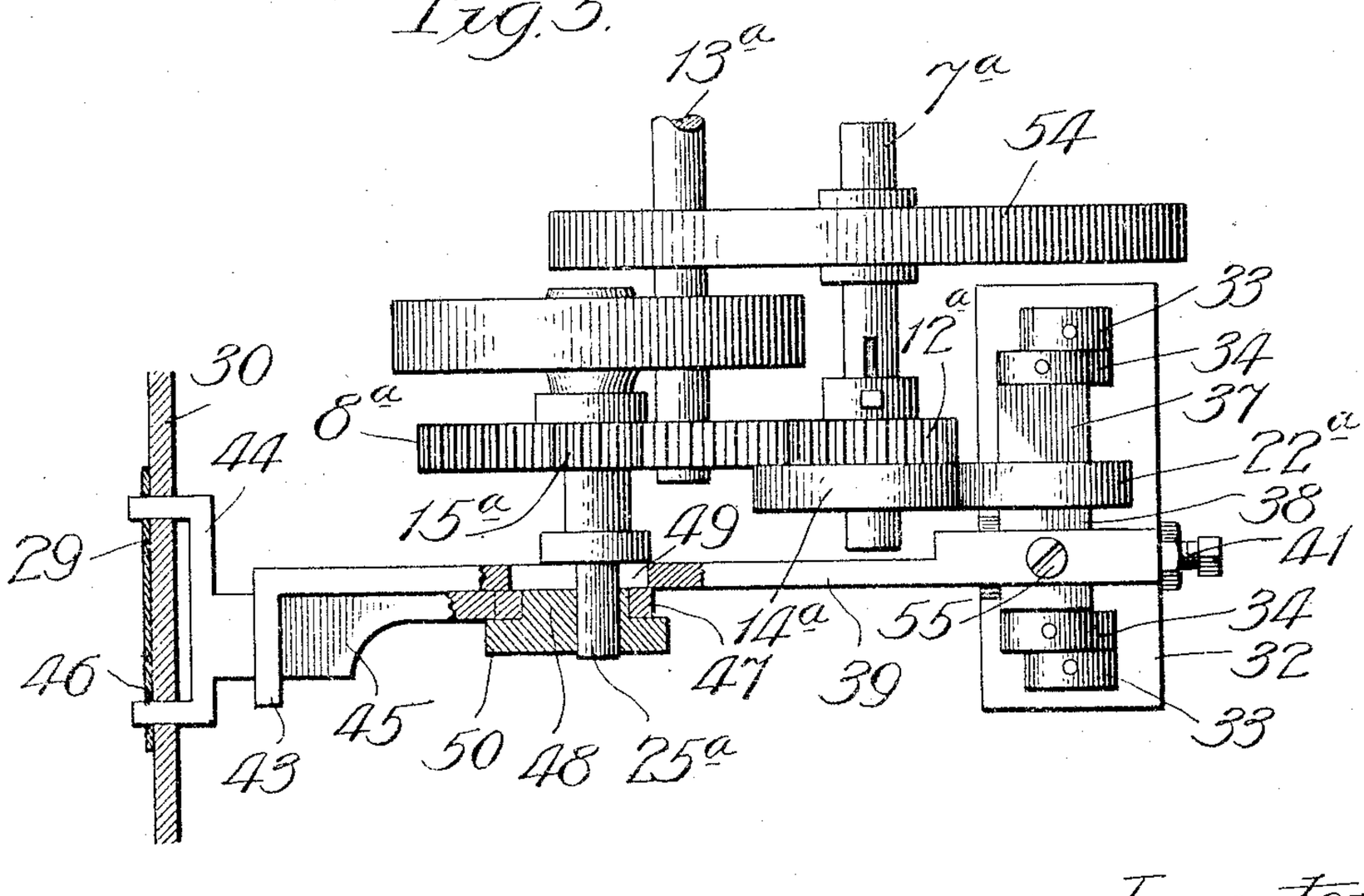


Fig. 5.



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UNITED STATES PATENT OFFICE.

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INTERMITTENT-MOTION DEVICE.

966,090. Specification of Letters Patent. **Patented Aug. 2, 1910.**

Application filed October 8, 1909. Serial No. 521,695.

To all whom it may concern:

Be it known that I, ADOLPH F. HAMACEK, 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 Intermittent-Motion Devices, of which the following is a specification.

My invention relates to an improvement more particularly in the class of intermittent-motion devices in which a rotating drive-shaft is so geared to a driven shaft as to turn the latter only intermittently, a type of gearing frequently used for the purpose being that known as the "Geneva" movement, though other kinds of gearing are also used.

The primary object of my invention is to provide an intermittent-motion device of novel construction adapting it to actuate the film in a moving-picture machine, whereby the driven shaft shall be caused to skip one or more movements in the rotation of the drive-shaft.

I have devised my improvement more particularly for employment in moving-picture machines, as being particularly useful in that connection, whether the machine be operated for taking, printing, or exhibiting a series of pictures on a moving film, inasmuch as it is desirable to prolong the exposure to view of each picture longer than the time required for one revolution of the drive-shaft. In fact, the exposure should be sufficiently long to enable the eye of the observer to regard it restfully and thus avoid the shimmering effect on the eye of the more frequent film-movements so objectionable in moving-picture machines as known to me; and this result is attained in a marked degree by the use of my improvement.

In the accompanying drawings, Figure 1 is a broken plan view showing one form of embodiment of my improvement in an intermittent-motion device employing the aforesaid "Geneva" type of movement; Figs. 2 and 3 are broken sections taken, respectively, on the lines A—A and B—B, Fig. 1. Fig. 4 is a broken view in elevation of an intermittent-motion device embodying my improvement in another form and showing it applied to a perforated film used in moving-picture machines, and Fig. 5 is a broken and partly sectional plan view showing the mechanism illustrated in Fig. 4.

Referring particularly to Figs. 1, 2 and 3, in a suitable frame 6 is shown to be journaled a power-shaft 7 carrying near one end a gear-wheel 8 and near its opposite end a gear wheel 9 releasably secured to the shaft by a set-screw 10 working through the hub of the wheel in a groove 11 provided in the shaft to enable the wheel 9 to be readily set with reference to another gear 12, hereinafter described. In the frame is also journaled the drive-shaft 13 of my improved intermittent-motion device having loosely mounted on it near one end the gear-wheel 12 to mesh with the gear 9, to which it bears the relation of 1 to 2, the gear 12 having a cam-faced hub 14; and the drive-shaft carries near its opposite end a gear-wheel 15 meshing with the gear 8 and bearing the relation to the latter of 1 to 4. On the shaft 13 is mounted, in a manner to permit it to be reciprocated longitudinally, a cylindrical body 16, between which and the hub of the gears 15 a spring 17, coiled about the shaft, is confined. For the attainment in the body of simplicity of construction and lightness, it is preferably formed as a cylindrical shell 18 fitting about rigid collars 19 and 20 on the drive-shaft and containing in one end a longitudinal slot 21, in which a guide-head 22 is confined by screwing it against the collar 19, thus to cause the shell to rotate with the shaft and also to guide it in its longitudinal movements; an anti-friction roller 122 depends at one end of the shell to engage the cam 14, and toward the opposite end of the shell is formed therein, crosswise of the axis, a slot 23 across which extends a pin or finger 24 rigidly fastened to the shell. The driven shaft 25 is also journaled in the frame and carries a star-wheel 26 in position to register with the slot 23, this wheel being of ordinary "Geneva" movement variety and containing four recesses 27 equidistant apart, between which the periphery forms concave arcs conforming to the circular surface of the shell 18. On the shaft 13 is shown a fly-wheel 28.

The operation is as follows: The power-shaft 7, by its gear-connection 8, with the shaft 13 drives the latter at high speed, their relation being 1 to 4, while the gear 9, bearing the relation of 2 to 1 to the gear 12 drives the latter at one-half that speed, so that the shell 18 turns twice as fast as the cam 14, whereby, in alternate revolutions of the shaft 13, the roller engages the cam to

force the sleeve 18 against the resistance of the spring 17 for the purpose hereinafter explained. In each intermediate revolution of the shaft 13 the pin 24 engages a slot 27 in the star-wheel, thereby quickly turning it, with the shaft 25, through a partial rotation, or until the pin clears the slot, thereby bringing a concave section of the star-wheel against the surface of the shell 18 to lock the wheel 26 against movement until another slot in it is encountered by the pin, all in the well-known manner. The slot 23 is provided to permit the star-wheel to operate in its circular path without obstruction. In each alternate revolution of the shaft 13, therefore, the cam 14 moves the shell 18 lengthwise of the shaft, and the parts are so relatively arranged as to cause that movement to carry the pin 24 out of the path of the star-wheel, thereby leaving the latter stationary. Each time the roller 22 clears the cam the spring 17 recoils to restore the body 16 to its normal position. Thus, as will be seen, the star-wheel is caused to skip a movement in each alternate revolution of the drive-shaft; and, obviously, by properly arranging the relations between the gears 9 and 12 suitably modifying the cam mechanism, the drive-shaft may be caused to make any desired number of revolutions without actuating the star-wheel. If it should ever be desired to prevent the skip, and thus cause the regular operation of the intermittent-motion device, this may be accomplished by loosening the set-screw 10 to prevent the shaft 7 from rotating the gear 9, which will render the cam inoperative.

Referring, particularly, to Figs. 4 and 5, in which the illustrated form of the intermittent-motion device is presented in its relation to a perforated picture-film 29 of a moving-picture machine, of which the backing 30 for the film is shown and contains an opening 31, the machine, however, involving any well-known or desired construction and not, therefore, requiring further illustration in this connection. The drive-shaft 13^a carries a gear 8^a, to one side of which is a bed-plate 32 provided near each end with an upwardly-projecting ear 33, in which ears are journaled, at their lower ends, the side-members or arms 34 of an upright rocking frame connected by a spiral spring 35 with the rigid backing 30. These arms are connected at their upper ends by a rod 36 carrying an anti-friction wheel 22^a, which is spaced from one arm 34 by a sleeve 37 and from the other arm by a flanged head 38 serving the adjusting purpose hereinafter described. A bar 39 is provided in its relatively thicker rear end with a rectangular opening 40, which surrounds the head 38 and in which the latter is adjustable, being shorter than the opening, which is adapted to be set relatively to the head, to lengthen and shorten the vertical sweep of the bar for the purpose hereinafter explained, by means of set-screws 41 and 42 working in the bar against opposite ends of the head. On the free end of the bar 39 is a laterally extending flange 43 through which works reciprocatingly the stem 45 of a bifurcated finger or fork 44, the separation between the two prongs of which causes them to register with coincident perforations 46 in the series thereof in opposite edge-portions of the film 29. The fork-stem terminates at its rear end in an eccentric-strap 47 encircling a disk 48 eccentrically mounted on a rotary driven shaft 25^a, which extends through an opening 49 in the bar to avoid obstructing its movements. The eccentric disk 48 carries at the outer side of the strap 47 a cam 50, which is confined between oppositely-placed anti-friction rollers 51 and 52 journaled on an expanded section 53 of the bar in which the opening 49 is provided. On this same shaft 25^a, which carries a fly-wheel 28^a, is provided a pinion 15^a meshing with the gear 8^a of the driver. Another rotary shaft 7^a, carrying a fly-wheel 54, is provided with a cam 14^a engaging the anti-friction wheel 22^a and a pinion 12^a, meshing with the drive-gear 8^a and bearing the relation to the pinion 15^a of 2 to 1. The pinion 12^a is releasably secured to its shaft as and for the same purpose described of the gears.

The operation is as follows: Rotation of the drive-shaft and with it of the gear 13^a causes the latter to drive the pinions 15^a and 12^a and rotate the shafts 25^a and 7^a. Rotation of the shaft 25^a actuates the eccentric device to reciprocate the fork 44, which works through the opening 31 in the film-backing, and thereby retract the fork out of perforations it is engaging and thereupon, under the action of the rotary cam 50, raise the fork to register with the next higher pair of the perforations to be engaged therewith by the continued throw of the eccentric, when the further action of the cam against the rolls 51 and 50 depresses the fork to draw the film downwardly the extent of the length of a picture thereon. The relations of the parts are such as to time the longitudinally and vertically oscillating movements of the fork accurately relative to the successive pairs of perforations in the film, which pairs are, of course, uniformly spaced apart. By the rotation of the pinion 12^a, which is completed once in each two revolutions of the pinion 15^a, in alternate revolutions of the latter the cam 14^a acts against the wheel 22^a to rock the frame 34 backwardly sufficiently far to retract the fork 44 in its forwardmost position, so that its prong-points reach short of the film, and to hold it there while the pinion 15^a makes a complete revolution, wherein it oscillates

the fork in the manner already described, but without engagement with the film, which therefore remains stationary during such revolution, thus skipping a movement; but when, in the continued rotation of the cam 14^a, it reaches its normal or inoperative position, which it is timed to do as the pinion 15^a completes its inoperative revolution, the spring 35 returns the frame to its normal position wherein the fork may operate upon the film.

The head 38 is fastened in its set position within the bar-opening 40 by a set-screw 55, upon loosening which the head may be adjusted relative to the center of movement (or center of the rod 36) and fastened in the adjusted position, to increase or decrease the extent of vertical sweep of the bar 39 and, of course, of the fork 44 thereon.

As will be understood, the pin 24 and fork 44 each constitute a species of driving-finger for moving the film, the disengagement of which during continued operation of the drive-shaft effects the described skipping function as to the movement of the film.

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

1. In an intermittent-motion device for actuating the film in a moving-picture machine, the combination of a drive-shaft and a driven shaft geared together, a driving-finger for intermittently moving said film, and means coöperating with said shafts in their rotation to actuate said finger intermittently and, in the rotation of the drive-shaft, to skip, one or more times, the operative action of said finger on the film.

2. In an intermittent-motion device for actuating the film in a moving-picture machine, the combination of a drive-shaft and a driven shaft geared together, a driving-finger for intermittently moving said film, and cam-actuated means coöperating with said shafts in their rotation to actuate said finger intermittently and, in the rotation of the drive-shaft, to skip, one or more times, the operative action of said finger on the film.

3. In an intermittent-motion device for actuating the film in a moving-picture machine, the combination of a drive-shaft, a gear-wheel on said shaft, a driven shaft, a relatively smaller gear-wheel on the driven shaft meshing with the first-named wheel, a cam on one of said shafts, a driving-finger for intermittently moving said film, and means actuated by said cam, coöperating with said shafts in their rotation to actuate said finger intermittently and, in the rotation of the drive-shaft, to skip, one or more times, the operative action of said finger on the film.

4. In an intermittent-motion device, the combination of a drive-shaft, a cylindrical body on and reciprocable lengthwise of the shaft, a cam loosely mounted on said shaft to rotate independently thereof and engaging said body, means for driving said shaft and rotating the cam thereon at relatively different speeds, a pin on said body, a driven shaft, and a star-wheel on the driven shaft coöperating with said body and pin, for the purpose set forth.

5. In an intermittent-motion device, the combination of a drive-shaft, a cylindrical body on and reciprocable lengthwise of the shaft and provided with a pin and a slot adjacent thereto, a cam loosely mounted on said shaft, means for driving said shaft and rotating the cam thereon at relatively different speeds, a driven shaft, and a star-wheel on the driven shaft adapted to work in said slot and coöperate with said body and pin, for the purpose set forth.

6. In an intermittent-motion device, the combination of a drive-shaft, a cylindrical body on and reciprocable lengthwise of the shaft and provided near one end with a pin and a slot adjacent thereto, an anti-friction roller on the opposite end of said body, a cam loosely mounted on the shaft and engaged by said roller, means for driving said shaft and rotating the cam thereon at relatively different speeds, a driven shaft, and a star-wheel on the driven shaft adapted to work in said slot and coöperate with said body and pin, for the purpose set forth.

7. An intermittent-motion device comprising, in combination, a frame, a power-shaft, a drive-shaft journaled in said frame and a driven shaft, gears of different diameters on the power-shaft, relatively smaller gears of different diameters on the drive-shaft respectively meshing with said gears on the power-shaft, one of said smaller gears being loose upon its shaft and provided with a cam, a spring-pressed pin-equipped cylindrical body on the drive-shaft engaging said cam and reciprocable relative thereto, and a star-wheel on the driven shaft to coöperate with said body and the pin thereon, for the purpose set forth.

ADOLPH F. HAMACEK.

In presence of—
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L. G. KIRKLAND.