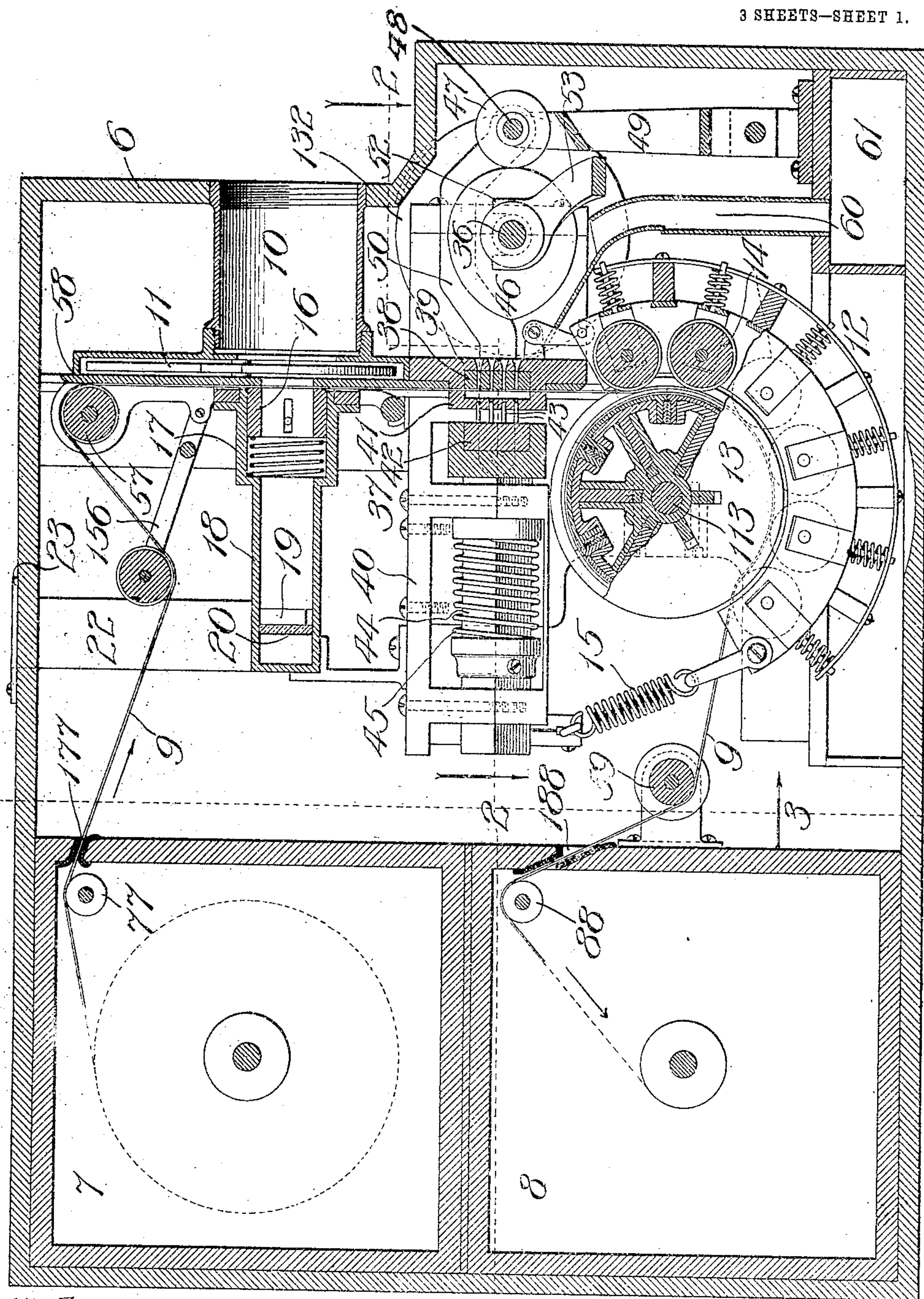


A. F. HAMACEK.
MOVING PICTURE MACHINE.
APPLICATION FILED OCT. 3, 1908.

Patented June 22, 1909.

3 SHEETS—SHEET 1.

925,697.



Witnesses:
John Enders
Chas. A. Buell

Fig. 1.

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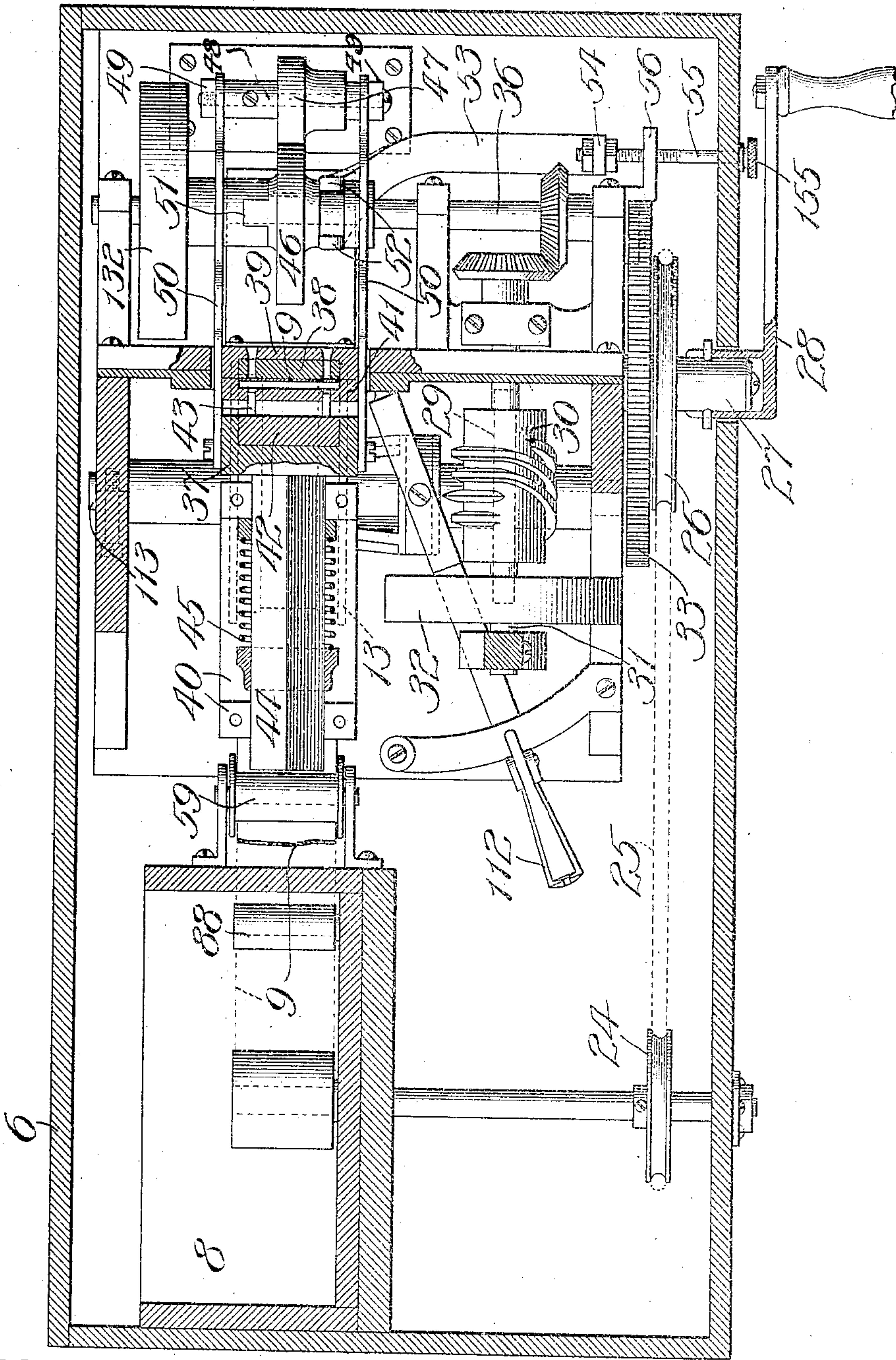
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Fig. 2.



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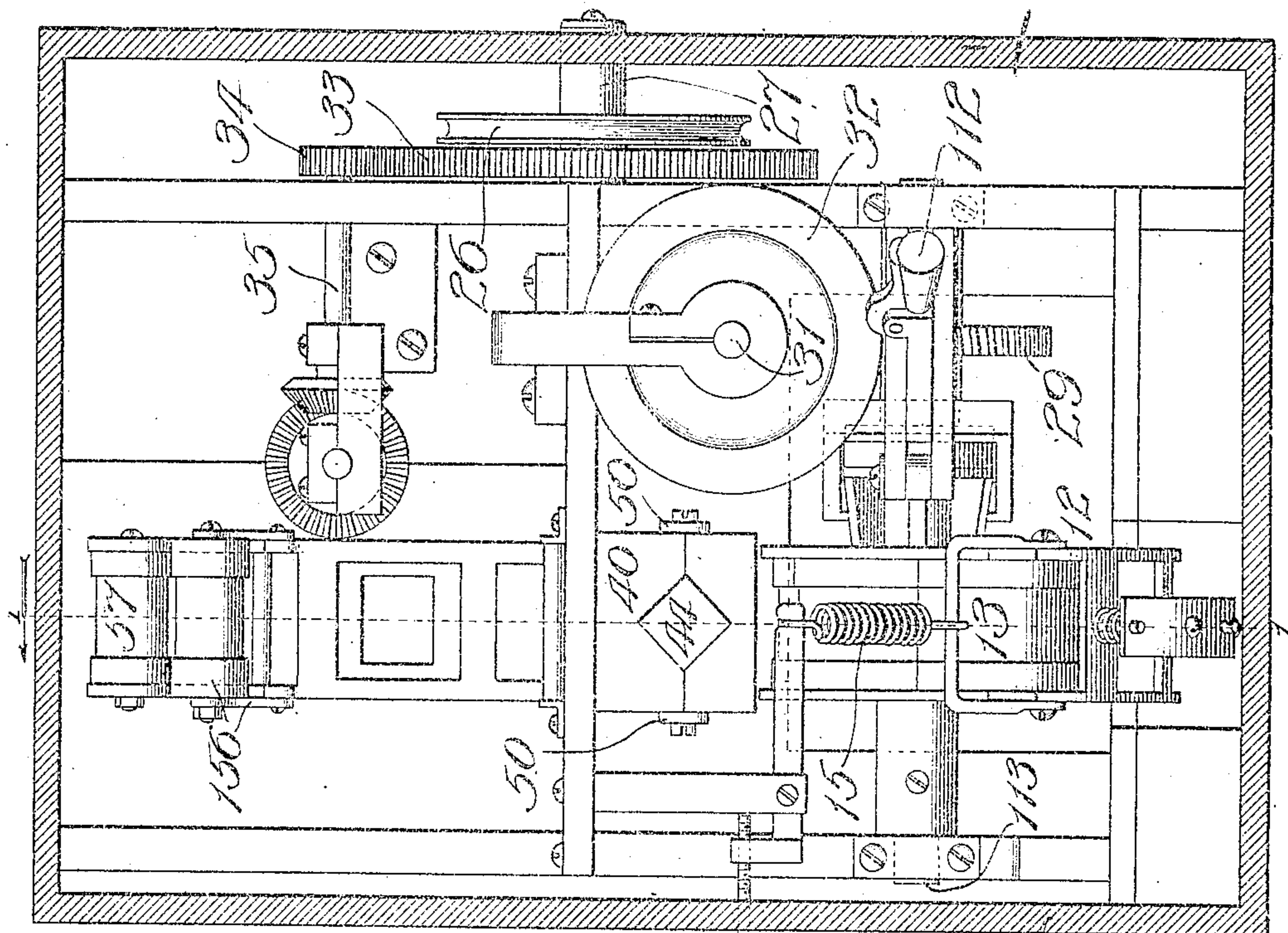
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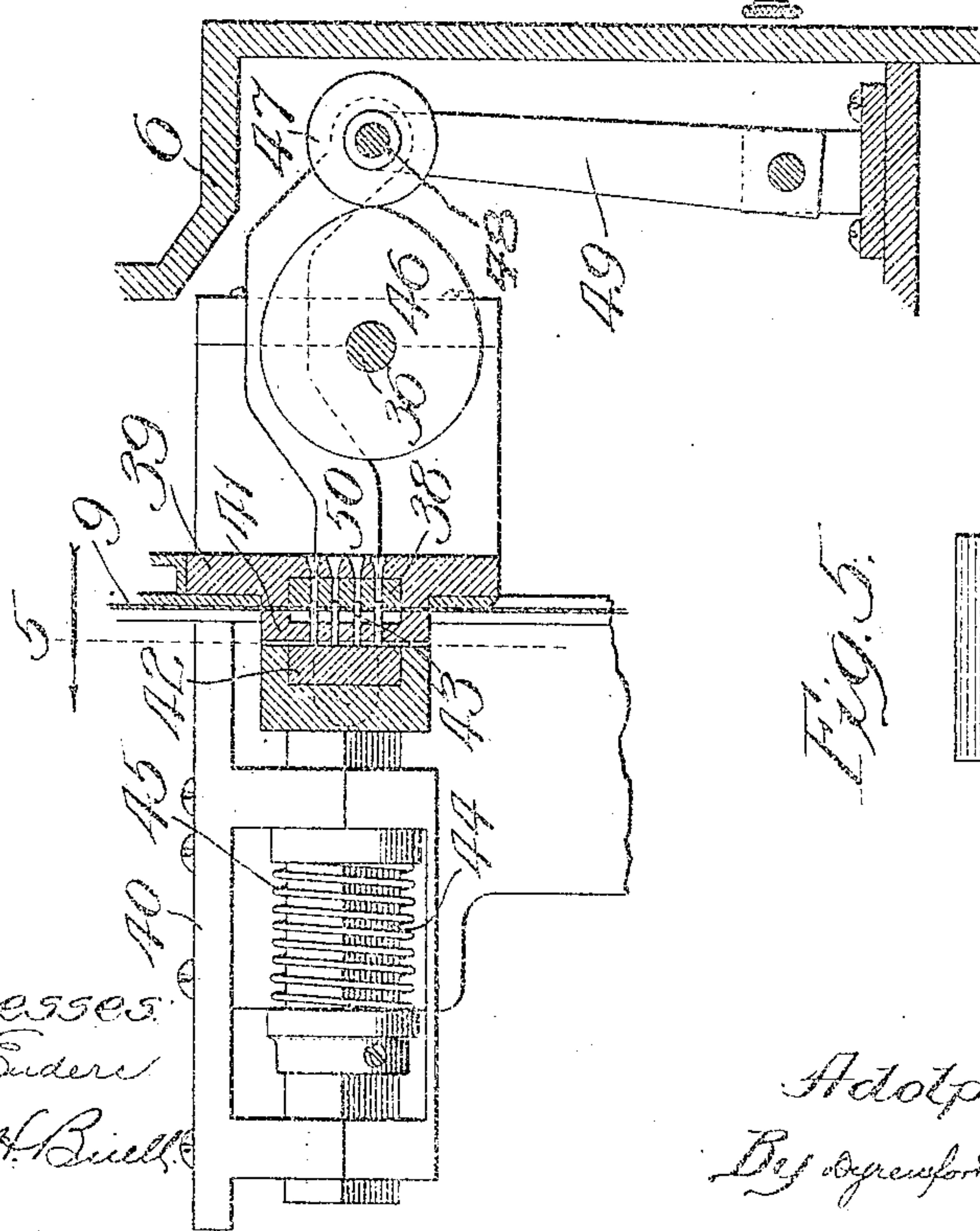
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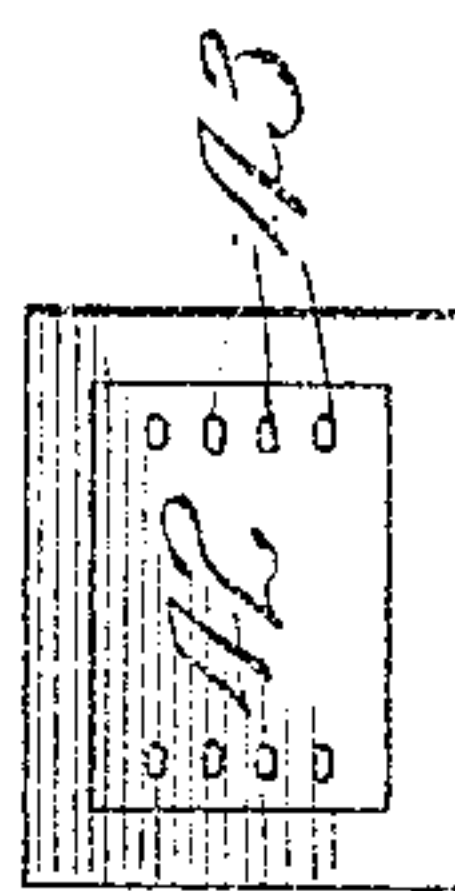
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UNITED STATES PATENT OFFICE.

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MOVING-PICTURE MACHINE.

No. 925,697.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed October 3, 1908. Serial No. 455,945.

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 Moving-Picture Machines, of which the following is a specification.

In moving-picture machines, whether used for taking or for exhibiting pictures on a film, the latter is fed through the machine either by sprocket-mechanism engaging perforations in the film-edges, or by friction.

The primary object of my invention is to adapt a machine for frictionally feeding the film to perforate the latter with accuracy relatively to each picture thereon and thereby adapt it to be used with machines employing the sprocket-feed.

I have more particularly devised my improvement as an adjunct of the moving-picture machine shown and described in Letters Patent of the United States, No. 909,904, granted to me January 12, 1909, and therefore hereinafter describe it in that connection and illustrate it in the present drawings in its coöperative relation to that machine, modified in more or less unimportant details.

In the accompanying drawings, Figure 1 shows a moving-picture machine equipped with my improvement, by a view in sectional elevation, the section being taken on the line 1—1, Fig. 3; Fig. 2 is a plan-section of the same on the irregular line 2—2, Fig. 1; Fig. 3 is a section on line 3, Fig. 1; Fig. 4 presents the perforating mechanism by a broken view in side elevation, mainly sectional, and Fig. 5 is a face-view, on line 5, Fig. 4, of the punch-carrying member of the perforator.

The casing 6 has the two end-compartments 7 and 8 containing reels for winding from one upon the other, in the direction of the arrows on Fig. 1, the film 9, which is guided, as indicated, across an end of a lens-barrel 10 and past an adjacent rotary shutter device 11 and about an intermittently actuated frictional feed-device 12 consisting of an expansible and contractible wheel 13 and a series of spring-pressed rollers 14 in an arc-shaped frame resiliently suspended at one end by a spring 15 to engage the rollers with the surface of the wheel, this feed-device involving the detailed construction set forth in my said patent, including the means for expanding it operated by a handle

represented at 112. The spring-pressed light-excluding follower 16 in the hood 17 is also as in said patent except that the tube 18 is not telescoping but contains reflecting mirrors 19 and 20 in its end where it opens into a vertical tube 22 leading through the top of the casing at which it is provided with a pivotal cover 23. This arrangement enables inspection of the film, for guidance in adjusting to proper focus the camera or projecting lenses in the barrel 10, through the tube 22 by the reflection of the mirrors which are set at the proper relative angles to divert the light to the tube 22.

The shaft of the film take-up reel in the compartment 8 carries a grooved pulley 24 having an endless-belt connection, indicated at 25, with a larger grooved pulley 26 on the drive-shaft 27 which carries an operating crank-handle 28, if the machine is hand-operated, though it may be actuated by any suitable motor geared to the drive-shaft.

On the shaft 113 which carries the film-feeding wheel 13 is mounted the gear-wheel 29 (Fig. 3, and shown dotted in Fig. 2) of the intermittent-motion device, the driving-member of which consists of the mutilated worm 30 on a shaft 31 carrying the fly-wheel 32, said member being formed with worm-sections extending about part of the circumference of the shaft with the ends of adjacent sections connected by gear-teeth extending about the remainder of that circumference at right-angles to the axis, one of said teeth being pointed and of greater diameter than the other teeth for locking the gear 29. As described in my said application, rotation of the member 30 drives the member 29, by the action of the inclined threads, from no motion to a slow motion increasing to a rapid motion, then gradually to the slow motion terminating in no motion and the remainder of the rotation of the driving member engages its straight teeth with those of the driven member 29 to cause the shallower teeth to hold it against further rotation until it is again engaged by the worm-sections, and to cause the higher pointed tooth to lock it against vibration or "back-lash."

For driving the machine a large gear 33 on the shaft 27 meshes with a pinion 34 on a shaft 35 geared to the shutter, and this gear also drives a shaft 36 having a miter-geared connection with the shaft 31 of the

driving member 30 of the intermittent-motion device, all as shown and described in my aforesaid patent.

In the path of the film 9 to the wheel 13 is a perforator 37, between the members of which it passes, by the action of the intermittent-motion device, to undergo perforation in the stationary intervals of the film. The female member 38 of the perforator is rigidly supported in a perforate head 39 at one side of the path of the film immediately below the inner end of the barrel 10, and facing that member is a rigidly-supported frame 40 carrying on its inner end a stripper 41, the punch-openings in which register with those in the member 38 and its supporting head. In the present case eight punch-openings are provided, in sets of four, uniformly spaced, near each lateral edge of the parts 38, 39 and 41. The male-member 42 carrying the punches 43 is supported in the recessed forward end or head of a plunger 44 reciprocally confined in bearings in the frame 40 to be advanced against the retractive force of a spiral spring 45 confined about it; the punches registering with the openings in the stripper 41. For actuating the perforator-member 42, a cam 46 is mounted on the shaft 36, which also carries the fly-wheel 132, and in its rotation the cam engages a follower shown as an anti-friction roller 47 journaled on a rod 48 connecting the upper ends of legs of a frame 49 pivotally supported at their lower ends to adapt the frame to rock; the projecting ends of this rod being pivotally connected by arms 50 with opposite sides of the recessed head of the plunger 44. Thus the spring 45 holds the roller 47 yieldingly in contact with the cam, so that when the low portion of the latter is opposed to the roller the punches are in their fully-retracted position, and when its high portion engages the roller the arms 50 force the frame 49 in the direction to draw the plunger against the resistance of its retracting spring and advance the punches to perforate the film. The perforating operation is so timed that a picture on the film accurately registers with the perforator each time the film is arrested by the action of the intermittent-motion device, and the punches are actuated to perforate the edges of the picture; and that the perforations for each picture accurately match with those of the one preceding it, whereby no difference occurs throughout the film in the spacing of the perforations.

It is sometimes desired to render the perforator inoperative to enable the machine to be used without employing its film-perforating function. To adapt the machine accordingly, the cam is loosely mounted on the shaft 36 to slide lengthwise thereof and has a releasable tongue-clutch engagement at 51 (Fig. 2), on one end of its hub, with that

of the fly-wheel 132; and the opposite end of the cam-hub is recessed circumferentially to admit the prongs of a fork 52 on one end of an arm 53 provided on its opposite end with a nut 54 extending at a right-angle from it and in which works a set-screw 55 supported in a bearing 56 and extending through a side-wall of the casing beyond which it carries a thumb-wheel 155, by which to turn it. To render the perforator inoperative, the screw is turned in the direction to retract the forked arm 53 and withdraw the cam out of its clutch-engagement with the fly-wheel, whereby it is also withdrawn from coincidence with the follower 47, so that in rotating with the shaft 36 it will fail to work the plunger 44, which remains in its retracted position under the pressure of the spring 45. By turning the screw in the opposite direction the cam is restored to its perforator-operating position.

To operate the machine when used as a camera, with proper lenses in the barrel 10, the sensitized film 9 is passed from its reel in chamber 7 over a guide-roller 77 and through an opening 177 therein about a tautening device 156 and over a guide-roller 57 past the shutter-device and between the barrel 10 and hood 17, where it is held smooth by the usual clamping-frame at 58; thence it passes between the members of the perforator and thence between those of the friction-feed device 12 over a guide-roller 59 through an opening 188 in the chamber 8 and over a guide-roller 88 in that chamber to the take-up reel therein. The focus of the camera-lens is adjusted by observation through the tube 22. Upon then turning the shaft 27 the shutter-device will open to take the picture and thereupon close, when the perforator will perforate the film some distance below the first-taken picture, then follows the action of the worm-sections of the intermittent-motion device to move the film to the position for photographing upon it another picture, when the shutter again opens with the film at rest because of the engagement of the straight teeth of the intermittent-motion device with the driven-member thereof. The second picture being thus taken and the shutter closed, before the movement of the film is continued the plunger 44 is actuated to advance and withdraw the punches and thus perforate the picture first taken, and so on until the desired length of film has been subjected to successive exposures and provided uniformly with perforations along the edges of each picture. The cuttings from the film by the action of the punches are carried off by dropping through a chute 60 provided in suitable position and leading to a box 61 or compartment in the casing.

As will be understood, the speed of rotation of the shutter-device 11, that of the

cam, and that of the driving-member 30 are alike, since one revolution of the member 30 turns the cam and the shutter through one revolution and actuates the punch once, whereby the worm moves the wheel 13 to pull down the film for one picture, then the shutter opens to permit the camera to take a picture and thereupon closes, then the perforator punches all the holes for one picture, the shutter being and remaining closed until the perforator has operated and the punches have been retracted and the film has been moved downwardly for another picture.

To employ the machine for exhibiting pictures on the film, thus as a kinetoscope, the camera-lens is replaced by a projecting lens and a suitable light is adjusted relative to the lens and thrown upon a screen, as usual, to penetrate the picture-bearing film properly applied in the machine. By then starting the operation the film will be intermittently actuated, each movement being of the extent of one picture, and, as in the case of the described camera-operation, including the action of the perforator if the film be imperforated and it be desired to perforate it for use in machines employing the sprocket-feed referred to. In this last-named use of the perforator the function of the expansible and contractible wheel 13 is especially useful as affording means for compensating for shrinkage or elongation of the film by properly expanding the wheel if observation shows that the film is not being drawn down fast enough because of its elongation, or contracting the wheel to slow the feed if shrinkage of the film appears.

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

1. In a moving-picture taking or exhibiting machine, the combination with picture-taking or exhibiting means the field of which is traversed by the film, film-observation and focus-adjusting means, a frictional film-feeding device, an intermittent-motion device in driving engagement with said feeding-device, and a perforator in the path of the film to said feeding-device cooperating with the latter and with the intermittent-motion device and timed with relation thereto to perforate the film along the edges of successive pictures thereon, whereby inaccuracies in the perforating of the film may be perceived and corrected, as set forth.

2. In a moving-picture taking or exhibiting machine, the combination with picture-taking or exhibiting means the field of which is traversed by the film, film-observation and focus-adjusting means, a frictional expansible and contractible film-feeding device, an intermittent-motion device in driving engagement with said feeding device, and a perforator in the path of the film to said feeding-device cooperating with the latter and with the intermittent-motion device and

timed with relation thereto to perforate the film along the edges of successive pictures thereon, for the purpose set forth.

3. In a moving-picture or exhibiting machine, the combination with picture-taking or exhibiting means the field of which is traversed by the film, film-observation and focus-adjusting means, a frictional film-feeding device, an intermittent-motion device in driving engagement with said feeding-device, and means for perforating a film in its course to said feeding-device, comprising a perforator having a stationary female-member and a reciprocable punch-carrying member at opposite sides of the film-path, a rocking frame connected with said reciprocable member, and a cam in driven engagement with said intermittent-motion device and engaging said frame, for the purpose set forth.

4. In a moving-picture taking or exhibiting machine, the combination with picture-taking or exhibiting means the field of which is traversed by the film, film-observation and focus-adjusting means, a frictional film-feeding device, an intermittent-motion device in driving engagement with said feeding-device, and means for perforating a film in its course to said feeding-device, comprising a perforator having a stationary female-member and a spring-retracted punch-carrying member at opposite sides of the film-path, a rocking frame connected with said reciprocable member, and a cam in driven engagement with said intermittent-motion device and adjustable into and out of engagement with said frame, for the purpose set forth.

5. In a moving-picture taking or exhibiting machine, the combination with picture-taking or exhibiting means the field of which is traversed by the film, film-observation and focus-adjusting means, a frictional film-feeding device, an intermittent-motion device in driving engagement with said feeding-device, and means for perforating a film in its course to said feeding-device, comprising a perforator having a stationary female-member and a spring-retracted plunger carrying punches opposed to said member with an interposed stripper, a rocking frame carrying a follower and having arm-connections with said plunger, and a cam in engagement with said follower and supported on a shaft in driven engagement with the driving-member of said intermittent-motion device, for the purpose set forth.

6. In a moving-picture taking or exhibiting machine, the combination of a frictional film-feeding device, an intermittent motion device in driving engagement with said feeding-device, and means for perforating a film in its course to said feeding-device, comprising a perforator having a stationary female-member and a reciprocable punch-carrying member at opposite sides of the film-path, a

rocking follower-carrying frame connected
with said reciprocable member, a shaft car-
rying a fly-wheel and in driven engagement
with the driving-member of said intermit-
5 tent-motion device, a cam loosely mounted on
said shaft and having a clutch-engagement
with the fly-wheel, and means for shipping

and unshipping said clutch to engage the
cam with and disengage it from said fol-
lower, for the purpose set forth.

ADOLPH F. HAMACEK.

In presence of—

K. M. CORNWALL,

R. A. SCHAEFER.