Feb. 26, 1952 J. THÉVENAZ 2,587,548

MECHANISM FOR THE INTERMITTENT DRIVING OF CINEMATOGRAPHIC FILMS

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Fig.1

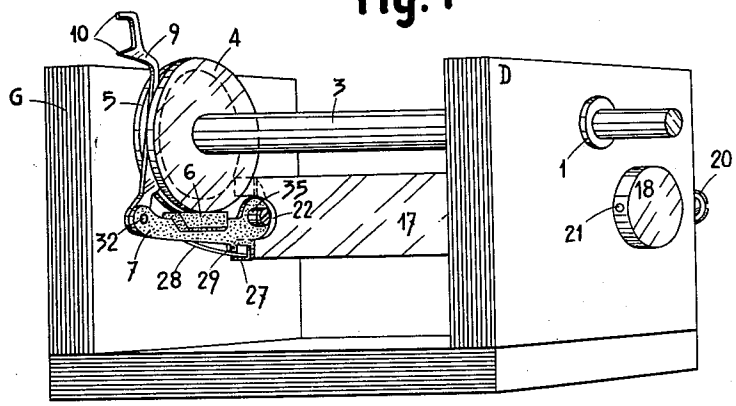
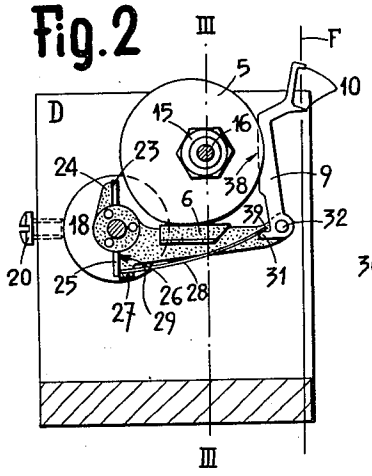


Fig.2



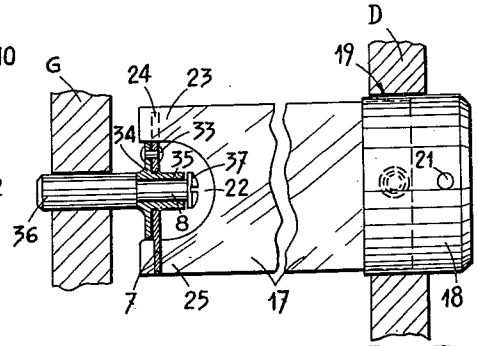
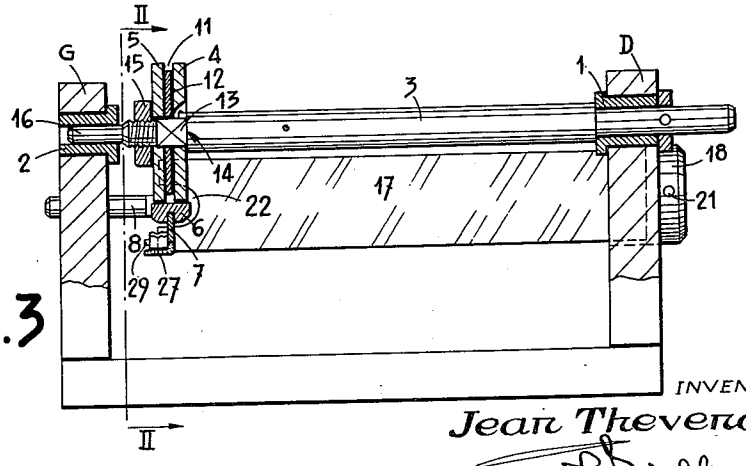


Fig.4

Fig.5

Fig.3



INVENTOR

Jean Thevenaz.

BY

ATTORNEY

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MECHANISM FOR THE INTERMITTENT DRIVING OF CINEMATOGRAPHIC FILMS

Jean Thévenaz, Yverdon, Switzerland, assignor to Paillard S. A., Sainte Croix, Switzerland, a corporation of Switzerland

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5 Claims. (Cl. 88—18.4)

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Mechanisms for the intermittent movement of a cinematographic film are known which are provided with a lever oscillating in a plane perpendicular to the plane of movement of the film and at the end of which is hinged an arm provided with a claw which, periodically, enters the perforations of the film, moving the latter through the height of an image and is disengaged therefrom for recommencing its operating cycle. The movements of the claw and those of the oscillating lever may each be controlled by a cam.

In some of these mechanisms, especially when the oscillating lever and the claw-carrying arm move in seperate planes the claw is liable to vibrate laterally and move away from its plane of action, which gives rise to a deleterious lateral component in the driving force of the film, to irregular wear of the perforations and to a lack of fixity or to a faulty alignment of the claw, relatively to the perforations of the film.

Further, it is known that for obtaining the maximum luminosity of a cinematographic projector, it is necessary to effect the movement of the film in accordance with the height of an image, in the shortest possible period of time, in such a manner as to reduce to a minimum the time during which the luminous beam is obturated. In order to avoid premature wear, the performances of a given mechanism are generally limited by the thickness of cams which it is possible to obtain by cutting. In fact, the specific pressures at the point of contact are the lower the larger the profile of the cams.

The present invention has for its subject an intermittent driving mechanism for a cinematographic film provided with a claw co-operating with the perforations of the film and carried by a lever actuated by a control member in an oscillating movement producing the movement of the film. This mechanism tends to remedy the disadvantages referred to by the fact that the member controlling the movement is formed by two cams of identical profile secured in the same angular position on a shaft on opposite sides of a cam controlling the penetration of the claw into the perforations of the film and by the fact that the thickness of this intermediate cam is at least equal to that of the arm carrying the claw.

One form of construction of the mechanism, forming the subject of the invention, is shown diagrammatically and by way of example in the accompanying drawing, wherein:

Fig. 1 shows in a diagrammatic manner a form of construction of the mechanism seen in oblique perspective.

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Fig. 2 is a view in section on the line II—II of Fig. 3.

Fig. 3 is a longitudinal section on the line III—III of Fig. 2.

Figs. 4 and 5 are detail views to a larger scale.

In these figures, D and G indicate the uprights of a stationary framework, each provided with a bearing 1, 2 in which turns a shaft 3, set in continuous rotation by a motor not shown. The shaft 3 carries two identical driving cams 4 and 5 located an opposite sides of a penetrating cam 12 and in contact with a shoe 6 secured to an oscillating lever 7 of which the oscillation shaft 8 is secured to the upright G.

At the free end of the oscillating lever 7 is hinged an arm 9 carrying a double claw 10 provided for penetrating two successive perforations of the film F. The driving cams 4 and 5, practically identical, are secured co-axially to the shaft 3 in the same angular position. These cams are spaced from one another and provide between them a groove 11 with edges parallel to the plane of oscillation of the claw-carrying arm. The cam 12 has a thickness at least equal to that of the arm 9 and constitutes the penetration cam 12 actuating the arm 9.

In order that the two cams 4 and 5 constitute a guide for the arm of the claw, tending to hold the latter in its plane, it is naturally necessary for the effective radii of these two cams, in each radial plane passing through their common axis of rotation, to be always greater than the corresponding effective radii of the penetrating cam 12. Thus a groove 11 is created between the two cams 4 and 5 which constitutes a continuous guide for the arm 9 of the claw.

As shown in the drawing, the two driving cams 4 and 5, made thick in order to reduce, as far as possible, the value of the specific pressure of contact of the shoe 6, and the cam 12 thinner, are mounted on a section 13 of the shaft 3 and locked against a shoulder 14 of this shaft by a nut 15. An extension 16 of the shaft 3 serves as a trunnion and turns in the bearing 2 provided in the upright G of the framework.

The shoe 6 is held in contact with the driving cams 4 and 5, by a torsion spring 17 of which the axis is located along an extension of the pivotal axis 8 of the oscillating lever 7. The torsion spring is formed by a spring blade located perpendicularly to the plane of oscillation of the lever 7, and of which one end is secured in a cylindrical boss 18 located in a bore 19 of the upright D from which it projects. The boss 18 is locked in angular position by a screw 20 en-

gaging with a screw threaded hole of the upright D. Radial recesses 21 provided in the periphery of the boss and into which may be introduced the end of a tool or of a rod, permit of selecting and fixing the angular position of the boss 18 and, consequently, of selecting and fixing the torsion and thus the initial tension of the spring 17. The end of the blade 17 remote from the boss 18, acts on the oscillating lever 7. For this purpose, it has an arcuate slope 22 above the end of the axis of oscillation 8 and forming a fork of which one limb 23 acts on a contact arm 24, and the other 25, on a contact projection 26 diametrically opposite the arm 24 and also secured to the oscillating lever 7. During the mounting, the boss 18 is locked, in an angular position, such that the branches 23 and 25 of the spring 17 apply to the oscillating lever 7 two equal and opposite forces forming a couple centred on the axis of oscillation 8 and which tends to hold the lever 7 in contact with the profile of the cams 4 and 5.

Underneath the range of contact, the oscillating lever 7 is provided with a bent tongue 27 against which bears, by one of its ends, a resilient blade 28 held flexed by a finger 29, and of which the other end 30 acts on a beak 31 secured to the claw-carrying arm 9. By resilient flexing, the end 30 applies to the beak 31 a force which is eccentric relatively to the hinging axis 32 connecting the arm 9 of the claw and the oscillating lever 7. This force causes the arm 9 to bear constantly against the penetration cam 12.

On examination of the accompanying drawing, it will be seen that the oscillating lever 7 and the arm 9 of the claw 10 have a common plane of symmetry, which is the plane of oscillation of the oscillating lever. Consequently the forces and reactions acting on the members of the mechanism are located also in this same plane, which contains the return couple generated by the torsion spring 17.

The oscillating lever 7 is secured by rivets 33 on the peripheral flange 34 of an anti-friction sleeve 35 turning freely on the axis of rotation 8 fitted with its reinforced part 36 in the upright G of the framework. A cap 37 screwed into the shaft 8, holds the sleeve 35 on the said shaft.

The profile of the driving cams 4 and 5 is so determined that the speeds communicated to the oscillating lever 7 and, consequently to the arm 9 of the claw 10 are progressive and that the oscillations of the oscillating lever are separated by stopping periods. The penetrating cam 12 acts directly on a projection of the dorsal contact 38 of the arm 9 of the claw of which the movements of penetration into the perforations of the film and of the disengagement from these, are accomplished approximately during the reversal of the direction of movement of the oscillating lever. Further, the portion of the profile of the cam 12 which is in contact with the projection 38 whilst the descending movement of the oscillating lever 7 for driving the film F is being accomplished for driving the film F, is preferably so provided as to compensate the effect of the arc of circle described by the hinge axis 32 and to act in such a manner that the claw 10 describes a practically straight line path.

As regards the transmission of forces it is to be observed that at each descending stroke of the oscillating lever 7, the film opposes a resistance to its movement, so that the arm 9 of the claw is subjected to a traction force which is converted into a variable force of application of

the oscillating lever, or more particularly of the shoe 6 against the driving cams 4 and 5. In other words, these cams apply the variable force necessary for moving the film, whilst the torsion spring 17 only supplies the very weak force necessary for holding the lever 7 and its shoe 6 in contact with the cams 4 and 5 and for the idle return of the claw 10, disengaged from the perforations of the film F, between two successive feeding strokes.

By reason of the fact that the member controlling the movement of the film is formed by two cams of identical profile secured to the same cam shaft in the same angular position, it is possible to obtain each of these cams, by cutting and to obtain in this manner cams of sufficient precision and at a cost of manufacture much less than that of a cam having a thickness necessitating rectifying operations of its profile, whilst maintaining a specific pressure of the shoe against their profile of a value sufficiently weak to avoid any premature wear. In order to enable the two cams 4 and 5 to be mounted easily on the cam shaft 3 in the same angular position it suffices to provide their central openings non-circular as shown in the drawing, which engage on a section 13 of a cross section corresponding with the cam shaft 3.

While this present application relates to the structure of the cams and levers, applicant's copending application Serial No. 149,502 filed March 14, 1950, relates to the combination of the claw arm, actuating lever therefor and the spring structure urging both elements.

I claim:

1. Mechanism for driving intermittently a film having perforations therein and comprising a frame, an arm having adjacent one end claw means for insertion in the film perforations, a lever pivoted to the other end of the arm and fulcrumed on the frame and including a shoe, a rotatable shaft journaled in the frame, a control cam rigid with the shaft engaged by the arm and of a thickness along the shaft axis at least equal to the corresponding thickness of the claw arm, a pair of other cams duplicates of one another one on either side of the control cam and secured to the shaft in the same angular relation and having in every radial plane effective radii longer than the corresponding effective radius of the firm cam and guiding the claw arm.

2. The mechanism according to claim 1 and also comprising a torsion spring to maintain the lever in contact with the other cams.

3. The mechanism according to claim 2 and further comprising a second spring urging the claw arm to engage its cam.

4. The mechanism according to claim 2 and further comprising a blade spring fixed at one of its opposite ends to the lever and at its other end bearing against the claw arm to maintain it in engagement with the first cam.

5. Mechanism for driving intermittently a film having perforations therein and comprising a frame, a claw cooperating with the perforations, an arm carrying the claw, a lever pivoted to the arm and fulcrumed on the frame, a shaft journaled in the frame, a pair of cams of the same profile and fixed to the shaft in the same angular relation and engaged by the lever, a second cam controlling the film penetration of the claw and fixed to the shaft between the pair of cams, the thickness of the penetration controlling cam being at least equal to the thickness of the claw arm, the first two cams having in every radial

plane passing through their axis of rotation effective radii longer than the corresponding radii of the penetration cam whereby to create between these first two cams a groove guiding the claw arm.

JEAN THÉVENAZ.

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