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H. J. REARDON
FILM-ADVANCING DEVICE

2,200,342

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Fig. 1

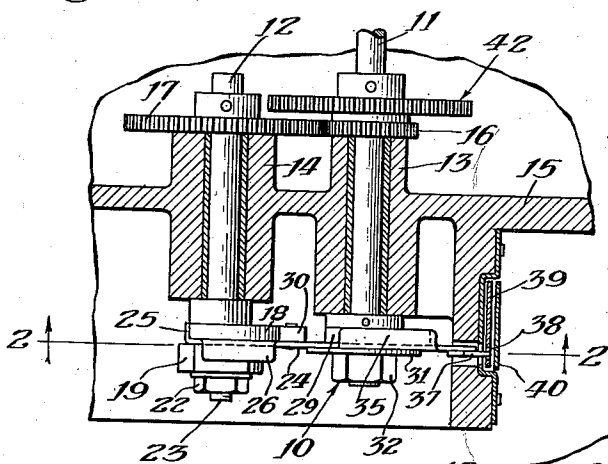


Fig. 4

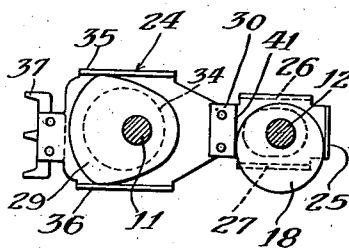


Fig. 5

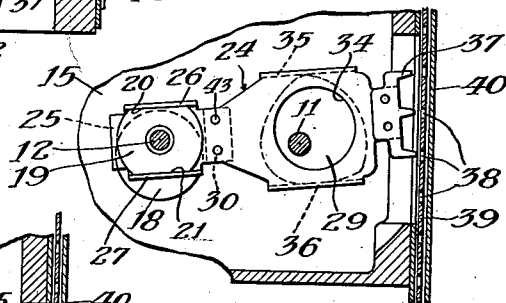


Fig. 2

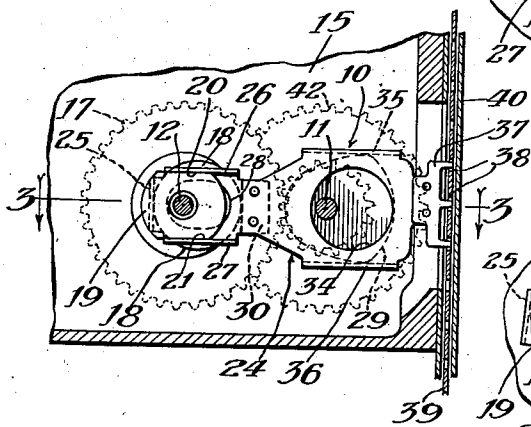


Fig. 6

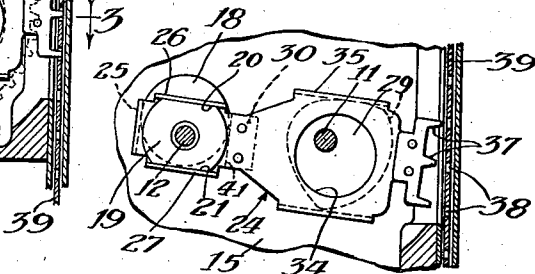


Fig. 3

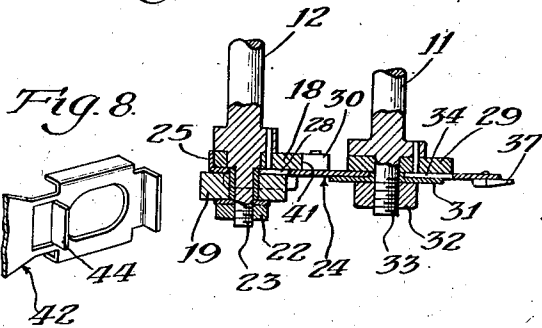


Fig. 7

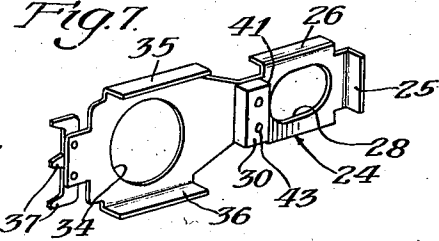
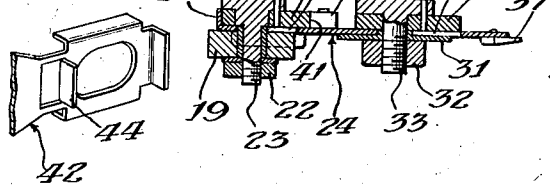


Fig. 8



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UNITED STATES PATENT OFFICE

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FILM-ADVANCING DEVICE

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1 Claim. (Cl. 88—18.4)

This invention relates to a film-advancing device for motion picture projectors.

An object of the present invention is to improve upon and simplify the construction of prior art film-advancing devices.

Another object of the present invention is to reduce the number of operating parts required to move the film-advancing claw or member during or throughout its operative cycle, and hence to reduce correspondingly the wear and friction on the working parts of the film-advancing device.

An additional object of the present invention is to eliminate one of the two rear or back cams which have heretofore customarily been used in film-advancing mechanism for imparting the back and forth or longitudinal movement to the film-advancing claw, and to operate the film-advancing claw by means of a single front cam and a single back cam, as distinguished from the two rear or back cams and the one front cam which have customarily been used heretofore in film-advancing devices of a somewhat similar or analogous type.

Fig. 1 is a view of the new film-advancing device, partly in section and partly in top plan, and showing the same applied to a motion picture projector;

Fig. 2 is a vertical sectional view on line 2—2 in Fig. 1 and showing the film-advancing member or claw in operative, that is, in effective or film-feeding position;

Fig. 3 is a horizontal sectional view on line 3—3 in Fig. 2;

Fig. 4 is a side elevational view, partly in section, showing the operating parts of the new film-advancing device, partly in section, and as seen from the side opposite which is shown in Figs. 2, 5 and 6;

Fig. 5 is a view partly in side elevation and partly in section and showing the parts of the new film-advancing device in the position which they assume when they are about to engage the film and initiate the film-advancing operation;

Fig. 6 is a view similar to Fig. 5 but showing the parts of the new film-feeding device in the position which they assume at the end of each film-advancing operation;

Fig. 7 is a perspective view of the new film-advancing member or claw; and

Fig. 8 is a fragmentary detail view illustrating a slightly modified form of the film-advancing claw which is embodied in the new film-advancing device.

A preferred form of the new film-advancing

device is shown in Figs. 1 to 7, inclusive, of the drawing, is therein generally indicated at 10, and comprises a driving member or shaft 11 and a driven member or shaft 12, both of which are rotatably mounted or journaled in bearing surfaces 13 and 14, respectively, which are provided in a supporting frame 15; the driving shaft 11 being operated by any conventional power-driving means which is known to or used in the art, the same being generally indicated at 42.

Carried by and fast upon the driving member or shaft 11 is a power transmitting element in the form of a gear 16 and this gear 16 meshes with another power-transmitting element in the form of a gear 17 which is carried by and is fast upon the driven shaft 12; the speed ratio between the driving gear 16 and the driven gear 17 being preferably two to one, that is, the driving gear 16 is shown as being only one-half as large in diameter as the driven gear 17, and hence the driving shaft 11 and gear 16 will make two revolutions for each revolution of the driven shaft 12 and gear 17.

Carried by and fast upon the driven shaft 12, at the opposite end thereof from the driven gear 17, is a cam 18 which as is shown in the drawing, is eccentrically mounted upon and relative to the driven shaft 12. Likewise carried by but floating upon the driven shaft 12, outwardly of the cam 18, is a guide member 19, which, as best shown in Fig. 6, has a flattened upper edge or face 20 and a flattened lower edge or face 21, for reasons to be explained hereafter; this guide member 19 being retained upon the driven shaft 12, and against axial movement thereon, by a nut 22 which is mounted on a threaded outer end portion 23 of the driven shaft 12.

The new film-advancing device also includes a film-engaging and advancing claw or member, which is generally indicated at 24 (Fig. 7), and this claw or member 24 has a transversely extending flange or cam surface 25 which projects substantially right-angularly from the body thereof at the rear end of the same, and this flange or cam surface 25 is adapted to be engaged by the peripheral edge or surface of the back or rear cam 18 at one stage in the operative cycle of the latter.

The film-advancing claw or member 24 also includes a pair of spaced upper and lower and longitudinally extending flanges or guide elements 26 and 27, respectively, which project substantially right-angularly from the body of the said claw member 24, at the opposite side of the same from the flange 25 and, like the latter, at

or in the rear end portion of the claw or film-advancing member 24, and these flanges are disposed in engagement with the flattened upper and lower surfaces 20 and 21, respectively, of the guide member 19, which is to say, that the guide member 19 lies between the flanges 26 and 27; the outer end portion 23 of the driven shaft 12 projecting through an opening 28 which is formed in the body of the film-advancing member or claw 24 (Fig. 7).

Carried by and fast upon the front or driving upon the driving shaft 11 is a guide member 31, which is arranged at the opposite side of the film-advancing member or claw 24 from the side thereof on which the front cam 18 is arranged, as shown, for example, in Fig. 3.

The guide member 31 is retained upon the driving shaft 11 by means of a nut 32 which is attached to the threaded outer end portion 33 of the driving shaft 11, and the driving shaft 11 projects through an opening or hole 34 which is formed in the body of the film-advancing claw 24 (Fig. 7).

The film-advancing member 24 includes a cam 25 or block 30 which is mounted thereon between the ends thereof and this cam or block 30 has a rear cam surface 41 which, at one stage in the operation of the new film-advancing device, is adapted to be engaged by the rear or back cam 18.

The film-advancing member 24 also includes a second pair of spaced upper and lower and longitudinally extending flanges or cam surfaces 35 and 36, respectively, and the front cam 29 lies between and alternately engages these flanges or cam surfaces 35 and 36, which project right-angularly from the body of the film-advancing member 24 but on the opposite side thereof from the side on which the flanges 26 and 27 are arranged, which is to say that the flanges 35 and 36 are arranged upon the same side of the film-advancing member 24 as the flange or cam surface 25.

The film-advancing member or claw 24 likewise includes a plurality of film-engaging teeth 37 which are engageable in the apertures 38 of the film 39 as the latter passes through the film guideway 40.

Operation

The operation of the new film-advancing device is as follows: When the driving shaft 11 is rotated, by a suitable source of power and power-transmitting means, (not shown in detail but generally indicated at 42), motion is transmitted by way of the intermeshing gears 16 and 17, from the drive shaft 11 to the driven shaft 12 and to the rear or back cam 18 which is carried thereby; the driven shaft 12 and the rear cam 18 which is carried thereby make only one revolution for two revolutions of the driving shaft 11 and the front cam 29 carried thereby, due to the two to one speed ratio between the driving and driven gears 16 and 17, respectively.

Accordingly, as the driven shaft 12 and the eccentrically mounted rear cam 18 carried thereby are rotated (counterclockwise, Figs. 2 and 6), the peripheral edge or surface of the rear or back cam 18 alternately engages and disengages the rear face or cam surface 41 of the cam or block 30, and in so doing moves the film-advancing member or claw 24 forwardly, that is, toward the film 39 and the film guideway 40.

Simultaneously with the forward movement of the film-advancing member or claw 24 which, as stated above, is caused by the engagement of the

peripheral edge of the rear or back cam 18 with the rear face 41 of the cam block 30, the peripheral edge of the eccentrically mounted front cam 29 engages the upper and front flange 35 and in so doing moves, that is, raises the front end portion of the film-advancing member or claw 24 into the position in which it is shown in Fig. 5, whereupon a slightly further rotary movement of the rear or back cam 18, which is at this time still in engagement with the rear face or surface 41 of the cam 30, moves the teeth 37 on the film-advancing member or claw 24 into the openings or apertures 38 in the film 39.

During this operation, that is, during the interval of time in which the teeth 37 of the film-advancing member 24 are being moved into engagement with the openings 38 in the film 39, the peripheral edge of the front cam 29 moves out of engagement with the upper front flange or cam surface 35, and subsequently moves into engagement with the lower front flange or cam surface 36, and in so doing rocks or pivots the front end portion, including the teeth 27, of the film-advancing member or claw 24 downwardly, about the rear or driven shaft 12 as a pivot, and in so doing moves or advances the film 39 one frame downwardly in the film trackway or guideway 40.

As soon as and when the film-advancing member or claw 24 completes its downward or film-advancing stroke, the peripheral edge of the rear or back cam 18, which at this time has moved out of engagement with the rear face or cam surface 41 of the cam or block 30, engages the substantially vertically extending rear flange or cam surface 25 and in so doing moves the film-advancing member 24 rearwardly, thus moving the teeth 37 of the film-advancing member or claw 24 out of the apertures or openings 38 in the film 39 and into a position rearwardly of the film 39, as shown in Fig. 6, whereupon the foregoing cycle of operations of the film-advancing member or claw 24 commences over again.

It will be noted, in connection with the operation of the new film-advancing device, that the guide member 19, which is carried by the rear or driven shaft 12, floats on the latter, and at no time rotates, since it is held against rotative movement by the engagement of its flattened upper and lower surfaces 20 and 21 with the upper and lower rear flanges 26 and 27, respectively, of the film-advancing member 24.

It will likewise be noted that all of the movements of the film-advancing member or claw 24 which take place during the operative cycle of the latter are accomplished by the use of only two cams, that is, by the use of the single front cam 29 and a single rear or back cam 18, as distinguished from the customary three cam arrangement of the prior art film-advancing devices, in which it has been the usual practice to employ a single front cam and two rear or back cams, one rear or back cam for effecting the forward longitudinal movement of the film-advancing member and the other rear or back cam effecting the rearward longitudinal movement of the same.

It will further be noted, in this connection, that in the new film-advancing device the entire longitudinal movement, that is, both the forward and rearward movement of the film-advancing member or claw 24 are caused by the single rear or back cam 18, in cooperation with the flange or cam surface 25 and the rear or cam surface 41 of the cam 30, and other associated parts of 75

the new film-advancing device, as distinguished from the customary prior art practice of employing two rear or back cams, one for effecting rearward movement and one for effecting forward movement of the film-advancing member or claw.

It will also be noted, in connection with the operation of the new film-advancing device, that due to the two to one speed ratio between the front or driving shaft 11 and the rear or driven shaft 12, the film-advancing member or claw 24 makes one idle transverse or lost up and down movement, under the action of the front cam 31, during each of its operative cycles, although this feature in itself is not new in the art and no claim to novelty therein is herein made.

The slightly modified form of the film-advancing claw which is embodied in the new film-advancing member is shown in Fig. 8, is therein generally indicated as 42, and this form of film-advancing claw is substantially the same as that which is shown in Figs. 1 to 7, inclusive, except that instead of forming the cam surface 41 upon a separate cam block 30 which is attached to the body of the film-advancing claw 24, as at 43, this cam surface in the modified form of the film-advancing claw which is shown in Fig. 8, is formed as a flange 44 which is integral with but struck out from the body of the film-advancing claw 42. Otherwise, however, the modified form of the film-advancing claw 42 which is shown in Fig. 8 is the same in construction and operation as the film-advancing claw 24 which is shown in Figs. 1 to 7, inclusive.

While I have illustrated and described a preferred form of construction for carrying my invention into effect, this is capable of variation and modification, without departing from the

spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claim.

I claim:

A film-advancing device comprising, in combination, a film-advancing member or claw having a portion at the front thereof adapted to engage a film, and means for operating said film-advancing member, said operating means including a rotary front shaft and a rotary rear shaft, said film-advancing member including a pair of spaced cam surfaces extending transversely relative to the longitudinal axis of the said film-advancing member, and a single rear cam on the said rear shaft coacting at different times with each of the said cam surfaces to effect the longitudinal or in and out movement of the said film-advancing member, said film-advancing member having a pair of guide flanges thereon at the opposite side thereof from the side of the same on which said cam surfaces are arranged, and a guide member having an aperture mounted to float upon the said rear shaft and having a pair of flattened guide surfaces thereon engaging with the said guide flanges to guide the said film-advancing member, said film-advancing member having a pair of longitudinally extending cam surfaces thereon on the same side thereof as the side thereof on which the said first-named cam surfaces are located but forwardly of the latter, and a single front cam on the said front shaft alternately engageable with the said second-hand cam surfaces for imparting the transverse or up and down movement to the said film-advancing member.

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