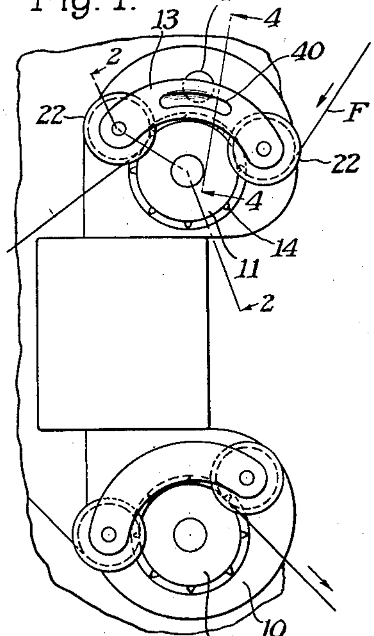
Feb. 13, 1951 D. F. LYMAN ET AL 2,541,475

FILM SPROCKET GUARD

Filed April 5, 1949

Fig. 1.



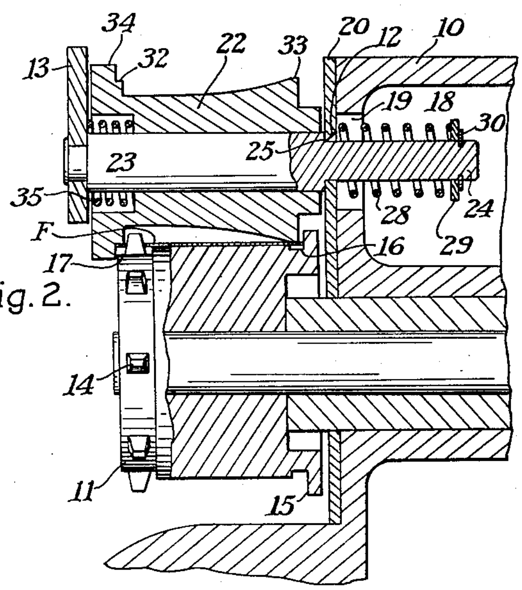


Fig. 2.

Fig. 3.

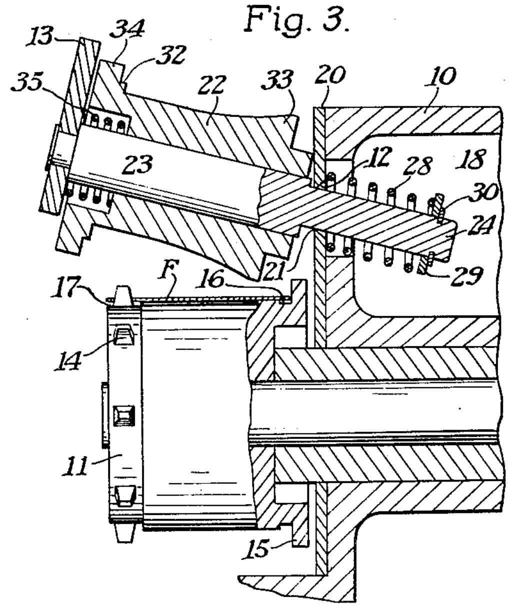
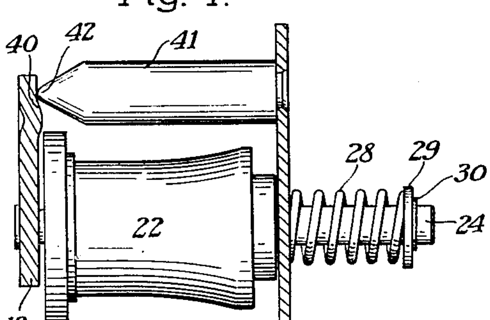


Fig. 4.



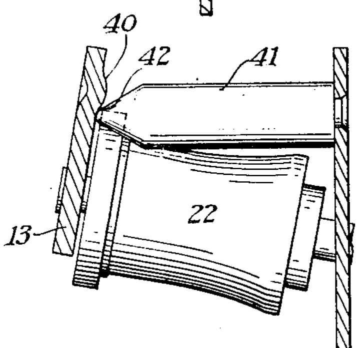


Fig. 5.

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FILM SPROCKET GUARD

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7 Claims. (Cl. 271—2.3)

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This invention relates to motion-picture apparatus, and particularly to film-guiding mechanism known as sprocket guards which are employed to hold the film in engagement with the various film-drive sprockets, or other drive rollers.

In the advancing of film in cameras, projectors, printers, etc., sprockets are employed for advancing the film through the apparatus. The film is maintained in driving engagement with the sprockets by means of guards which may comprise one or more rollers which bear against the film at the desired points. Inasmuch as these guards generally overhang the end of the sprocket, provision must be made for their movement away from the sprocket periphery in order to permit the film to be threaded edgewise onto the sprocket.

A primary object of the present invention is to provide a sprocket guard of the type in question which comprises two rollers spaced peripherally with respect to the sprocket to insure a given angle of wrap for the film on the sprocket, and which rollers are connected together and so mounted that they can be pivoted away from the sprocket periphery to a threading position.

Another object of the present invention is to provide a sprocket guard comprising a roller which is mounted on the mechanism plate so as to move between an operative position, wherein its axis is substantially parallel to the sprocket axis, and a threading position, wherein its axis is tilted relative to the sprocket axis.

And, another object is to provide a sprocket guard of the type set forth wherein the guide roller is normally spring-pressed to a running position, but can be manually raised to a threading position wherein it is automatically held by a frictional latching means, including the spring, which normally moves the roller to its running position.

And, a further object is to provide a sprocket guard of the type set forth wherein the guide roller is provided with a flange for engaging the outer edge of the film positioned on the sprocket, and the roller is normally spring-pressed along its axis so that said flange tends to move the film axially of the sprocket and against a locating flange on the inner end of the sprocket.

And yet, another object is to provide a sprocket guard of the type set forth whose effective periphery is so formed as to facilitate threading the film onto the sprocket by feeding the film strip edgewise axially of the sprocket.

And, another object is to provide a sprocket guard mechanism of the type set forth which is

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simple and rugged in construction, but, at the same time, efficiently positions and holds the film strip on the film sprocket.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, however, both as to its construction and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which

Fig. 1 is a partial side elevation of a motion-picture film-feeding mechanism and showing a preferred embodiment of the sprocket guard constituting the present invention;

Fig. 2 is an enlarged sectional view taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a view substantially the same as Fig. 2, but showing the sprocket guard raised to a threading position;

Fig. 4 is an enlarged view taken substantially on line 4—4 of Fig. 1 and showing the sprocket guard in a running position;

Fig. 5 is a view corresponding to Fig. 4, but showing the sprocket guard and the latching mechanism therefor in the positions they assume when the guard is raised to its threading position.

Like reference characters refer to corresponding parts throughout the drawings.

Briefly, a sprocket guard, constructed in accordance with the present invention, comprises one or more rollers which are pivoted on the mechanism plate adjacent the sprocket to move between a normal running position, wherein the specially formed periphery of the guide roller cooperates with the periphery of the sprocket to hold a film thereon, and a raised or threading position, wherein the roller is moved away from the sprocket to permit a film to be moved edgewise onto, or off from, the sprocket. The guard is provided with a latch element which cooperates with a stationary latch and the spring that normally moves the guard to its operative position in order to frictionally retain the guard in either a raised position to permit threading or to retain it in an operative position against the pull of the film. The guide roller of the guard is normally spring-pressed axially of its supporting shaft and includes a flange adapted to engage the outer edge of the film on the sprocket to properly locate the film laterally of the sprocket as defined by a plain flange on the inner end thereof.

Referring now to the drawings, we have shown

our invention as applied to a motion-picture apparatus consisting of a cast body 10 in which are journalled a pair of conventional sprockets 11 which are driven at a constant speed, as is customary in this type of apparatus. The upper sprocket 11 draws the film "F" from a take-up spool, not shown, and feeds it to an intermittent feeding mechanism, not shown, from which the lower sprocket 11 draws the film and feeds it onto a sound drum and/or a take-up roll, not shown. In order to hold the film "F" on each of the sprockets 11, with a desired angle of wrap, we provide a film guard consisting of a pair of guide rollers 22 connected together by a strap 13. Inasmuch as each of these guide rollers 22 is individually mounted and formed in exactly the same manner, only one of them will be specifically described. By the same token it will be appreciated that, while we have shown this guard as including two rollers spaced around the periphery of the sprocket, a single guard roller could be formed and mounted in precisely the same manner, if the question of angle of wrap is of no concern, and still come within the scope of the present invention.

As shown in Fig. 2, the film sprocket 11 is one of the type for handling sound film, being perforated along only one edge. Accordingly, the sprocket 11 includes teeth 14 around its outer end, while its inner end is provided with a plain flange 15 adapted to engage and guide the inner edge of the film "F." That portion of the sprocket adjacent each edge of the film is cut away, as shown at 16 and 17, so that the edges of the film engaged by the guide roller, to be later described, are not pressed directly against the periphery of the sprocket. As is well known, this sprocket is driven at a constant speed by a suitable mechanism, not shown.

The body of the casting is provided with a recess 18 terminating in a bore 19; said bore being covered by a mechanism plate 20 having an aperture 21 formed therein. The inside face of the mechanism plate adjacent the aperture 21 is countersunk, as shown at 12, to permit the guide roller shaft to tilt, as will be hereinafter described.

Coming now to the guide roller assembly, this comprises a stub shaft 23 having a reduced end 24 with a square shoulder 25 at the juncture of the two diameters. The diameter of the main portion of the shaft 23 is larger than the aperture 21, while the diameter of the reduced portion of the shaft is substantially equal in diameter to the aperture 21 through which it extends. The relatively narrow portion of the aperture 21 left by the countersinking of the other face of the plate 20 provides a knife-like bearing support for the reduced portion 24 of the shaft 23 to permit it to tilt from an operative position shown in Fig. 2 to the threading position shown in Fig. 3. The same result could be obtained by reducing the thickness of the plate at that portion containing aperture 21 to that corresponding to the thickness left by the countersinking operation and then providing this thinned area of the plate with an aperture of the same diameter throughout its depth.

The stub shaft 23 is normally moved to the running position shown in Fig. 2 by the action of a compression spring 28 encircling the reduced end 24 of the shaft and being confined between the inner face of the mechanism plate 20 and a washer 29 held on the shaft by a cotter pin 30, or the like. It will be readily appreciated that the normal action of this compression spring 28 is to move the stub shaft 23 to the right, looking at Figs. 2 and 3, and into a position in which the shoulder 25 on the shaft is flush with the outside face of the mechanism plate. In this position the stub shaft extends substantially parallel to the axis of the sprocket.

Rotatably mounted on the stub shaft 23 is the guide roller 22. This roller has two film-engaging portions 32 and 33 lying substantially in the same plane and which are adapted to engage the extreme edges of the film and hold the film on the periphery of the sprocket. The guide roller also includes on its outer end a flange 34 adapted to overhang the periphery of the sprocket and engage the edge of the film "F" positioned thereon. The outer end of the guide roller is provided with a recess in which is located a compression spring 35 which normally acts to move the guide roller to the right, looking at Figs. 2 and 3, so that the flange 34 tends to move the film "F" laterally of the sprocket and hold its inner edge against the face of the flange 15. It will thus be seen that the guide roller 22 not only positions the film radially of the sprocket, but also serves to position it properly in a lateral direction in combination with the flange on the sprocket.

In order to hold the film-guiding roller 31 in a raised or threading position, as shown in Fig. 3, a novel frictional latch mechanism is provided, as will now be described, and which takes over automatically as the guard is manually raised from the position shown in Fig. 2 to that shown in Fig. 3. This latch mechanism comprises in the embodiment disclosed the strap 13 connecting the two guide rollers 12 together; said strap intermediate its ends being provided with a protuberance 40 extending substantially axially of the guide rollers 22, see Figs. 4 and 5. Fixed to the mechanism plate 20, and extending away from the same in substantially parallel relation with the axis of the guide rollers 22, is a latch pin 41 having a rounded end 42 lying in the path of, and adapted to cooperate with, the protuberance 40. The strap 13 being fixed to the stub shaft 23 is normally moved inwardly by the action of compression spring 28 so as to be held against the rounded nose 42 of latch pin 41. As shown in Fig. 5, when the sprocket guard is manually moved to a raised or threading position, the protuberance 40 snaps over the rounded end 42 of the latch pin 41 and, having assumed this position, is frictionally retained therein because of the action of the compression spring 28 normally drawing the strap 13 against the end of the latch pin 41.

When it is desired to drop the guard from a threading position to a running position, it is merely necessary to grasp the strap 13 by hand and pull downwardly to force the protuberance 40 over the rounded end of the pin 41. Compression spring 28 compresses to permit this movement to take place. Just as soon as the top of the protuberance passes the end of the pin 41, the guard snaps down to the running position under the action of compression spring 28. Looking at Fig. 4, it will be observed that in this position the end 42 of the latch pin 41 engages the other side of the protuberance 40 so as to frictionally retain the guard in an operative position, so that the normal pull on the film will not cause the guard to be raised accidentally from its operative position.

While we have shown a sprocket guard consisting of two guide rollers spaced circumferen-

tially of a sprocket to hold the film on the sprocket with a given angle of wrap, it will be readily understood by those skilled in the art that a film guard, or pad roller, consisting of but a single roller for holding a film on a sprocket at but a single point, could be constructed and mounted in precisely the same manner as that described for a guard including two rollers. The only modification necessary would be to redesign the strap 13 so that with a single roller its equivalent would be fixed to, and extend substantially vertically from, the shaft of the roller to engage a latch pin disposed in proper cooperating relation with respect to a protuberance thereon.

Although we have shown and described certain specific embodiments of our invention, we are aware that many modifications thereof are possible. Our invention therefore is not to be limited to the precise details of construction shown and described, but is intended to cover all modifications coming within the scope of the appended claims.

Having thus described our invention, what we claim is new and desire to secure by Letters Patent of the United States is:

1. In a film-moving mechanism the combination with a feeding drum for engaging and moving a film strip, of a guide roller assembly movable relative to said drum between a running position, wherein it holds a film strip in driving relation with said drum, and a threading position, wherein it is moved away from the surface of said drum to permit a film strip to be threaded thereonto, and comprising a mechanism plate extending vertically relative to the axis of said drum, and including a relatively thin portion provided with an aperture, a stub shaft including a portion having a diameter larger than that of said aperture and including a portion of a diameter slightly less than the diameter of said aperture and extending therethrough, said two portions of the shaft being adjacent one another and joined by a shoulder extending substantially radially of said shaft and which, when moved into engagement with that part of said mechanism plate surrounding said aperture, causes the shaft to be positioned parallel to the axis of said drum, a spring acting on said shaft in a direction to force said shoulder thereon toward, and into engagement with, said mechanism plate, a guide roller rotatably mounted on that portion of said stub shaft having the larger diameter and adapted to hold said film on the drum when the assembly is in a running position, and means for automatically releasably latching said assembly in said threading position when it is manually moved thereto.

2. A film-moving mechanism according to claim 1, in which said releasable latching means comprises a latch member fixed to the enlarged portion of said stub shaft and including a protuberance extending axially of said shaft, and a fixed latch member lying in the path of movement of said protuberance and over and above which said protuberance is adapted to be moved when the assembly is moved to threading position.

3. A film-moving mechanism according to claim 1, in which said guide roller includes a flange on its outer end adapted to engage the edge of a film on said drum to edge-guide the film strip, and means for normally forcing said guide roller axially of said stub shaft in a direction to force the film edgewise onto said drum.

4. A film-moving mechanism according to claim 1, in which said drum includes a plurality of teeth around its outer end to engage perforations along one edge of the film and a flange around its inner end to edge-guide said film, and in which said guide roller has a flange on its outer end adapted to engage the edge of a film on said drum, means normally forcing said guide roller axially of said stub shaft in a direction such that the flange on said guide roller forces the other edge of the film against the flange on said drum, that portion of the periphery of the guide roller spanning said drum cut away to accommodate said teeth on the drum and gradually flared to a larger diameter at its inner end which is adapted to hold the inner edge of the film on said drum, the flared portion of the periphery of said roller providing a guiding surface for the edge of the film when the assembly is in its threading position to facilitate threading the film edgewise onto said drum.

5. In a film-moving mechanism the combination with a sprocket having a row of teeth around one end for engaging the perforations along one edge of a motion picture film to move the same and having a flange on the other end for edge-guiding said film, of a guide roller assembly movable to and from a running position relative to said sprocket in which it holds the film on said sprocket, and comprising an apertured mechanism plate adjacent the flanged end of said sprocket and extending perpendicular to the axis thereof, said aperture countersunk from the side of the mechanism plate removed from said sprocket, a stub shaft having a portion whose diameter is greater than that of said aperture and a portion of reduced diameter equal to that of said aperture, with a square shoulder between the two portions, said stub shaft mounted with its reduced portion extending through said aperture and away from said sprocket, a compression spring encircling said reduced end of said shaft and confined between the countersunk face of said mechanism plate and a collar on the end of said reduced portion and normally acting to locate said shoulder on the shaft flush with the face of the plate and thereby position the shaft in its running position wherein it is parallel with the axis of the sprocket, a guide roller rotatably mounted on the enlarged portion of said shaft and having a periphery formed to cooperate with the periphery of the sprocket to hold a film on the latter when the roller assembly is in its running position, and a latching means for frictionally holding said roller assembly away from its running position when manually moved thereto.

6. A film-moving mechanism according to claim 5 in which said latching means comprises a round-ended pin fixed to said mechanism plate and extending away therefrom axially of said stub shaft, a latch plate fixed to the end of said stub shaft and normally pressed against the end of said pin by the action of said compression spring, and a cam faced protuberance on said plate adjacent said pin adapted to snap over the end of said pin as the assembly is moved to and from its running position and in each position the combined action of said protuberance, round-ended pin, and spring is adapted to frictionally restrain the assembly against movement therefrom.

7. A film-moving mechanism according to claim 5 in which the guide roller includes a flange on its outer end to engage the edge of the film at the toothed end of said sprocket, a spring

normally urging said roller axially of said shaft toward said plate whereby the flange thereon tends to hold the other edge of the film on the sprocket against the flange on the inner end thereof, and that portion of the periphery of the roller spanning said sprocket relieved to accommodate the sprocket teeth and free the picture area of the film from rubbing contact and terminate in a narrow flange engaging the edge of the film just inside the flange on said sprocket, the relieved portion of said roller being gradually flared so as to provide a surface for guiding the leading edge of the film onto the sprocket as it is fed edgewise onto the sprocket with the guide roller assembly moved away from the running position.

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