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L. A. McNABB

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DRIVING MECHANISM

Filed Feb. 5, 1940

2 Sheets-Sheet 1

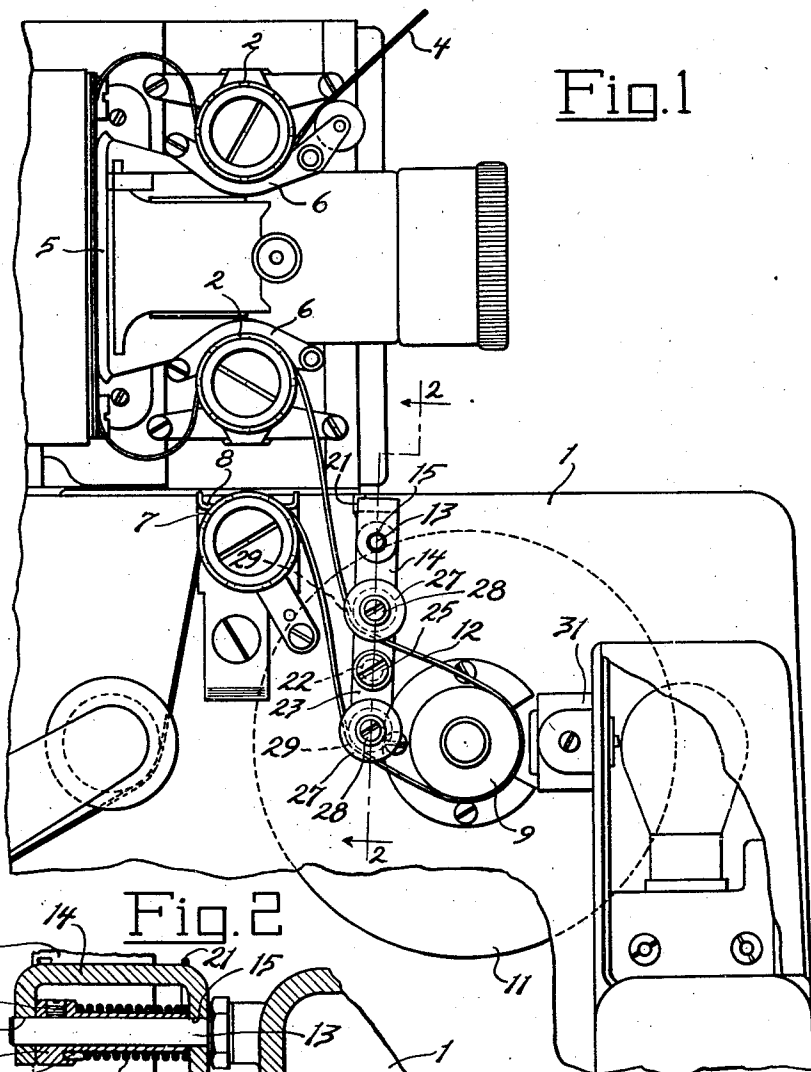


Fig. 1

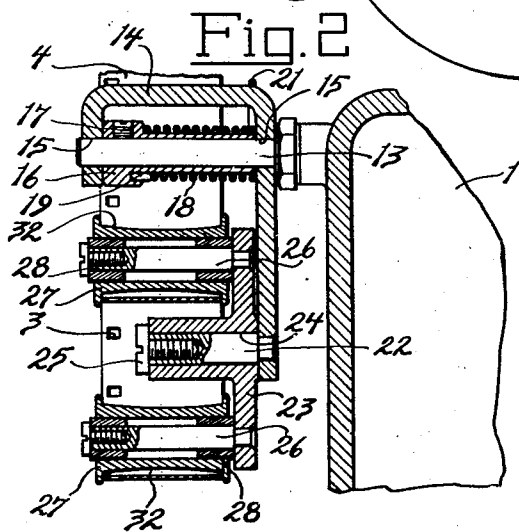


Fig. 2

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Fig. 3

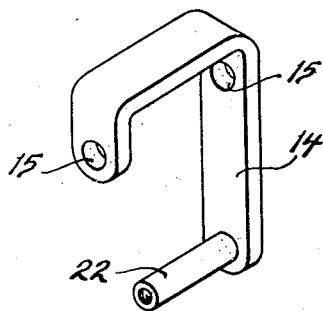


Fig. 4

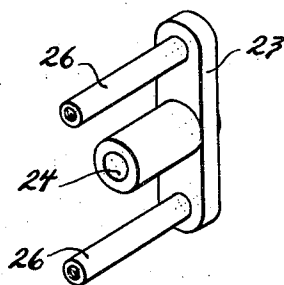
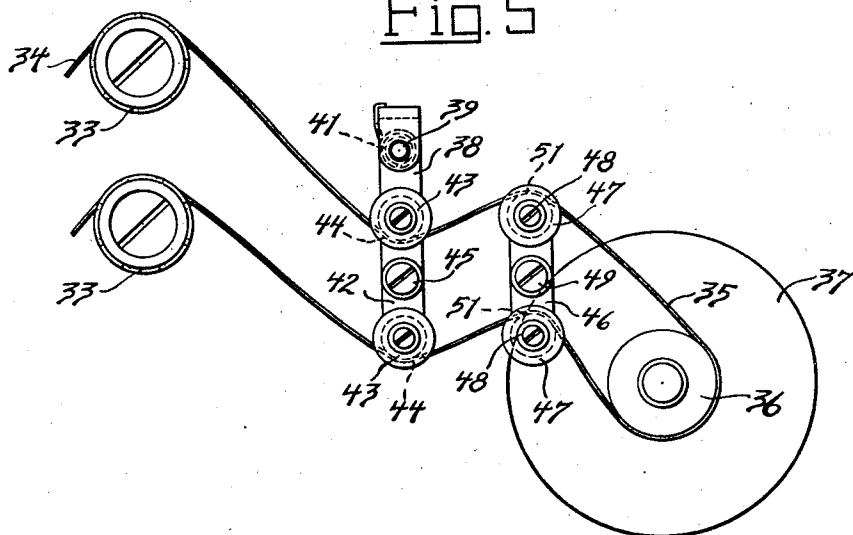


Fig. 5



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DRIVING MECHANISM

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9 Claims. (Cl. 271-2.3)

My invention relates particularly to the drive of sound record strips such as the photographic sound record film strips which are used in the production of sound accompanied motion pictures, although not limited to this use alone.

The object of the invention resides in the provision of novel and effective drive mechanism, involving a driven strip or belt engaging over a rotatable drum or pulley and driving the same, which promotes accurately uniform constant movement of the strip over the drum and corresponding accurately uniform rotation of the drum, to the instant end of promoting such accurately uniform constant drive of a feed perforated photographic sound record film strip past a translating station operatively related with the strip at a point where it passes over a "sound" drum for reducing or eliminating sound distortion.

The invention will be better understood by reference to the accompanying drawings in which—

Figure 1 is a partial side elevation of a sound motion picture projecting machine embodying my invention;

Figure 2 is a partial sectional view substantially on the line 2—2 of Figure 1;

Figures 3 and 4 are perspective views of parts of the mechanism, hereinafter described; and

Figure 5 is a fragmentary side elevation of a modification of my invention.

Referring to Figures 1 to 4 inclusive of the drawings, 1 designates the frame of a sound motion picture projecting machine, and disposed upwardly on the frame is a usual motion picture projecting mechanism including two vertically spaced rotating constant feed sprockets 2 which engage usual feed perforations 3 in a motion picture and sound record bearing photographic film strip 4 and feed it to and from a prejection apertured intermittent feed guide 5 wherein the film is fed intermittently in a downward direction by a usual intermittent feed mechanism not shown, the film being retained in engagement with the sprockets 2 by usual releasable retaining members 6. See Figures 1 and 2.

A third rotating constant feed sprocket 7 is mounted on the frame 1 below the lower sprocket 2 and engages the feed perforations of the film strip 4 for further constantly feeding the same, the film being retained in engagement with the sprocket 7 by a usual releasable retaining member 8. The sprockets 2 and 7 are driven in unison to feed the film at the same rate by a usual driving mechanism not shown.

A "sound" drum 9 is rotatably mounted in a usual manner on the frame 1 on an axis in parallelism with those of the sprockets 2 and 7, a fly-wheel 11 being connected with the drum to augment the momentum thereof as is usual.

The lower sprocket 2 and the sprocket 7 in their feed engagement of the strip serve for constantly feeding the film strip 4 in a loop 12 about and rotating the drum 9, see Figure 1, these sprockets engaging the film strip at both ends of the loop.

A stationary stud 13 is secured on the frame 1 above the loop 12, and a mounting arm 14 is provided at its upper end with spaced bored portions 15 which are engaged on the stud for the pivotal mounting of this arm thereon. See Figures 1, 2 and 3. A bored sleeve 16 is secured on the stud 13 between the bored portions 15 of the arm 14 by means of a set screw 17, and a torsion spring 18 encircles this sleeve and the stud 13 and has one end thereof engaged with the sleeve, as designated at 19, and has the other end thereof engaged with the arm 14, as designated at 21, to yieldably urge the arm 14 in a direction clockwise in Figure 1.

The lower or free end of the arm 14 is provided with a stud 22 arranged in parallelism with the pivotal axis of the arm, and another arm or connecting member 23 is provided with an extended intermediate bore 24 in which the stud 22 is engaged for the pivotal mounting of the arm 23 on the arm 14, a headed screw 25 being screw-threaded into the projecting end of the stud to retain the arm 23 thereon. See particularly Figure 2.

The arm 23 is provided with spaced parallel studs 26 between which the pivotal mounting of this arm, involving the bore 24, is disposed, and bored and flanged rollers 27 are rotatably mounted on these studs by plain bearings 28.

The rollers 27 engage the two stretches of the strip between the lower sprocket 2 and the sprocket 7 and the drum 9 in vertically spaced relation and in a clockwise direction in Figure 1 and are tensioned thereagainst and form bights 29 therein by reason of the pivotal axes of the mounting arm 14 and of the connecting arm 23 being disposed in a common vertical plane extending correspondingly with that of the rollers 27 when tensioned against said stretches of the strip to provide bodily movement of the connecting arm 23 in a path extending through the common plane of the rollers 27 and by reason of the spring 18 yieldably urging the mounting arm 14 and the

connecting arm 23, through its pivotal mounting intermediate the rollers 27, clockwise or in the direction of said path opposed by engagement of the rollers 27 with the two stretches of the strip.

Accordingly, variations in tension of the stretches of the film strip between the drum 9 and the lower sprocket 2 and the sprocket 7 are transmitted, through the connecting arm 23 which may oscillate without interference from the tensioning spring 18, from one to the other of these stretches to the end of maintaining tension balance between these stretches and minimizing interference with uniform rotation of the drum and movement of the portion of the film strip engaged thereon, the momentum of the drum and/or its flywheel or equivalent tending to maintain the rate of rotation of the drum.

As shown, the internal bending friction of the aforesaid stretches of the film strip as well as the friction involved with the tensioning device, such as the friction of the plain bearings 28 of the rollers 27, serve in absorbing oscillatory energy so that such oscillatory energy does not accumulate by way of periodicity to a magnitude which would disturb uniform rotation of the drum 9 and the portion of the film strip engaged thereon. To the end of augmenting the internal bending friction of the film strip the rollers 27 are preferably relatively small in diameter to make the bights 29 relatively sharp.

Thus, both transient disturbances, such as may be caused by casual irregularity of feed of the film strip, the passage of a splice of the film strip, or unit length variation of the film strip, and periodic disturbances, such as may be caused by eccentricity of the feed sprockets and driving gears thereof or other manufacturing inaccuracies, are absorbed without unduly increasing the amount of energy transmitted by the film strip or unduly increasing the elastance of the aforesaid stretches of the film strip.

The circumference of the rollers 27 are preferably longitudinally concave as shown at 32 in Figure 2, the rollers 27 thus engaging the film strip only at the extreme edge portions thereof so that the record portion of the film strip is not engaged with these rollers to prevent damage thereto, and so that the feed perforated portion of the film strip is not engaged with these rollers to prevent disturbance of the film strip thereby.

A usual optical slit translating device or "sound pick up," generally designated at 31, has operative relation with the film strip while engaged on the drum as is usual.

Referring to Figure 5 of the drawings, two vertically spaced rotatable constant feed sprockets 33 are driven in unison in a usual manner and, engaging the usual feed perforations of a film strip 34, serve to constantly feed this film strip in a loop 35 about and to rotate a rotatable drum 36 which is connected with a flywheel 37.

A tension transmitting connection is provided between the two stretches of the film strip 34 between the sprockets 33 and the drum 36, and, being identical with that of Figures 1 to 4 inclusive, comprises an arm 38 pivoted at 39 and yieldably urged clockwise by a spring 41, a connecting arm 42 provided with spaced rollers 43 forming bights 44 in the said two stretches of the film strip 34, and pivotally mounted immediately of the rollers 43 on the free end of the arm 38, as designated at 45, this tension transmitting device functioning similarly to that of Figures 1 to 4 inclusive.

Another tension transmitting connection is

provided between the two stretches of the film strip 34 between the sprockets 33 and the drum 36 and comprises as follows: Another connecting arm 46 is provided with spaced rollers 47 rotatably mounted thereon as designated at 48, and is pivotally mounted intermediately of the rollers 47, as designated at 49. The rollers 47 form bights 51 in the aforesaid stretches of the film strip opposite the bights 44 formed by the rollers 43 and between these bights 44 and the drum 36.

The spring 41 of the arm 38 serves to tension both pairs of rollers 43 and 47 against the stretches of the film strip 34 between the sprockets 33 and the drum 36, and both of the connecting arms 42 and 46 function in cooperation in a manner similar to the functioning of the connecting arm 23 and its rollers of Figures 1 and 2, one or the other of the structures of Figures 1 and 2 and that of Figure 5 being invention.

While I have thus described my invention, I do not wish to be limited to the precise details described as changes may be readily made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:

1. In a device of the character described, the combination with a rotatable drum, of constant feed means for feeding a strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising a connecting member having tensioned operative relation at spaced points thereon with said strip on opposite sides of said drum, a mounting carrying said connecting member for pivotal movement on an axis intermediate said spaced points and in turn movably mounted for bodily movement of said connecting member in a path extending through the common plane of said spaced points when operatively related with said strip, and means operative on and yieldably urging said mounting in the direction of said path opposed by said tensioned operative relation.

2. In a device of the character described, the combination with a rotatable drum, of constant feed means for feeding a strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising strip engaging elements tensioned against and forming bights in said stretches, a connecting member operatively connected at spaced points thereon with said strip engaging elements, a mounting carrying said connecting member for pivotal movement on an axis intermediate said spaced points and in turn movably mounted for bodily movement of said connecting member in a path extending through the common plane of said spaced points when said strip engaging elements are engaged with said strip, and means operative on and yieldably urging said mounting in the direction of said path opposed by engagement of said strip engaging elements with said strip.

3. In a device of the character described, the combination with a rotatable drum, of constant feed sprocket means for feeding a feed perforated strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between

said feed means and said drum comprising a connecting member provided with spaced rollers tensioned against and forming bights in said stretches, a pivoted arm on which said connecting member is pivotally mounted intermediate said rollers on an axis spaced from the pivotal axis of said arm, the pivotal axis of said arm and of said connecting member being disposed in a common plane extending correspondingly with that of said rollers when engaged with said strip, and means operative on and yieldingly urging said arm in the direction of its pivotal movement opposed by engagement of said rollers with said stretches.

4. In a device of the character described, the combination with a rotatable drum, of constant feed sprocket means for feeding a feed perforated strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising a connecting member provided with spaced rollers of relatively small diameter and having the circumferences thereof longitudinally concave and tensioned against and forming bights in said stretches, a mounting carrying said connecting member for pivotal movement on an axis intermediate said rollers and in turn movably mounted for bodily movement of said connecting member in a path extending through the common plane of said rollers when engaged with said strip, and means operative on and yieldably urging said mounting in the direction of said path opposed by engagement of said rollers with said stretches.

5. In a device of the character described, the combination with a rotatable drum, of constant feed sprocket means for feeding a feed perforated strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising a connecting member provided with spaced parallel studs and bored rollers of relatively small diameter and having the circumferences thereof longitudinally concave and rotatably mounted on said studs and tensioned against and forming bights in said stretches, a stationary stud, an arm pivotally mounted on said stationary stud and on which said connecting member is pivotally mounted intermediate said rollers on an axis spaced from the pivotal axis of said arm, the pivotal axes of said arm and of said connecting member being disposed in a common plane extending correspondingly with that of said rollers when engaged with said strip, and a torsion spring surrounding said stationary stud and operative on said arm to tension said rollers against said stretches of the strip.

6. In a device of the character described, the combination with a rotatable drum, of constant feed means for feeding a strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising strip engaging elements tensioned against and forming bights in said stretches, a connecting member operatively connected at spaced points thereon with said strip engaging elements, a mounting carrying said connecting member for pivotal movement on an axis intermediate said spaced points and in turn movably mounted for bodily movement of said

connecting member in a path extending through the common plane of said spaced points when said strip engaging elements are engaged with said strip, means operative on and yieldably urging said mounting in the direction of said path opposed by engagement of said strip engaging elements with said stretches, additional strip engaging elements tensioned against and forming bights in said stretches opposite said first mentioned bights, a second connecting member operatively connected at spaced points thereon with said additional strip engaging elements, and a second mounting carrying said second connecting member for pivotal movement on an axis intermediate said spaced points thereof.

7. In a device of the character described, the combination with a rotatable drum, of constant feed sprocket means for feeding a feed perforated strip over and rotating said drum and operative on the strip on both sides of said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising a connecting member provided with spaced rollers tensioned against and forming bights in said stretches, a second connecting member provided with spaced rollers tensioned against and forming bights in said stretches opposite said first mentioned bights, a mounting carrying said first mentioned connecting member for pivotal movement on an axis intermediate said first mentioned rollers and in turn movably mounted for bodily movement of said first mentioned connecting member in a path extending through the common plane of said first mentioned rollers when engaged with said strip, a second mounting carrying said second connecting member for pivotal movement intermediate said second mentioned rollers, and resilient means operative on and yieldably urging said first mentioned mounting in the direction of said path opposed by engagement of said first mentioned rollers with said stretches.

8. In a device of the character described, the combination with a rotatable drum and a flywheel connected therewith, of constant feed sprocket means for feeding a feed perforated optical record strip over and rotating said drum and engaging the strip on both sides of said drum, an optical translating device having operative relation with said strip while engaged on said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between said feed means and said drum comprising a connecting member having tensioned operative relation at spaced points thereon with said strip on opposite sides of said drum, a mounting carrying said connecting member for pivotal movement on an axis intermediate said spaced points and in turn mounted for bodily movement of said connecting member in a path extending through the common plane of said spaced points when operatively related with said strip, and means operative on and yieldably urging said mounting in the direction of said path opposed by said tensioned operative relation.

9. In a device of the character described, the combination with a rotatable drum and a flywheel connected therewith, of constant feed sprocket means for feeding a feed perforated optical record strip over and rotating said drum and engaging the strip on both sides of said drum, an optical translating device having operative relation with said strip while engaged on said drum, and means operative to transmit tension from one to the other of the two stretches of the strip between

said feed means and said drum comprising a connecting member provided with spaced rollers tensioned against and forming bights in said stretches, a mounting carrying said connecting member for pivotal movement on an axis intermediate said rollers and in turn movably mounted for bodily movement of said connecting member

in a path extending through the common plane of said rollers when engaged with said strip, and means operative on and yieldably urging said mounting in the direction of said path opposed by engagement of said rollers with said stretches.

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