Dec. 29, 1942. O. J. HOLMES 2,306,730

FRICTION COUPLING

Filed Feb. 26, 1940

FIG. 1.

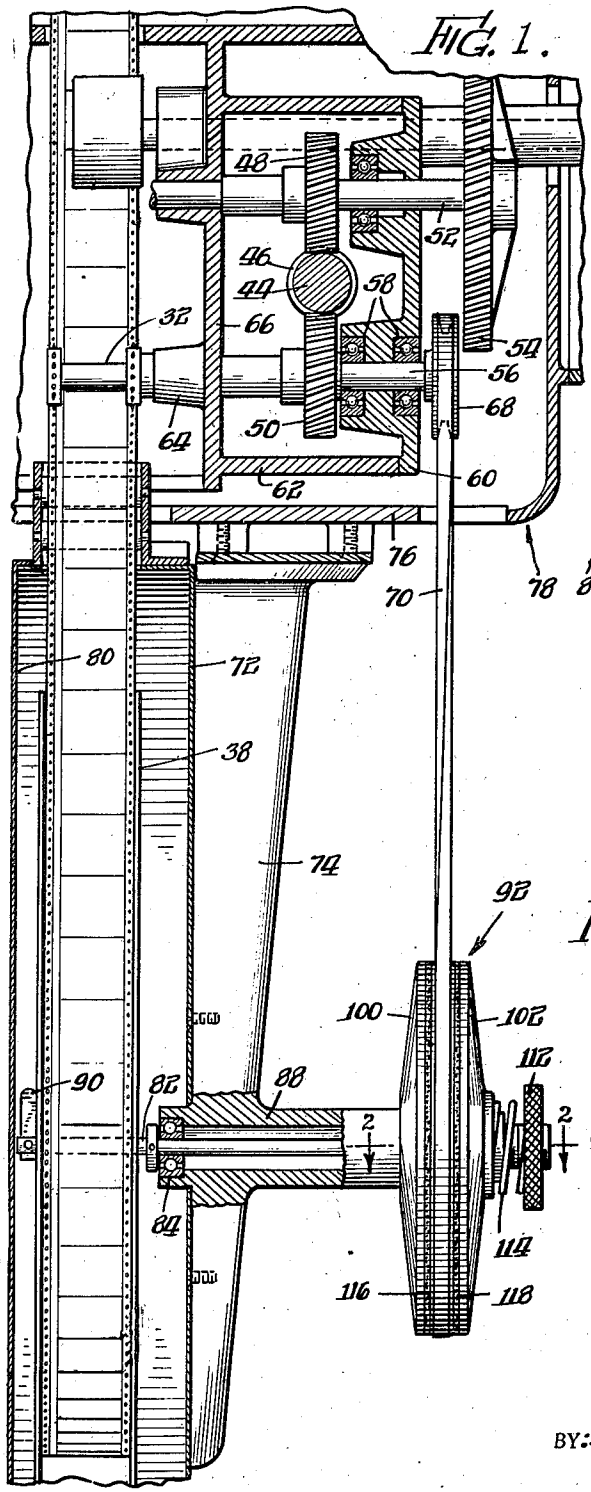


FIG. 2.

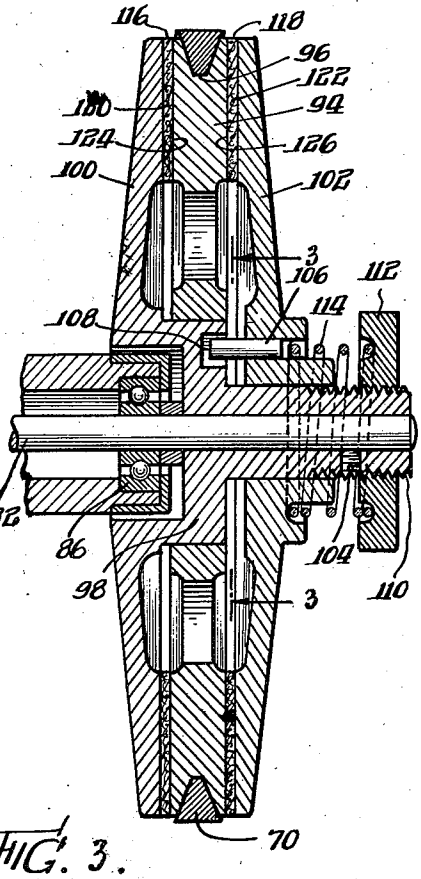
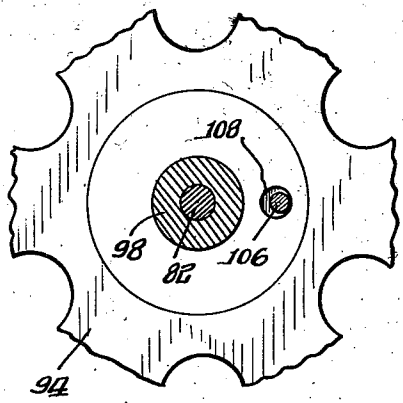


FIG. 3.



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FRICTION COUPLING

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1 Claim. (Cl. 64—30)

This invention relates to the drive for the take-up reel of a motion picture machine.

It is an object of applicant's invention to provide a reel drive embodying frictionally engaging elements operatively adjustable while running to vary the driving tension whereby to cause the film to be wound as a tight reel without loose layers.

It is a further object of the invention to provide in a motion-picture machine a reel drive embodying relatively small, frictionally engaging driving and driven members having, however, a large area of frictional contact.

Applicant's invention contemplates the provision in a motion-picture machine of a reel drive of frictional character providing readily adjustable means having a fine sensitivity of adjustment, enabling adjustment of the driving tension exerted upon the film to the proper value to insure smooth running of the film and uniform winding of the film upon the reel.

A further object of the invention is to provide in a motion-picture machine a reel drive coupling of frictional character which is of marked simplicity, from a manufacturing standpoint, and in which the parts are readily replaceable as occasion or wear may require.

A still further object of the invention is to provide, in a motion-picture machine, a film drive providing a driving pulley frictionally driving the reel through members engaging opposite sides of the driving pulley, whereby to apply equal and opposite axial forces upon the driving pulley to insure true running of the pulley and prevent wobbling or binding of the pulley with respect to its mounting member, journal or bushing.

Other and further objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawing, wherein

Figure 1 is an enlarged fragmentary view in vertical section through the driving mechanism of a motion-picture machine embodying the invention;

Figure 2 is a fragmentary horizontal section taken along the line 2—2 of Figure 1; and

Figure 3 is a fragmentary vertical section taken along the line 3—3 of Figure 2.

As shown in the drawing, a drive shaft 44 (Figure 1) carries a worm 46. The worm 46 meshes with and drives a pair of worm gears 48 and 50, the worm gear 48 being mounted on a shaft 52 to which is secured a gear 54. The gear 54, through a suitable train of gears (not shown), drives certain of the film feeding sprockets and the intermittent motion mechanism (not shown).

The worm gear 50 is secured to a shaft 56 journalled by ball-bearings 58 in the plate 60 of a housing 62 and in a boss 64 formed in the wall 66 of the housing. A feed sprocket 32 is secured to one end of this shaft 56. A pulley 68 is secured to the other end of the shaft 56 and is provided with a circumferential groove of V-shape, in cross section, to receive a V-belt 70.

A take-up reel 38 is enclosed in a sheet metal housing 72 mounted on a bracket 74 fastened to and depending from the bottom wall 76 of a housing 78 for the sound reproducing mechanism of the motion-picture machine. The reel housing 72 is provided with the usual pivoted cover 80 through which a reel of conventional structure may be inserted on the free end of a shaft 82 journalled in roller bearings 84 and 86 carried by an apertured boss 88 formed in the bracket 74. The shaft 82 is provided with the usual pivoted locking finger 90 by which the reel is detachably held against axial movement, and the reel is secured to the shaft by the conventional interfitting lugs and recesses formed in the hub of the reel and the shaft 82.

Applicant's invention provides a reel drive 92 of frictional character for driving the reel shaft 82. As shown for purposes of illustration, this reel drive 92 embodies a driving pulley or member 94 having a circumferential groove 96 of V-shape, in cross section, to receive the V-belt 70. The driving pulley or member 94 is journalled on a bushing or bearing 98 which is preferably formed as the hub portion of one of two driven members or disks 100 and 102 disposed on opposite sides of the pulley or driving member 94.

One of the driven members or disks is connected or secured to the reel shaft 82 as by a key or pin 104 engaging the hub portion 98 and the shaft 82. The other driven member or disk, as, for example, the disk 102, is connected to the opposite disk 100 in a manner to permit axial movement between the disks, while causing simultaneous rotation of the disks. Such connection may comprise a pin 106 projecting axially from the hub of one of the disks and received in an opening 108 in the hub of the opposite disk, the opening 108 being extended sufficiently in an axial direction to permit the desired relative movement of the pin 106 in an axial direction.

The hub portion of one of the disks is extended axially and is provided with external threads 110 receiving an internally threaded adjusting member or knob 112. A coil spring 114 encircles the threaded hub and is interposed between the ad-

justing member or knob 112 and the hub of the opposite driven member or disk.

Annular strips 116 and 118, of felt or similar friction material, are interposed between the inner annular plane faces 120 and 122 of the disks 100 and 102 and the opposed annular plane faces 124 and 126 of the driving member or pulley 94. Preferably, the annular strips 116 and 118 of friction material are adhesively secured to the inner faces of the disks 100 and 102.

Since the reel shaft 82 must be driven in an opposite direction to the feed sprocket 32, the belt 70 is crossed between the pulley 68 and the driving member or pulley of the reel drive 92.

As seen in Figures 1 and 2, the adjusting member or knob 112 is adjustably threaded on the outwardly projecting end of the hub portion 98 of the inner disk 100, and is conveniently positioned for grasping and manipulation by the operator while the machine is running, so that the tension of the spring 114 may be adjusted while the machine is running.

It will be apparent that the tension of the spring or resilient means 114 determines the degree of coupling between the driving member or pulley 94 and the driven members or disks 100 and 102, and thus determines the driving tension exerted upon the film as it is wound upon the take-up reel 38. Thus, during operation of the machine, the winding tension exerted upon the film may be adjusted and varied from time to time to insure that the film is wound uniformly in tight layers upon the reel, independently of the condition of the film. That is to say, an old and repeatedly stretched film may be wound on the reel with the same uniformity as a new and unstretched film. Also, the tension upon the film may be varied as the film accumulates on the reel, so that the initial layers of film on the reel may be wound with the same uniformity and tightness as the final layers of film. At the same time, the arrangement is such that the driving member or pulley may readily slip relative to the reel shaft to prevent breaking of the film, even though the tension of the resilient means or spring 114 is adjusted to its maximum degree.

The driven members or disks 100 and 102 engage opposite sides of the driving member or pulley 94, and hence act as opposed guides to prevent wobbling of the driving member on the bearing or bushing 98, thus insuring true running of the pulley on this bearing or bushing. Since the driven disks exert the force of the spring 114 in equal and opposite portions on the driving disk, there is no force exerted on the driving member which would tend to cause it to bind on its bearing or bushing, as in prior reel drives of this nature.

Also, it will be evident that applicant's invention provides a relatively large area of frictional contact between the driving and driven members in a structure which is of relatively small size, and in which such area of frictional contact is double the area of frictional contact between the driving and driven members of the same diameter, but in which the driven member is disposed on one side only of the driving member.

The adjusting member or knob 112 may be adjusted angularly or rotatably a considerable amount without effecting more than a slight axial adjustment or compression and release of the resilient member or spring 114, and therefore a very fine sensitivity of adjustment is provided, so that, during operation of the machine, the tension exerted upon the film, as it is wound on the take-up reel, may be precisely adjusted to the proper degree to obtain a smooth winding of the film on the reel, without jerking, and at the proper synchronized rate with the rate of feeding of the film by the sprocket 32, so that there will be no tendency for the film reel to be driven in a reverse or unwinding direction.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claim.

The invention is hereby claimed as follows:

In a film reel drive, a shaft adapted to receive the reel, a driven disc having an axially extending hub portion of reduced diameter adapted to receive said shaft and having an enlarged hub portion, said disc being secured to said shaft for rotation therewith, a driving disc of external diameter substantially equal to the diameter of the first disc and journalled on the enlarged hub portion of the first disc, the driving disc having annular plane surfaces at the periphery thereof, a third and driven disc on the opposite side of said driving disc from the first disc, said third disc being mounted on the reduced hub portion of the first disc and pinned to the first disc for rotation therewith and for axial movement relative thereto, rings of friction material interposed between the opposed annular plane surfaces of the second and driving disc and complementary surfaces of the first and third and driven discs, the free end of the reduced hub portion of the first disc being threaded, an adjusting nut threaded on said free end of said hub portion and a coil spring encircling said reduced hub portion and interposed between the adjusting nut and the third and driven disc.

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