

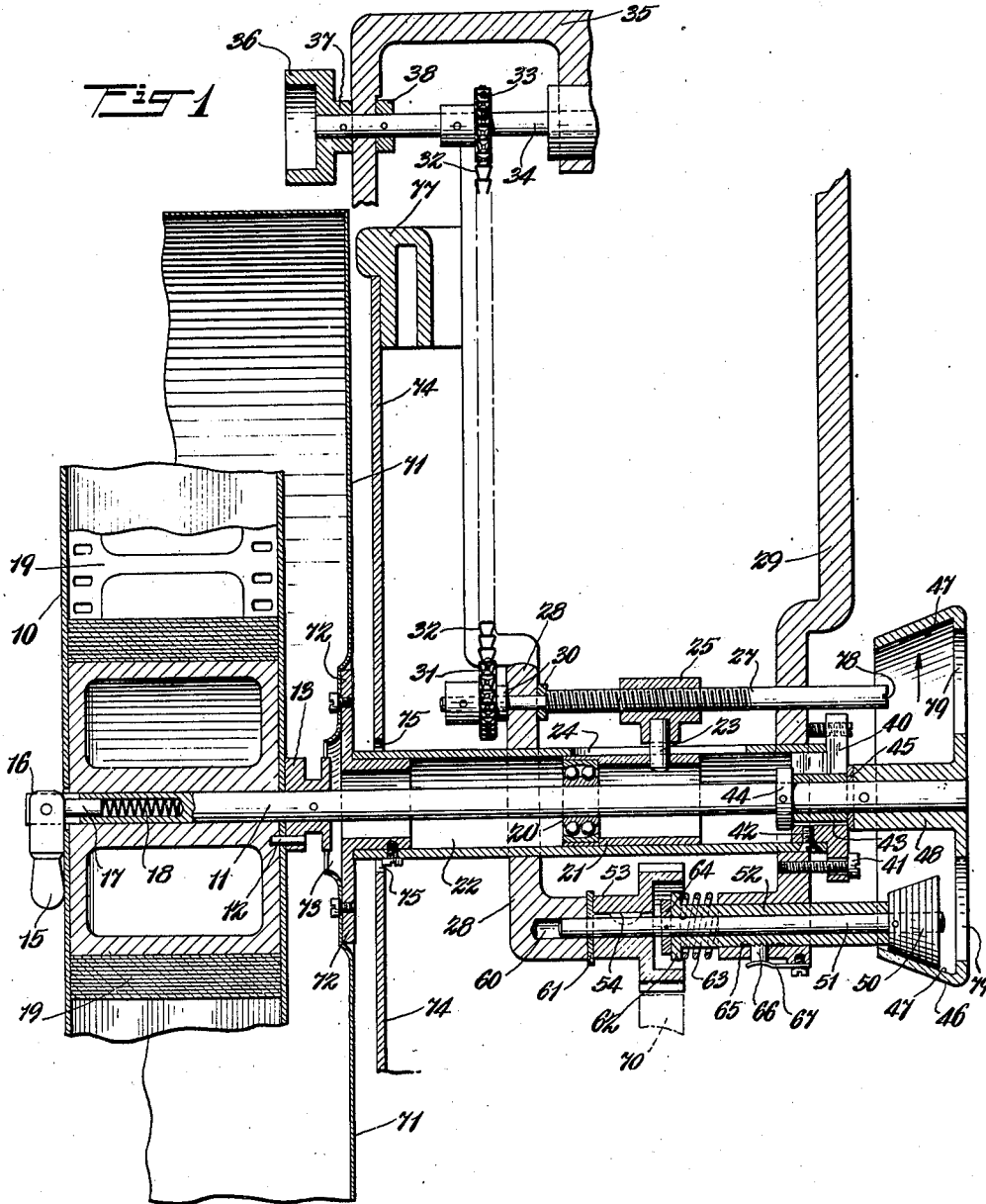
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TAKE-UP REEL SLIP DEVICE

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TAKE UP REEL SLIP DEVICE

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This invention relates to take-up devices, and more particularly to an automatic tensioning mechanism for winding a flexible member on a reel.

5 The invention is particularly applicable to a motion picture projection machine, and provides a take-up mechanism for winding a film on the film reel and maintaining the correct tension thereon regardless of the size or
10 weight of the film.

An object of the invention is to provide a mechanism for maintaining a constant tension on a flexible element, such as a film when it is being wound on a reel.

15 Another object is to provide a mechanism in which the weight of the reel automatically controls the force applied to the film during the winding operation.

A still further object is to provide a mechanism in which the winding force is automatically varied directly as the weight of the reel.

20 Another object is to provide a mechanism of the above character in which the ratio of the force transmitted through the winding mechanism with respect to the weight of the reel may be varied at will.

Another object is to provide a cheap, simple, dependable and convenient device of the type above indicated.

30 The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

35 Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization
40 may be better understood by referring to the following description taken in connection with the accompanying drawing forming a part thereof, in which

45 Figure 1 is a transverse sectional view of a take-up mechanism constructed in accordance with the present invention.

In the following description and in the claims parts will be identified by specific
50 names for convenience, but they are intended

to be as generic in their application to similar parts as the art will permit.

Referring to the drawing more in detail, the invention is shown as applied to a reeling device for a film reel 10, which comprises a shaft 11 on which said reel is secured as by pin 12, which is mounted in a collar 13 pinned to said shaft and cooperates with a suitable aperture on said reel. The reel is held in engagement with pin 12 by means of a latch 15, which is pinned to the end of shaft 11, and is provided with a cam surface 16 which cooperates with a plunger 17 held in the end of shaft 11, and maintained in engagement with said cam surface by spring 18. A film 19, or other flexible element, may be supported on reel 10.

Shaft 11 is mounted in bearing 20 for pivotal and rotational movement. Said bearing is preferably of the anti-friction type, as for example, a ball bearing, and is secured in a tubular member 21 which is slidably mounted in housing 22. Said member 21 is controlled by pin 23 which engages a suitable bore in said member and passes through a slot 24 in housing 22. Said pin is held in collar 25 which is in threaded engagement with shaft 27. Said shaft 27 is journaled in sections 28 and 29, which form a part of the frame of the machine.

Longitudinal movement of shaft 27 is prevented by collars 30, which are mounted thereon and engage section 28 of the frame. A sprocket 31 is secured to said shaft and is in engagement with a chain 32, which passes over sprocket 33 mounted on shaft 34. Said shaft 34 is journaled in section 35 forming a part of the frame of the machine, and is provided with a hand wheel 36 which adjustment thereof may be made. Said shaft 34 is held in correct longitudinal position by shoulder 37 formed on wheel 36 and by collar 38 which is pinned to said shaft.

Shaft 11 is held against angular displacement in a horizontal direction and also against longitudinal displacement by means of bearing member 40, which is provided with an elongated or U-shaped opening to permit vertical movement of said shaft therein. Said member 40 is secured to frame section 29 by means of set screws 41 and is secured to

housing 22 by screw 42. A bushing 43 is mounted on the shaft 11 in engagement with bearing member 40, and is adapted to permit rotational movement of said shaft and pivotal movement in a vertical direction, but to cooperate with the elongated slot in bearing member 40 to prevent pivotal movement of said shaft in a horizontal direction. Collars 44 and 45 engage bearing member 40 to prevent longitudinal movement of shaft 11.

A driving wheel 46 having an inner surface 47 of frusto-conical shape is secured to a shaft 11 as by hub member 48 which is pinned thereto. For driving said wheel there is provided a friction member 50, which is pinned to shaft 51. Said shaft is journaled in sleeve 52, which is slidably mounted in suitable bore in the frame member 29. Said shaft is slidably keyed to driving gear 53, as by a key 54, which permits longitudinal movement of said shaft with respect to gear 53, but prevents relative rotational movement therebetween. Said shaft is also journaled in a bore 60 in frame section 28. Washer 61 is mounted on shaft 51 between section 28 and gear wheel 53 to prevent direct contact between said wheel and said frame member.

Sleeve 52 is provided with a shoulder 62 against which spring 63 is seated for normally holding said sleeve in engagement with a collar 64 pinned on shaft 51. The tension of said spring is in such direction that the pressure exerted by said spring on sleeve 52 and shaft 51 holds member 50 in engagement with surface 47 of driving wheel 46. A ratchet 65 formed on sleeve 52 engages a pawl 66 which is adapted to permit movement of sleeve 52 in one direction in response to spring 63, but to prevent movement in the reverse direction. Said pawl 66 is held by spring 67 in firm engagement with said ratchet.

Power may be applied to gear 53 from any suitable source, as by driving gear 70, and friction member 50 may be lined with any suitable friction material such as leather by which the friction thereof on the conical surface of driving wheel 46 may be more accurately controlled. A suitable casing 71 for the reel 10 may be mounted on a housing 22, as by plate 72. Said casing terminates in a flange 73 which surrounds shaft 11 and prevents the entrance of extraneous materials into housing 22. Wall 74, forming a part of a wall of the apparatus, is provided with an opening 75 through which housing 22 projects and is attached to a portion 77 of the frame of the machine. Rod 77 is provided at its end with a groove 78 to receive a tool for affecting manual adjustment. A plurality of recesses 79 are formed in driving wheel 46 both for the purpose of lightening said wheel and to permit access of a suitable tool to groove 78.

In the operation of the above described sys-

tem, it will be noted that the weight of the material, such as film 19 on reel 10, causes shaft 11 to pivot in bearing 20 whereby driving wheel 46 is caused to exert pressure on friction member 50. The driving torque is accordingly applied to shaft 11 from driving gear 70 through gear 53, shaft 51, friction member 50 and driving wheel 46. The amount of frictional driving force thus applied is determined by the pressure of wheel 46 on friction member 50, and this in turn is determined by the weight of the material supported on reel 10. It is evident, therefore, that the driving force is directly proportional to the weight of said material, and in the case of a motion picture machine is proportional to the diameter of the film supported on reel 10. This ratio is such that the film is maintained under substantially constant tension regardless of the driving force exerted on gear 53.

As the friction surface of member 50 becomes worn, said member is held in engagement with wheel 46 by the action of spring 63 on sleeve 52 and shaft 51, which causes longitudinal movement of said shaft. Whenever such movement of shaft 51 is taking place, pawl 66 and ratchet 65 cooperate to maintain said shaft in operative position so that the engagement of member 50 with wheel 46 is not dependent upon the force of spring 63. This prevents longitudinal movement of shaft 51 in response to variations in pressure of wheel 46 as the mechanism is operated.

In order to vary the force applied to the driving shaft for any given weight of materials supported on reel 10, the hand wheel 36 may be manually adjusted thereby rotating shaft 34 and shaft 27 and causes longitudinal movement of collar 25 and bearing 20 with respect to housing 22, such movement of bearing 20 changes the ratio of the lever arms between reel 10 and driving wheel 46. This adjustment may be varied to obtain any desired driving force, or to maintain any desired tension on film 19 in response to the frictional engagement of member 50 and driving wheel 46.

It will be noted that the adjustment of the driving friction may be made by hand wheel 36 when the machine is operating, and an extremely fine adjustment may be maintained by reason of the engagement of threaded rod 27 with collar 25. Such adjustment may become necessary, for example, in changing from one weight of reel to a reel of a different weight or by a variation in the condition of the frictional surfaces of members 50 and 46.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may

be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:—

1. A reeling device comprising a substantially horizontal shaft, a bearing supporting said shaft for rotational and vertical movement, a friction element carried by said shaft and a cooperating friction element in driving engagement therewith, the arrangement being such that the weight of material on said shaft tends to cause pivotal movement thereof, whereby said friction elements are maintained in frictional engagement, and resilient means for causing relative movement between said elements to compensate for wear of the friction surfaces.

2. A reeling device comprising a rotating shaft mounted for pivotal movement in a vertical plane, and a friction drive for said shaft comprising friction elements carried by said shaft and by a driving shaft respectively, and resilient means for maintaining said elements in engagement and for compensating for wear of the friction surfaces.

3. A reeling device comprising a rotating shaft mounted for pivotal movement in a vertical plane in response to the weight of the material being reeled, a driving shaft mounted in substantially parallel relationship to said first shaft, and friction driving means comprising friction elements carried on said shafts and having tapered surfaces in frictional engagement, and means for causing longitudinal movement of said driving shaft with respect to said first shaft whereby said friction surfaces are adjusted to compensate for wear.

4. A reeling device comprising a horizontal shaft mounted for pivotal movement in a vertical plane in response to the weight of the material being reeled, a driving shaft therefor mounted in substantial parallelism to said first shaft, friction driving means interconnecting said shafts comprising friction elements mounted on each of said shafts, and having cooperating frusto-conical surfaces, and resilient means for causing relative longitudinal movement of said shafts in such direction that said conical surfaces are maintained in frictional contact regardless of the extent of wear thereon.

5. A reeling device comprising a horizontal shaft mounted for pivotal movement in a vertical plane in response to the weight of the material being reeled, a driving shaft therefor mounted in substantial parallelism to said first shaft, friction driving means interconnecting said shafts comprising friction elements mounted on each of said shafts, and having cooperating frusto-conical surfaces, and resilient means for causing relative longitudinal movement of said shafts in such direction that said conical surfaces are maintained in frictional contact regardless of the extent of wear thereon, and means for lock-

ing said elements against movement in a direction which would tend to lessen the friction therebetween.

6. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material.

7. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, said external surface having a lining of soft friction material thereon whereby the wear is concentrated and the parts may be restored to their original condition by replacement of said lining, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material.

8. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, said external surface having a lining of soft friction material thereon whereby the wear is concentrated and the parts may be restored to their original condition by replacement of said lining, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material, and means for causing longitudinal

movement of said driving shaft, whereby relative movement between said friction surfaces is obtained to compensate for wear.

9. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, said external surface having a lining of soft friction material thereon whereby the wear is concentrated and the parts may be restored to their original condition by replacement of said lining, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material, and resilient means for causing longitudinal movement of said driving shaft in a direction to maintain said friction surfaces in constant engagement.

10. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, said external surface having a lining of soft friction material thereon whereby the wear is concentrated and the parts may be restored to their original condition by replacement of said lining, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material, resilient means for causing longitudinal movement of said driving shaft for maintaining said friction surfaces in engagement, and locking means for preventing reverse movement of said driving shaft.

11. A reeling device comprising a rotating shaft adapted to support a reel, a bearing for mounting said shaft for rotational and pivotal movement, a friction element carried by said shaft and having an internal tapered friction surface, a driving shaft mounted substantially parallel to said first shaft, and a friction element mounted on said driving shaft and having an external tapered surface adapted to cooperate with said first mentioned tapered surface, said external

surface having a lining of soft friction material thereon whereby the wear is concentrated and the parts may be restored to their original condition by replacement of said lining, the arrangement being such that the weight of the material being reeled tends to cause pivotal movement of said first shaft for maintaining pressure between said frictional surfaces, whereby a driving force is transmitted which is proportional to the weight of said material, a spring adapted to cause longitudinal movement of said driving shaft for maintaining said surfaces in engagement, and a pawl and ratchet adapted to lock said shaft against reverse movement.

12. A reeling device comprising a substantially horizontal shaft, a bearing supporting said shaft for rotational and pivotal movement, and means for adjusting said bearing longitudinally of said shaft, comprising a threaded shaft mounted substantially parallel to said first shaft and carrying a threaded collar, and means interconnecting said collar with said bearing whereby upon rotation of said threaded shaft longitudinal movement of said bearing is obtained.

13. A reeling device comprising a substantially horizontal shaft, a bearing supporting said shaft for rotational and pivotal movement, and means for adjusting said bearing longitudinally of said shaft, comprising a threaded shaft mounted substantially parallel to said first shaft and carrying a threaded collar, and means interconnecting said collar with said bearing whereby upon rotation of said threaded shaft longitudinal movement of said bearing is obtained, a hand adjusting mechanism for said threaded shaft comprising a third shaft having a hand wheel mounted in an accessible position, and driving mechanism interconnecting said third shaft and said threaded shaft.

14. A reeling device comprising a rotating shaft adapted to support a reel, a friction element carried on said shaft and a bearing mounted between said reel and said friction element and adapted to permit pivotal movement of said shaft in a vertical plane, a housing, means for mounting said bearing therein for slidable movement longitudinally of said shaft, a threaded shaft mounted adjacent said housing and parallel thereto, a threaded collar mounted on said threaded shaft and having a member extending through a slot in said housing into engagement with said bearing, means for rotating said threaded rod whereby longitudinal movement of said collar and of said bearing is obtained for varying the lever arms of said reel and said friction member with respect to said bearing.

15. A reeling device comprising a rotating shaft adapted to support a reel, a friction element carried on said shaft and a bearing mounted between said reel and said friction

element and adapted to permit pivotal movement of said shaft in a vertical plane, a housing, means for mounting said bearing therein for slidable movement longitudinally of said shaft, a threaded shaft mounted adjacent said housing and parallel thereto, a threaded collar mounted on said threaded shaft and having a member extending through a slot in said housing into engagement with said bearing, means for rotating said threaded rod whereby longitudinal movement of said collar and of said bearing is obtained for varying the lever arms of said reel and said friction member with respect to said bearing, comprising a sprocket wheel carried on said threaded rod, a chain cooperating with said wheel, and a control sprocket in engagement with said chain, and said control sprocket being mounted on a shaft located at a distance from said threaded rod, and carrying a hand adjusting wheel mounted in an accessible position.

16. A reeling device comprising a rotating shaft adapted to carry the material being reeled, a bearing for mounting said shaft for rotational and pivotal movement, a housing carrying said bearing, and a thrust bearing for said shaft comprising a member having an elongated opening mounted in said housing, said opening being adapted to permit vertical movement of said shaft and to prevent appreciable horizontal movement thereof, a driving shaft extending substantially parallel to said first shaft, friction elements interconnecting said shafts, said elements having tapered surfaces in frictional engagement, means for causing longitudinal movement of said second shaft for compensating for wear of said surfaces, and means for adjusting said bearing longitudinally of said first shaft for varying the ratio of the lever arms of said reel, and said friction member comprising a threaded member connected to said bearing in engagement with a threaded rod extending parallel to said shaft, and means for rotating said threaded rod comprising a chain and sprocket and hand operative means for controlling said chain.

In testimony whereof we have hereunto set our hands.

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