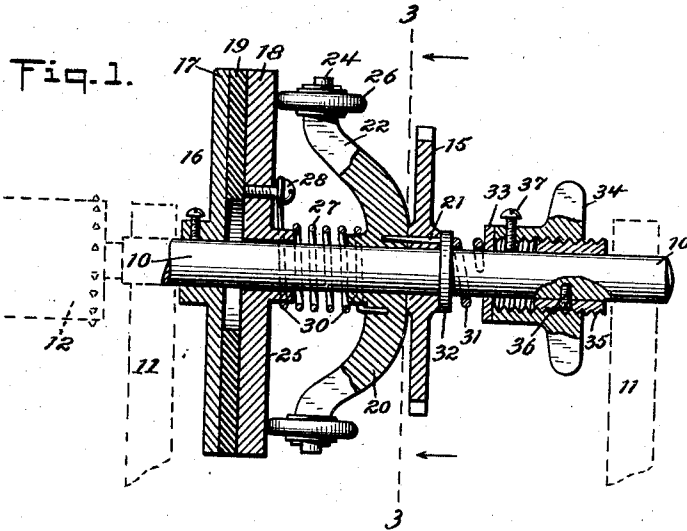
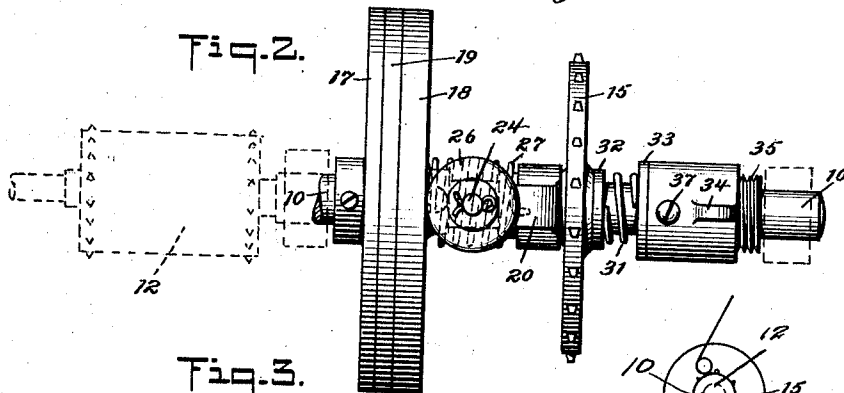
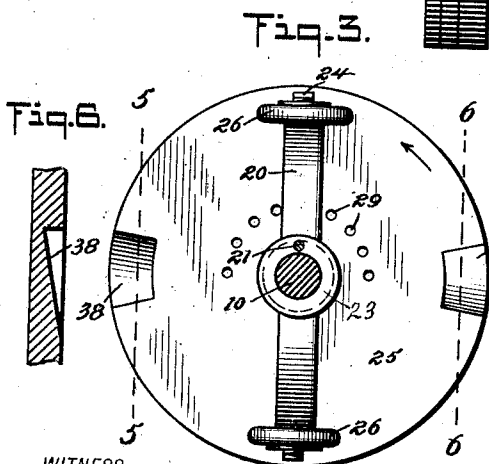
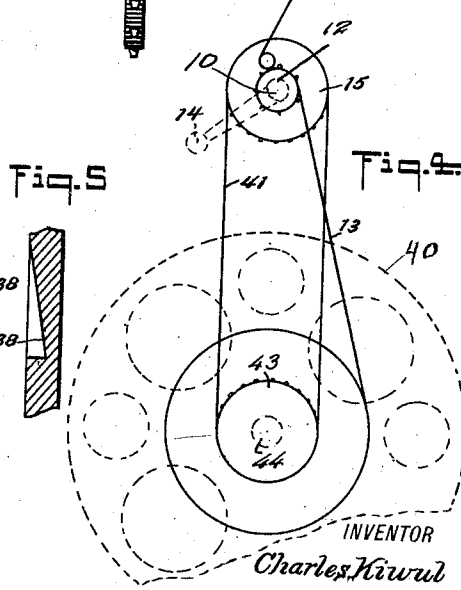


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TENSION DEVICE.
APPLICATION FILED SEPT. 21, 1916.

1,322,119.

Patented Nov. 18, 1919.



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TENSION DEVICE.

1,322,119.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES KIWUL, a subject of the Emperor of Russia, and resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Tension Devices, of which the following is a specification.

My invention relates in general to a flexible driving connection for transmitting power from a driving to a driven member under conditions where the driving force acting on the driving member may vary or where the load on the driven member may vary, and specifically relates to a web feeding or take-up mechanism such as the film sprocket drive, the take-up reel driving mechanism of a kinetoscope or film re-winder.

One of the objects of the invention is to provide a simple form of driving mechanism for driving a reel with a turning moment which remains constant under all conditions of service.

More specifically stated, the invention has for an object the provision of a simple, reliable and efficient form of mechanism for winding a web or film onto a take-up reel under such conditions that the film is given the required tension during the winding operation but released from any undue tension.

It has been usual in devices of this character to compensate for the increase in turning moments caused by the increase in diameter of the coiled film in the case of a winding reel, either by the engagement with the periphery of the rolled coil or by depending upon an abnormal pull upon the film itself for the purpose of intercepting the driving connection. Devices depending on either of these methods are objectionable, for any mechanism which bears on the film is very apt to scratch the same in addition to introducing a tension not necessary to the winding operation, or where the device depends upon the pull on the film, any such pull, even though momentary, introduces the very condition which is desired to be avoided.

Accordingly, another object of the invention is to provide a compensating device peculiarly sensitive to slight variations of load on the take-up reel or other film engaging or drawing member to inaugurate its operation.

Another object of the invention is to provide a simple form of device for permitting of a ready presetting of the initial maximum draft tension on the film and for resetting said maximum tension.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

Figure 1 is a sectional view taken axially through a preferred embodiment of my invention and shown connected to a conventional form of feed sprocket;

Fig. 2 is a plan view of the device shown in Fig. 1;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1, looking in the direction indicated by the arrows;

Fig. 4 is a diagrammatic view in side elevation of take-up reel showing an application of my invention as part of the driving mechanism therefor; and

Figs. 5 and 6 are detailed sectional views taken through the floating disks respectively on the lines 5—5 and 6—6 of Fig. 3.

In the device here illustrated as exemplifying my invention, there is shown a shaft journaled for rotary movement in supports 11, which may constitute part of a motion picture machine. The shaft is shown in operative driving engagement with a feed sprocket 12 in outline and arranged for moving a film 13. This shaft will be identified as a driving shaft in the present description, but it will be obvious as the disclosure progresses that the direction of power transmission may be reversed and this shaft may be a driven element. A driven member 15 in the form of a sprocket wheel is loosely mounted upon the shaft 10. A flexible driving connection is provided between the driven member and the driving shaft, which connection includes a friction clutch 16 formed of a disk 17 fixed to the shaft and a floating disk 18 loose on the shaft with a compressible fabric disk 19 interposed therebetween as is usual with conventional forms of devices of this character. A U-shaped spacing carriage 20 is loosely mounted upon the shaft 10 between the

clutch and driven member and free for both rotary and longitudinal movement thereon. The carriage is fixed to the driven sprocket 15 by means of the pin 21. This spacing carriage includes arms 22 curving outwardly of the shaft diametrically from the hub portion 23 of the carriage and terminating in roller-shafts 24 extending parallel to the adjacent bearing face 25 of the floating disk 18. Rollers 26 are mounted upon the shafts 24 and bear normally on the disk face 25 to maintain the driven member 15 normally at a fixed distance from the clutch.

A flexible drawing member 27 connects the floating disk with the spacing carriage and is shown in the form of a coiled spring guided on the shaft, with one end thereof suitably affixed to the carriage and the other end fixed to the disk 18 eccentrically thereof by means of a set pin 28. This pin may be set in fixed position, but to illustrate a feature of adjustment, the pin is shown engaging in one of a plurality of pin sockets 29 in the bearing face 25. The hub portion of the carriage and the hub portion of the floating disk may be provided with integral bearing sleeves 30 projecting toward each other and designed to provide long bearings on the shaft and to maintain the spring in spaced relation to the shaft. The pin sockets 29 are spaced apart in an arc concentric with the axis of rotation of the shaft, as shown more particularly in Fig. 3, so that any initial releasing tension may be placed on the spring 27. The carriage is maintained in bearing engagement on the face 25 by means of a coiled spring 31, one end of which bears against a washer 32 in turn bearing on the sprocket 15, and the other end of which spring bears against a washer 33 backed by an adjustable stop fixed to the shaft. This stop is shown to be in the form of a wing nut 34 threaded on a sleeve 35 fixed to the shaft by means of the concealed screw 36. The nut is arranged for movement longitudinally of the shaft to and from the driven sprocket 15, so as to cause the spring 31 to bear on the driven member and spacing carriage with a variable tension. A set screw 37 is passed through the side of the wing nut and is designed to bear on the shaft to lock the wing nut in set position.

The bearing face 25 is provided with a pair of diametrically disposed inclined recesses 38 positioned in the path of the revolving rollers 26, and reversely positioned as shown in Figs. 5 and 6 so that the rollers will simultaneously enter the incline and move toward the deeper end thereof when the driven member is subjected to an abnormal torque.

In the disclosure shown in Fig. 4, the film 13 is shown to be passed about the feed sprocket 12 and fed therefrom onto a take-

up reel 40. In this case the sprocket 15 is connected to actuate the reel by means of an endless belt or chain, 41, passed about the sprocket 43 fixed to the shaft 44 carrying the reel 40.

In operation, and referring particularly to the form of the invention disclosed in Fig. 1, the wing nut is adjusted until the desired pressure on the carriage is provided to give the requisite frictional engagement between the relatively fixed and movable elements of the friction clutch. Assuming that the set pin 28 is in the proper socket to give the requisite draft tension on the film and that the driving shaft 10 is connected with some suitable prime mover, the rotation of this shaft will act through the clutch and tend to rotate the carriage in the direction indicated by the arrow in Fig. 3. At the same time the spring 27 will be placed under a gradually increasing tension. Force is thus transmitted through the tensioned spring and acts on the carriage to cause the same to rotate in the direction of rotation of the driving member. As the disks are in frictional engagement, the torque on the fixed disk is transferred to the floating disk and thus motion is transmitted to the driven member. Should a greater resistance be imposed on the driven member, the effect will be to place the spring under a greater tension and increase its torque. Increase in torque, however, will cause the rollers to approach the inclined recesses and eventually move into these recesses. Should the spring 31 be short and stiff, a small change in the relative angular position of the carriage and clutch after the entry of the rollers 26 into the recesses 38 as compared to that position in which the spring 27 is under no stress, is sufficient to reduce the pressure and consequently the frictional engagement between the clutch elements is reduced almost to zero. Obviously the movement of the rollers into the recesses releases the bearing engagement of the carriage on the floating disk and permits a slippage between the elements of the friction clutch. Any slippage, however, releases the driving engagement, and the spring 27 will tend to turn the floating disk back, so as to decrease the angle of torsion of the spring 27, releasing the abnormal tension on the spring until the frictional engagement of the elements of the clutch is just sufficient to counterbalance the force with which the spring tends to turn the floating disk back. Any increase of torque on the driven member from this point will merely cause the rollers to move deeper into the inclines with a gradual release of the frictional elements of the clutch. Any increase in torque over the counterbalancing torque will merely cause the floating disk to approach a condition in which it rotates freely without transmitting force to the

driven member. As the torque transmitted to the driven sprocket 15 is proportionate to the angle of movement of the carriage, relatively to the floating disk, and the change in this angle necessary to release the pressure on the clutch elements once the rollers are in the recesses is very small, the tension of the spring remains practically constant, as long as the source of power is sufficient to cause the rollers to enter the inclined depressions whatever may be the absolute or relative speed of the driving and driven members.

It is obvious that by means of a device of this character, when applied to the take-up reel of a motion picture machine, any force by means of which the take-up reel will be turned remains constant irrespective of its speed.

By varying the position of the set pin 29, the angle through which the carriage must turn before the rollers move into the depressions can be carried from zero to about 175° and thus the value of the force f can be regulated within definite limits or in case the offset recess construction is used the variation may be increased up to about 355°.

Having described my invention, I claim:

1. In a device of the class described, a driving member, a driven member comprising a driving element and a driven element, mechanism including a coiled spring connecting said elements for permitting the driving member to pull on the driven element with any tension below a preset maximum tension and means including a spacing carriage, a floating disk, anti-friction bearings between the carriage and disk, said means controlled by said maximum tension acting through said spring for releasing the driving connection between said members.

2. In a device of the class described, a driving member, a driven member comprising a driving element and a driven element, mechanism connecting said elements for permitting the driving member to pull on the driven element with any tension below a preset maximum tension, means controlled by said maximum tension acting on said mechanism for varying the driving connection between said members, means for pre-setting said maximum tension, said mechanism including an inclined recess and a roller element adapted to seat therein to constitute a means controlled by increase in said tension for relieving said connecting means.

3. In a device of the class described, a driven member subject to a resistant torque, a power member operatively connected to said driven member to overcome said resistant torque and to impose an actuating torque on said driven member, and mechanism including a pair of elements connected to said member and mounted for relative

rotary movement and means depending on the angle of relative rotation of said elements for maintaining said actuating torque constant.

4. In a device of the class described, a driving member, a driven member, a frictional driving connection between said members, said connection including a spring placed under tension by relative movement between said members and spring controlled means for varying the tension of the spring thereby to vary the torque at which slippage will occur between the elements of the frictional driving connection.

5. In a device of the class described, a driving member, a driven member mounted for relative rotary movement, a frictional driving connection connected to one of said members, means for varying the friction between said members, a resilient connection between the other of said members and said frictional driving connection and means controlled by the relative angular movement of said members for releasing the frictional driving connection.

6. In a device of the class described, a pair of frictional disks, a driven member, a spring constituting a driving connection between the driven member and one of said disks, mechanism connected to the other disk to actuate the same and a carriage provided with two spaced apart bearing wheels in rotary engagement with one of the disks and governed by the tension on said spring for controlling the frictional engagement between the pair of disks.

7. In a device of the class described, a pair of friction disks, a driven member, a spring constituting a driving connection between the driven member and one of said disks, mechanism connected to the other disk to actuate the same, means governed by the tension on said spring for controlling the frictional engagement between the pair of disks, resilient means for varying tension at which said spring will act to affect the frictional engagement of the pair of disks and an adjusting nut bearing on said resilient means and acting as an additional means to control the frictional engagement between the pairs of disks.

8. In a device of the class described, a driven member, a driving member, and a flexible connection therebetween, said connection including a friction clutch with one element thereof connected with one of the members, a spring connecting the other element of the friction clutch with the other member, and means carried by the driving member, acting in line with the spring and coacting with the spring to maintain the clutch elements in operative driving position.

9. In a device of the class described, a driven member, a driving member, and a

flexible connection therebetween, said connection including a friction clutch with one element thereof connected with one of the members, a spring connecting the other element of the friction clutch with the other member, means coacting with the spring to maintain the clutch elements in operative driving position, and means including a carriage normally bearing on said other clutch element, freely rotatable relative and controlled by the tension on the spring for releasing the elements from their operative driving position.

10. In a device of the class described, a driving member, a driven member, and a flexible connection therebetween, said connection including a friction clutch, one element of said friction clutch provided with a recess, a carriage bearing on said element of the clutch normally to maintain the clutch elements in operative driving position, a resilient connection between said carriage and the clutch element engaged thereby, and means coacting with said recess and controlled by the tension imposed on the resilient connection for releasing the bearing engagement of the carriage on the clutch element, thereby permitting relative slip between the clutch elements.

11. In a device of the class described, a shaft, a friction clutch mounted on the shaft with one element of the clutch in driven engagement therewith, a driven member loose on the shaft, a spring guided on the shaft and connecting said driven member with the other clutch element to be rotated thereby, means controlled by the relative angular movement of said clutch and member for releasing tension on said spring, and means for shifting the position of the driven member relative to the clutch.

12. In a device of the class described, a shaft, a friction clutch mounted on the shaft with one element of the clutch in

driven engagement therewith, a driven member loose on the shaft, a spring guided on the shaft and connecting said driven member with the other clutch element to rotate the same, means for shifting the position of the driven member relative to the clutch, and means for locking the last named means in shifted position.

13. In a device of the class described, a shaft, a friction clutch mounted on the shaft with one element thereof fixed to the shaft, a driven member loose on the shaft, the friction element of the clutch facing the driven member and provided with an inclined recess, a spacing member fixed to the driven member and provided with means normally bearing on said facing element revoluble thereon and designed to move into said recess to release the bearing engagement of the spacing member on the clutch, and a flexible driving connection between said driven member and said facing element.

14. In a device of the class described, a shaft, a friction clutch mounted on the shaft with one element thereof fixed to the shaft, a driven member loose on the shaft, the friction element of the clutch facing the driven member and provided with an inclined recess, a spacing member fixed to the driven member and provided with means normally bearing on said facing element revoluble thereon and designed to move into said recess to release the bearing engagement of the spacing member on the clutch, a flexible driving connection between said driven member and said facing element, and means for regulating the normal bearing engagement of the spacing member on said facing clutch element.

Signed at New York city, in the county of New York, and State of New York, this 29th day of August, A. D. 1916.

CHARLES KIWUL.