

May 15, 1934.

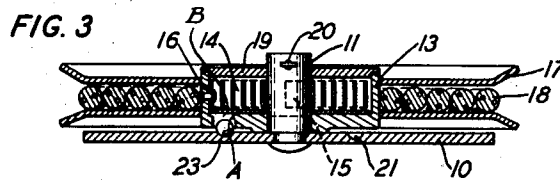
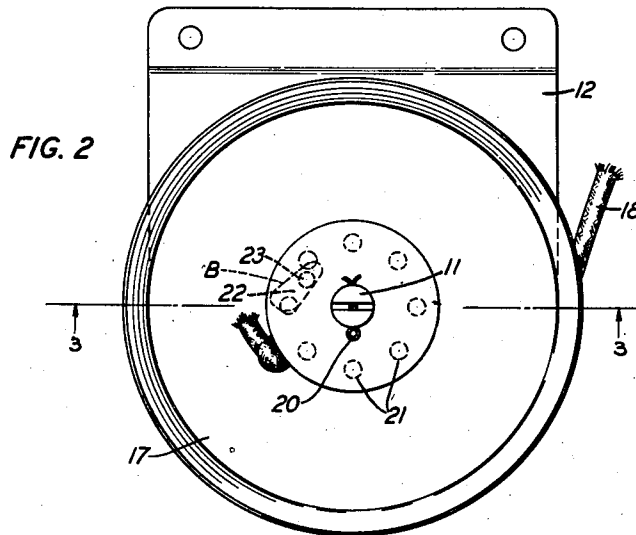
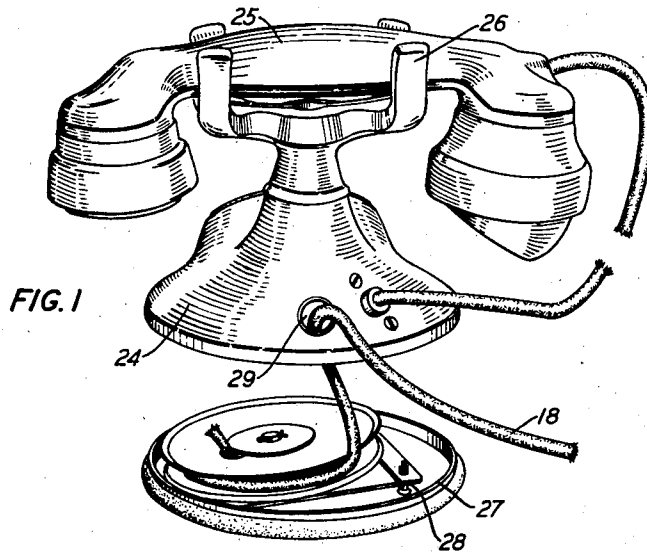
H. K. KRANTZ

1,958,626

REELING DEVICE

Filed April 10, 1931

2 Sheets-Sheet 1



INVENTOR
H. K. KRANTZ
BY
Walter C. Kiesel
ATTORNEY

May 15, 1934.

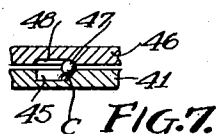
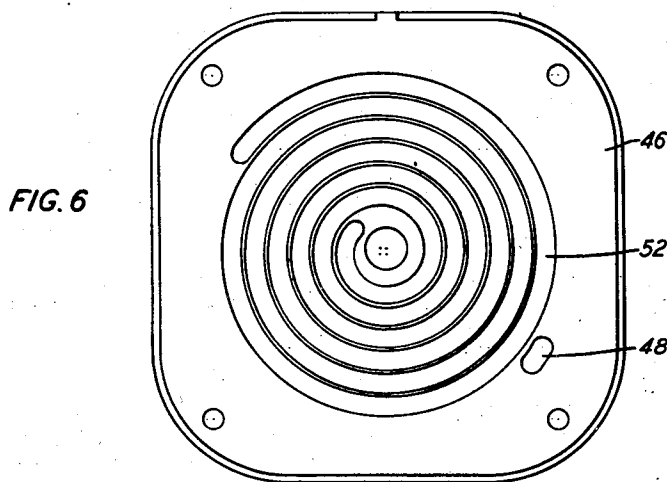
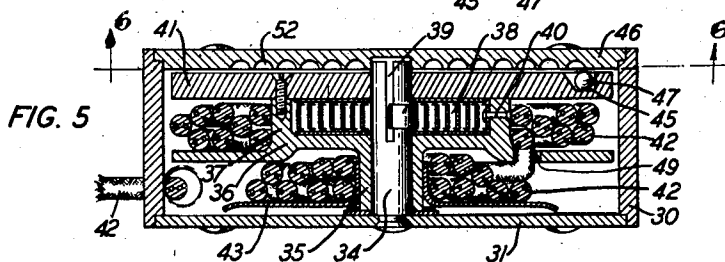
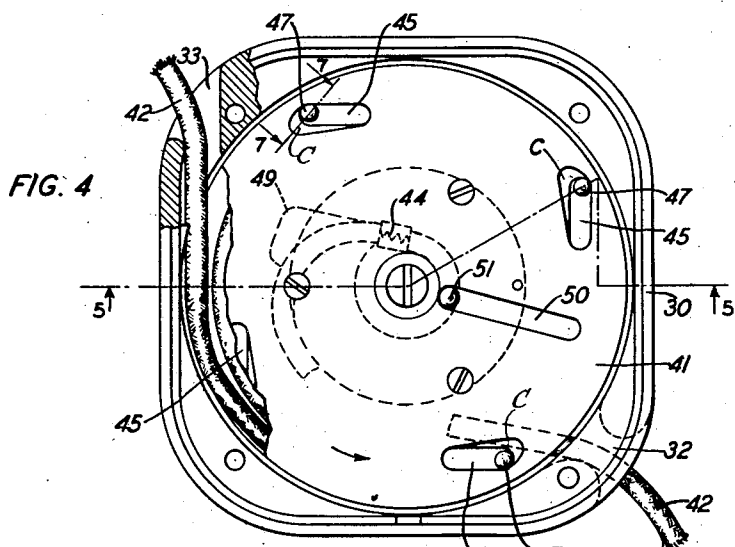
H. K. KRANTZ

1,958,626

REELING DEVICE

Filed April 10, 1931

2 Sheets-Sheet 2



INVENTOR
H. K. KRANTZ
BY
Walter C. Kiesel
ATTORNEY

UNITED STATES PATENT OFFICE

1,958,626

REELING DEVICE

Hubert K. Krantz, Brooklyn, N. Y., assignor to
Bell Telephone Laboratories, Incorporated,
New York, N. Y., a corporation of New York

Application April 10, 1931, Serial No. 529,006

9 Claims. (Cl. 242—107)

This invention relates to reeling devices and more particularly to reels for cords attached to electrical apparatus.

In the usual take-up device, such as a cord reel, heretofore used in connection with electrical apparatus, it has been the practice to employ pawls or similar latching devices to arrest the rotation of the reel in order to relieve the tension on the length of conductor unwound from the reel. These arrangements have certain disadvantages since they are considerably noisy in operation and inefficient due to rust and corrosion affecting the positive action of the moving parts. Furthermore, the maintenance cost is considerably high due to the replacement of parts worn out by friction.

An object of this invention is to overcome these difficulties and produce an efficient take-up device for conductors which will be positive in operation and reduce manufacturing costs.

In accordance with one embodiment of this invention, the reeling device is adapted to be arranged in a horizontal position in the base of a telephone instrument, such as a handset mounting, and comprises a base plate supporting a rotatable reel on which the conductor is wound. The central part of the reel is formed into a casing enclosing a retractile spring, the casing having an elongated slot or race in its surface adjacent the base plate. A latch ball confined in the slot and freely movable therein engages one of a plurality of indentations or holes arranged in a circle in the area of the slot in the reel. This arrangement provides a positive silent locking means for the reel when it is desired to unwind the cord conductor from the reel and maintain the cord extended for use. The configuration of the slot insures uniform free movement of the reel in either direction of rotation without setting in locking position until the speed of rotation is reduced, whereupon the latch ball engages one of the co-operating indentations in the base plate and the reel is locked in stationary position.

In another embodiment of the invention employing the same principle of operation, the reel is adapted for vertical mounting on the side of a desk or other support and comprises a casing enclosing a reel rotatable on a shaft and a retractile spring confined within the two portions of the reel. One face of the reel is provided with equi-distant confining slots or compartments which contain individual latch balls. These latch balls cooperate with a single groove or indentation in the face plate adjacent the reel to lock the reel in stationary position at equi-distant quarter revolutions of the reel.

A feature of the invention relates to the control of the locking means and the limits of travel of the rotating reel. This arrangement comprises

a radially moving latch ball confined in an elongated slot or race formed on the surface of the cord reel, the ball cooperating with a spiral groove in the face plate adjacent the cord reel, to limit the rotation of the reel and permit the release of the reel from the locking means when the limit of cord is unwound from the reel. This arrangement prevents permanent locking of the reel in its advance position of rotation when the length of conductor is removed from the reel.

These and other features of the invention will be more clearly understood from the following detailed description in connection with the accompanying drawings.

Fig. 1 shows in perspective a hand telephone set mounting with the base plate removed to illustrate the position of the reeling device of the horizontal type made in accordance with this invention and mounted in operative relation in the base of the telephone set mounting.

Fig. 2 is a plan view of the cord reel shown in Fig. 1 illustrating in dotted outline the arrangement of the latch ball race and its association with the circularly distributed indentations in the base plate of the reel.

Fig. 3 is a cross-sectional view of the reeling device shown in Fig. 2 and taken on the line 3—3 thereof, illustrating the reel locked in position by means of the latching ball engaging one of the indentations in the base plate.

Fig. 4 illustrates a cord reeling device of the vertical mounted type made in accordance with this invention with the cover plate removed to clearly show the interior construction in which a plurality of slots are distributed around the face of the reel and the control latch ball located in the radial slot extending from the center of the reel.

Fig. 5 is a cross-sectional view of the reeling device shown in Fig. 4 on the line 5—5 of Fig. 4 and illustrates the compound reel structure for supporting the conductor in the reeling device and the relationship of the spirally grooved cover plate with respect to the cord reel.

Fig. 6 is a plan view of the cover plate of the cord reeling device shown in Fig. 5 taken on the line 6—6 of Fig. 5 and illustrates the spirally grooved central portion of the plate which co-operates with the control latching ball in the radial groove of the reel and the single locking slot outside of the boundary of the spiral groove which cooperates with the latching balls in the slots of the cord reeling device.

Fig. 7 is a fragmentary view in cross-section on an imaginary line 7—7 of Fig. 4 in combination with the plate 46 to illustrate the operation of the latch ball in locking position.

Referring to the drawings, the horizontally mounted type of cord reeling device is shown in

Figs. 1, 2 and 3 and comprises a metallic base plate 10 having a central stub shaft 11 rigidly attached thereto and also provided with an extension 12 for mounting the reel in the base of a handset telephone mounting as shown in Fig. 1. A cup-shaped housing 13 fits loosely over the stub shaft 11 and forms a receptacle for a helical tension spring 14 which is anchored at its inner end as shown at 15 in the stub shaft 11 and at its outer end is attached to the housing 13 as shown at 16. A sheave or reel 17 is rigidly affixed to the housing 13 and serves as the carrier for the wound conductor 18 which is arranged in layers on the sheave 17. A top plate or cover 19 fits over the housing 13 and is rigidly held in position on the shaft 11 by a cotter pin 20. This arrangement forms a compact take-up device or reel composed of a few parts which are easily assembled and is efficient and positive in action in supporting the length of cord conductor which serves as a flexible connection for a telephone set.

In all reeling devices the tension of the spring is relied on to rewind the conductor on the reel after use. In telephone cord reels, when the conductor is unwound from the reel, the tension of the rewinding spring exerts a constant force on the flexible cord and may strain the cord to such an extent as to rupture the conductors held within the cord. In order to overcome this straining of the cord in a telephone cord reel, in accordance with this invention, a silent latching device is incorporated in the reel and efficiently arrests the motion of the reel at different positions of rotation and relieves the tension of the spring on the cord conductors.

In one embodiment of the invention as shown in Figs. 2 and 3, the base plate 10 is provided with a plurality of indentations 21 arranged in a circular boundary around the shaft 11, the circular boundary being of a smaller diameter than the exterior boundary of the housing 13. The face of the housing 13 adjacent the base plate 10 is provided with an elongated slot or race 22 having its outer end adjacent the circular indentations 21 in the base plate 10 and its other end located at a tangent within the boundary of the outer end. The elongated race 22 forms a pocket for a ball latch 23 which rides within the limits of the elongated race while the reel is being rotated. The operation of the silent ball latch mechanism is as follows: The reel 17 is held in stationary position by the latch ball 23 registering in one of the indentations 21 in the base plate 10 and the pressure exerted by the tension spring 14 causing the angular edge A of the race 22 to hold the latch ball positively centered in the indentation 21. When the cord is withdrawn from the reel, the reel rotates in a counter-clockwise direction and the outer vertical edge B performs a "camming" action on the latch ball 23 and easily dislodges it from the indentation 21. The counter-clockwise rotation of the reel causes the latch ball 23 to ride to the inner end of the elongated race 22 where it is in position to freely pass over the adjacent surface of the base plate without locking action. When the required length of conductor is unwound from the reel, the reel is permitted to rotate slowly in a reverse direction whereupon the latch ball rides to a position in the outer end of the elongated race 22 in alignment with the indentations and drops into one of the indentations 21 in the base plate 10. When the latch ball 23 drops into the indentation 21 it acts as a stop between the base plate

and the housing to disconnect the tension force of the rewinding spring 14 so that the strain is relieved from the conductor extending from the reel.

This arrangement forms an efficient and silent latching mechanism which is positive in operation, extremely simple in application and materially prolongs the life of the cord conductor wound on the reel and furthermore eliminates noise which is objectionable in a telephone instrument. As shown in Fig. 1, the telephone set mounting 24 supports a handset 25 on a cradle structure 26 and is provided with the usual removable base 27 in which the cord reel of this invention may be easily mounted in a horizontal position. In arranging the cord reel in the base of the mounting the fastening screws 28 support the extension 12 of the base 10 in a tilting position so that the cord conductor 18 is freely movable through the opening 29 in the mounting 24.

In accordance with another embodiment of the invention, a cord reeling device employing the same principles of operation as disclosed heretofore, is shown in Figs. 4 and 5 which illustrate a cord reeling device which may be mounted either in a vertical position or a horizontal position. For instance, the cord reeling device may be attached to the side of a desk or table, or it may be incorporated in the base of a telephone mounting. As shown in Figs. 4 and 5, the cord reeling device consists of a cup-shaped casing 30 having a base portion 31 and a substantially square-shaped wall portion having rounded corners, preferably cast in one piece, and provided with a cord outlet opening 32 in the lower right-hand corner and a similar opening 33 in the upper left-hand corner. The cast wall forms a cylindrical cavity within the casing. Located within this cavity is a central rigid shaft 34 attached to the base plate 31. A cylindrical sleeve or bearing 35 surrounds the shaft 34 and is provided with a large diameter circular flange portion 36 from which projects an annular portion 37 to form a housing for a helical spring 38. One end of the spring 38 is held in a slot 39 in the shaft 34 while the other end of the spring is rigidly attached to the inner surface of the annular portion 37 as shown at 40. The outer surface of the annular portion 37 and the extending flange portion of the sleeve 35 together with a top plate 41 form the rotatable reel or sheave on which a flexible conductor cord 42 is wound. In order to provide a continuous conductor wound on the cord reel so as to eliminate wiping contacts, the cord is arranged on a multiple reel in which one section of the conductor is wound on the reel proper as formed by the flange portion 36 and the top plate 41, while the other section is wound on an auxiliary sheave 43 which is attached to the sleeve member 35 and arranged in the casing below the flange member 36. In this arrangement the section of cord on the sheave 43 is spirally movable when the main reel is rotated and extends through the opening 33 in the upper left-hand corner of the casing as shown in Fig. 4, while the section of cord wound on the main reel is freely movable through the opening 32 in the lower right-hand corner of the casing as shown in Fig. 4. The center portion of the cord is anchored to the flange portion 36 by a clip 44 shown in dotted outline in Fig. 4, the lower section of cord extending through an opening 49 in the flange portion 36.

In order to stop the rotation of the reel in

various positions of rotation, the top plate 41 is provided with a plurality of equi-distantly spaced elongated raceways or slots 45 formed in the plate 41 adjacent a cover member 46. These raceways or slots are of uniform depth with the edges along the length of the slots perpendicular and one end of the slots having an outwardly sloping wall C. A latch ball 47 is located in each of the slots 45. The equi-distant raceways on the top plate 41 cooperate with a single indentation 48 in the cover member 46 shown in Fig. 6.

When the cord 42 is withdrawn from the reeling device through the opening 32, the sheave rotates in a counter-clockwise direction as shown in Fig. 4, and the latch balls 47 in each of the raceways 45 are located in the innermost end of the raceways and therefore they do not exert any locking action on the rotation of the sheave. When the desired length of conductor is removed from the sheave the reel is permitted to rotate in a clockwise direction and the latch balls 47 fall toward the sloping wall C of the raceways until one of the raceways comes into alignment with the indentation 48 in the cover member 46 whereupon the rotation of the reel is stopped and the reel is locked in position without the tension of the spring 38 exerting a strain on the cord 42. The latch ball 47 is held in the indentation 48 by the downward pressure exerted by the sloping wall C of the raceway 45. To release the latching mechanism it is only necessary to exert a slight pulling force on the cord and the outer perpendicular wall of the slot 45 exerts a shearing action on the latch ball 47 held therein which causes the latch ball to move toward the center of the raceway 45 and therefore disengage the locking mechanism. The tension spring 38 then exerts its controlling action on the winding of the cord on the reel or, if desired, the cord may be further unwound from the reel by drawing the cord from the reel to any desired length. Since the raceways and latch balls are positioned at four equi-distant locations on the face of the sheave, it is possible to arrest the rotation of the reel at each quarter revolution.

This arrangement provides a reeling device in which multiple latching mechanisms stop the rotation of the sheave in either direction of rotation to relieve the strain of the tension spring on the cord extended from the reeling device. By providing a plurality of latching mechanisms the reeling device may be adapted for vertical or horizontal mounting without detracting from the efficiency of operation in either position. Furthermore, the configuration of the raceways insures a positive and silent operation of the latching mechanism in which the centrifugal force exerted on the latch balls in the raceways maintains the latch balls out of locking position during the winding of the cord on the reel and upon reduction of the speed of rotation the latch ball immediately moves into locking position to hold the rotatable sheave in stationary position at various degrees of revolution.

In the usual take-up devices heretofore used the tension spring operating the sheave or reel controlled the limits of the length of cord and placed a continual strain on the length of cord unwound from the reel. Another difficulty with prior devices occurs when the complete cord is unwound from the reel and a clutch mechanism or latch-stop arrests the motion of the reel at the extreme limit of rotation. In this case it is impossible to release the clutch mechanism by pulling on the

cord and therefore the device must be taken apart to release the clutch mechanism.

In accordance with this invention these difficulties are overcome by providing auxiliary controlling means to limit the rotation of the sheave or reel to a definite number of turns so that the extreme limit of rotation will not be reached. Therefore, there will be sufficient leeway to pull the cord to release the latching mechanism and at the other limit there will always be a definite length of cord extending from the reeling device when the length of cord conductor is fully wound thereon. This arrangement is of particular interest in connection with a telephone instrument attached to a conductor cord so that a short length of cord between the reeling device and the telephone instrument is not subject to strains. The auxiliary control for limiting the rotation of the sheave to a definite number of revolutions, in accordance with this invention, consists in providing a radial elongated slot or groove 50 in the top plate 41 which forms a raceway for a latch ball 51 and cooperates with a spiral groove 52, shown clearly in Fig. 6, in the cover member 46. The operation of the limit control is as follows: When the cord 42 is completely wound on the sheave, the latch ball 51 is located at the outer end of the raceway 50 and is therefore in engagement with the outermost end of the spiral groove 52 in the cover member 46. In this position there will be a definite length of cord extending from the reel which will not be subject to any strain exerted by the tension spring 38. As the reel is rotated to unwind the cord 42 from the sheave, the latch ball 51 travels radially inward in the raceway 50 and also spirally inward in the spiral groove 52 in the plate member 46. Upon further rotation of the reel, the latch ball 51 ultimately reaches the inner end of the raceway 50 and consequently will be located in the inner boundary of the spiral groove 52. However in this position the reel cannot be locked due to the raceway 50 being in a line intermediate the locking slots 45. When the limit of travel of the cord is reached the reel must rotate in the reverse direction in order that the sheave may be locked in position by one of the latching balls 47 entering the indentation 48 in the cover member 46. The sheave may then be rotated sufficiently to release the latch ball 47 to return the cord to the sheave. Due to the auxiliary control mechanism, the rotations of the sheave is confined to definite limits so that the latching mechanism may be easily disengaged when it is desired to rewind the cord on the sheave. This arrangement also provides a definite length of cord extending from the reeling device when the complete number of turns have been wound on the sheave. It will, therefore, be seen that the rotatable sheave will not be locked in permanent position since the auxiliary control mechanism insures a definite clearance to release the latching mechanism when the cord is completely unwound from the sheave. The latch ball 51 riding in the radial groove and the spiral groove is also silent in operation and insures continued operation with a minimum of wear so that the maintenance cost will be considerably reduced.

While the invention has been disclosed in a particular assembly of elements, it is apparent that various modifications may be made, or the invention applied to other assembled structures, without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A reeling device comprising a rotatable sheave, a plate member adjacent said sheave having an indented portion, a retractile spring for
5 said sheave, means loosely positioned in said sheave adapted to engage said indented portion upon a cessation of rotation of said sheave for locking the sheave against rotation, and radially
10 moving means controlling the number of rotations of said sheave, said radially moving means advancing during the rotation of said sheave.

2. A reeling device comprising a rotatable sheave, a plate member adjacent said sheave having an indentation therein, said sheave having
15 an elongated raceway therein, one end of said raceway having a sloping surface and being adapted to be brought into alignment with the indentation in said plate member, the inclination
20 of said sloping surface being with reference to the plane of the bottom of the raceway, and centrifugally controlled means within said raceway adapted to be wedged in the aligned end of said
raceway and indentation when the speed of rotation of said sheave is reduced.

3. A reeling device comprising a rotatable sheave, a plate member adjacent said sheave having an indentation therein, said sheave having
25 an elongated raceway formed therein, one end of said raceway being in alignment with the indentation in said plate member and having an inclined surface and the other end being at an angle with respect to the boundary of said sheave,
30 said inclined surface being oblique to the bottom of said raceway, and a ball latch member confined in said raceway, said ball latch member being adapted to ride in one end of said raceway
35 out of alignment with said indentation upon rapid revolution of said sheave and adapted to travel to the opposite end of said raceway in alignment with said indentation upon a decrease
40 in rotation of said sheave, whereby said ball latch member is wedged in said indentation by the inclined surface of said raceway.

4. A reeling device comprising a rotatable sheave member, a stationary plate member adjacent said sheave member and having an indentation
45 in the surface thereof, said sheave member having a plurality of elongated raceways adjacent the boundary thereof, each of said raceways being symmetrical at its base about its
50 lengthwise dimension and having a defining wall including an offset surface at one end of the raceway inclined relatively to the base of the raceway, and means in each of said raceways adapted
55 to engage the indentation in said plate member and in turn to be engaged by said offset surface of said raceway to arrest the rotation of said sheave at various positions of rotation.

5. A reeling device comprising a rotatable sheave having a plurality of equi-distant elongated
60 raceways formed therein, a plate member adjacent said sheave having a single indentation along a boundary in alignment with the line of travel traversed by said raceways, reciprocating means confined in said raceways adapted to en-
65 gage said indentation in said plate member upon a cessation of rotation of said sheave, and guided means engaging said sheave and plate member and actuated during the rotation of said sheave, to limit the number of revolutions of said sheave.

70 6. A reeling device comprising a rotatable sheave having a plurality of equi-distant elongated raceways formed therein, a plate member

adjacent said sheave having a single indentation along a boundary in alignment with the line of travel traversed by said raceways, reciprocating means confined in said raceways adapted to en-
80 gage said indentation in said plate member, said plate member having a flat spiral groove formed around the center thereof, said sheave member having a radial raceway formed in the surface
85 adjacent said plate member, and a rotatable member between said sheave and plate member adapted to travel a radial course in said raceway and a spiral course in said plate member.

7. A reeling device comprising a rotatable sheave member having a plurality of elongated
90 raceways having a sloping wall in one end positioned at equi-distant positions adjacent the boundary of said sheave, the base of each of said raceways being symmetrical about its long axis and the sloping wall being inclined relative there-
95 to, a plate member adjacent said sheave member having an indentation in the line of travel of said raceways, and individual ball latch members within each of said raceways, said raceways being so
100 designed that centrifugal force exerted on said ball latch members causes them to travel in the outer end of the raceways and upon decrease in speed of revolution of the sheave the ball latch
members are caused to ride toward the sloping wall of the raceways and produce a wedging
105 action in cooperation with the indentation in said plate member to arrest the motion of said sheave.

8. A reeling device comprising a casing having a base portion and a surrounding wall portion,
110 a central shaft rigidly attached to said base portion, a rotatable sleeve on said shaft having a central cup portion and an annular flanged portion, a plate member surrounding said shaft and attached to said cup portion to form a sheave, a retractile spring enclosed in said cup portion, said
115 spring having one end attached to said shaft and the other end attached to said cup portion, a cover member enclosing said sheave within said casing, said plate member having a plurality of equi-distantly spaced raceways and a radial race-
120 way, said cover member having a spiral groove arranged in the surface adjacent said plate member and a single indentation on the boundary of said groove, and ball latch members within said
125 raceways between said cover member and plate member, one of said ball latch members being adapted to cooperate with said radial raceway and spiral groove and the other ball latch members being adapted to cooperate with said single
indentation in said cover member.

9. A reeling device comprising a rotatable
130 sheave, a stationary plate member adjacent said sheave having an indented portion, a second plate member attached to said sheave and adjacent said stationary plate member, said second plate
135 member having an elongated slot therein arranged so that one end of its defining wall is in alignment with said indentation, and a ball latch in said slot, a portion of the slot defining wall extending perpendicular to the surface of the second
140 plate member and the remaining portion sloping at an angle to said surface, said slot wall in alignment with said indentation being sloped to exert a pressure force on said ball latch in said indentation when the ball latch is projected
145 toward the sloped wall upon a cessation of rotation of said sheave.

HUBERT K. KRANTZ.