

May 15, 1956

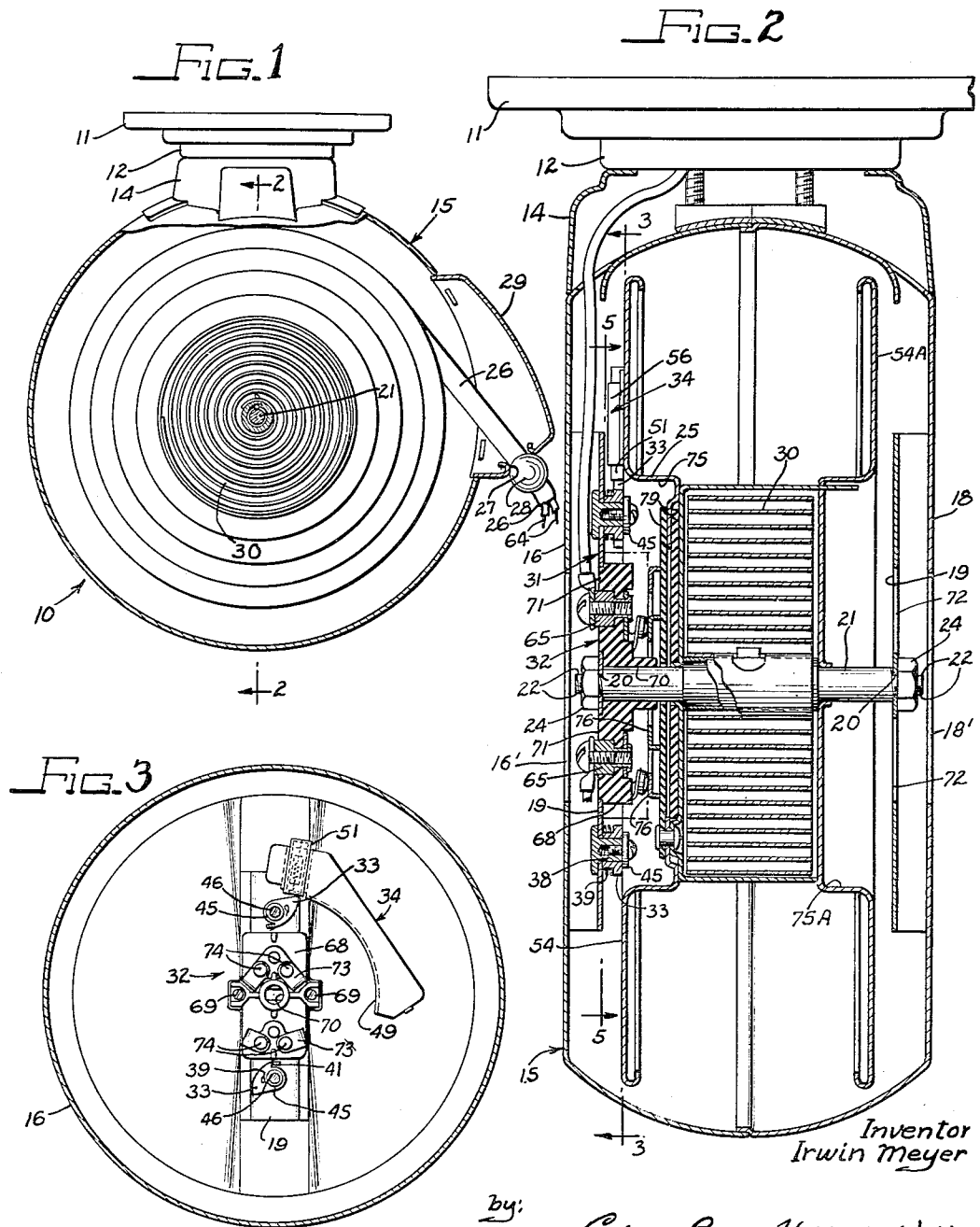
I. MEYER

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TAKE-UP REEL WITH RELEASABLE LOCKING DEVICE

Filed June 3, 1950

2 Sheets-Sheet 1



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FIG. 5

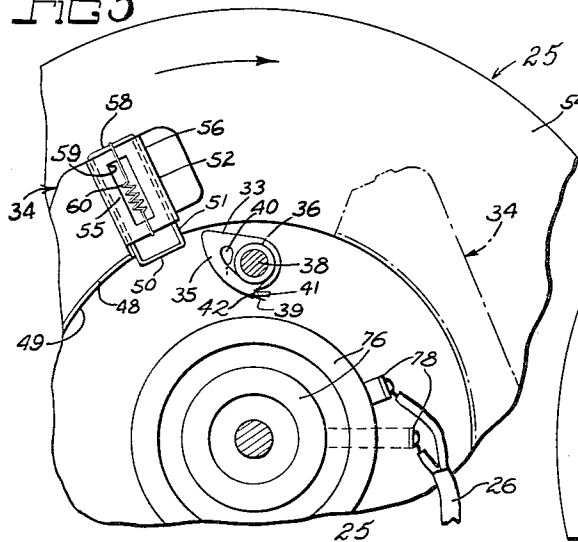


FIG. 6

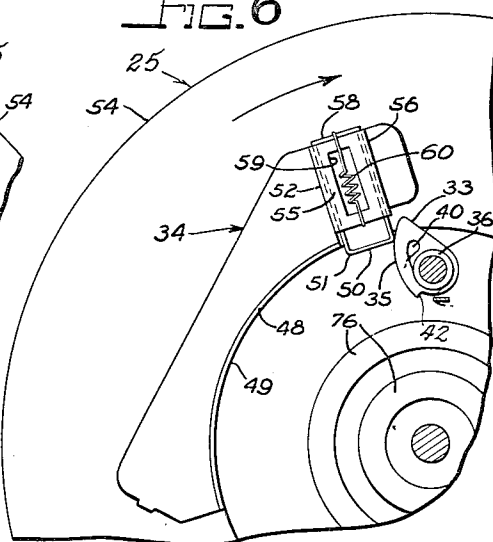


FIG. 7

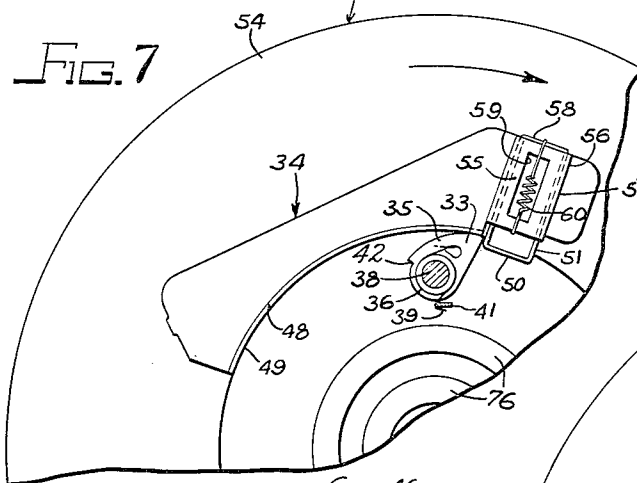


FIG. 9

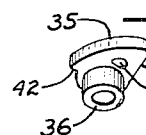


FIG. 8

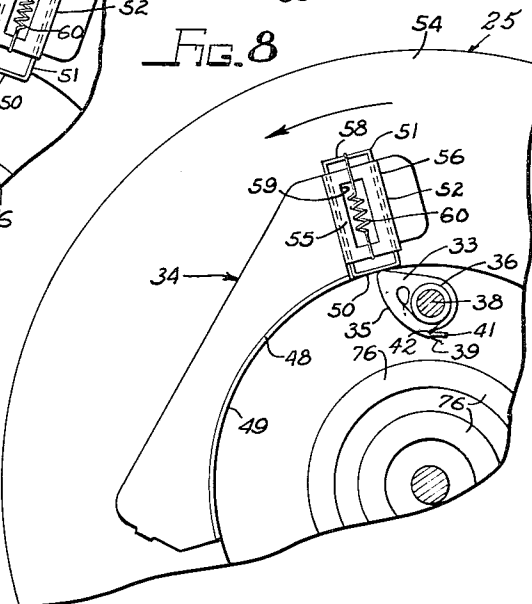
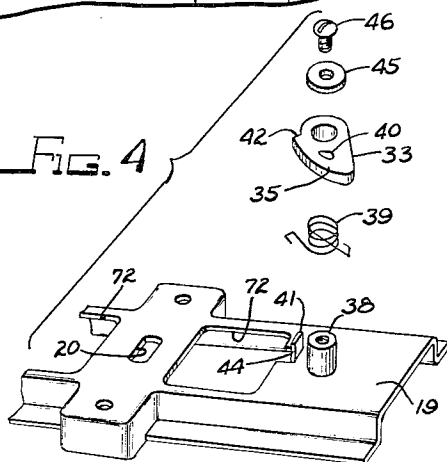


FIG. 4



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TAKE-UP REEL WITH RELEASABLE LOCKING DEVICE

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8 Claims. (Cl. 191—12.2)

The present invention pertains generally to take-up reels for electric cord, flexible hose and the like, but more specifically to a reel assembly of the foregoing type having a novel releasable locking device.

In take-up reel assemblies such as the one described herein, releasable locking devices are used to effect automatic locking of the reel against rewinding when a desired length of cord or hose has been run out. Such locking devices are releasable in response to a short pull on the unwound cord or hose and thereupon permit the entire length thereof to be automatically rewound under the action of a suitable loading spring within the reel assembly. Locking devices which produce this action under certain operating conditions have been developed in the past with varying degrees of success. It is with the creation of a novel and improved releasable locking device that the present invention is particularly concerned.

A general object of the invention is to provide a take-up reel assembly of the type set forth and having a novel locking device which will be susceptible of operation regardless of the plane of orientation of the reel, its operation being unaffected by gravity.

Another object is to provide a reel assembly of extremely simple, economical construction and having a releasable locking device compact in form and light in weight, such device being adapted to operate without being adversely affected by centrifugal forces.

A further object is to provide a take-up reel assembly of the character set forth and which will have a novel correlation between the construction of the locking mechanism, the sheave and its support, and an electrical contact arrangement.

Still another object is to provide a releasable locking device of the above type which will be foolproof in operation and susceptible of protective enclosure within the reel housing.

Other objects and advantages will become apparent as the description herein proceeds, taken in the light of the accompanying drawings wherein:

Figure 1 is a fragmentary vertical sectional view taken in the transverse medial plane of an illustrative reel assembly embodying the present invention.

Fig. 2 is an enlarged fragmentary axial sectional view taken through the reel assembly of Fig. 1 and in the plane of the line 2—2.

Fig. 3 is a transverse sectional view through the illustrative reel assembly of Fig. 1 but taken in the transverse plane corresponding to the line 3—3 in Fig. 2.

Fig. 4 is an exploded perspective view detailing a dog and its mounting means used in the locking mechanism of the present invention.

Figs. 5, 6 and 7 are sequential stop-motion views of certain major elements of the novel locking device mechanism in the illustrative reel assembly of Fig. 1, such views being taken in fragmentary transverse sectional form and in the plane of the line 5—5 in Fig. 2.

Fig. 8 is a view similar to Figs. 5 to 7, inclusive, but

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indicating the performance of the locking mechanism upon reverse rotation or rewinding of the reel sheave.

Fig. 9 is a perspective view showing further details of a locking dog, per se.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment has been shown in the drawings and will be described below in considerable detail. It should be understood, however, that there is no intention to limit the invention to the specific form disclosed, but on the contrary, the intention is to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more specifically to the drawing, the invention is there shown embodied in an illustrative take-up reel assembly 10 which in the present instance happens to be attached to a swivel mounting comprising a supporting flange 11 and a swivel plate 12. The reel assembly 10 is fixed to the swivel plate 12 as by means of a transition neck 14 which, in turn, is secured in any appropriate manner to a housing 15 which protectively encloses the reel assembly. Preferably, the housing 15 is defined by means of a pair of opposed, dished sheet metal shells 16, 18 having their contacting peripheral portions mechanically engaged in any suitable manner. Each shell 16, 18 of the housing has rigidly fixed to the inside face thereof, as by spot welding, an elongated bracket 19 which in the present instance happens to have the shape of a channel with outturned side flanges (see Figs. 2 and 4). Centrally located in each of the brackets 19 is an oblong aperture 20 which is adapted to receive an end of the sheave supporting shaft 21 and to restrain the same against rotation. In the present device, the extremities of the shaft are each fashioned with a pair of diametrically opposed flats 22 which are snugly engaged by the edges of the aperture 20. Each end of the shaft 21 projects through its corresponding bracket 19 and threadedly receives a fastening nut 24, the latter being conveniently applied and removed by access through central openings 16', 18' in the respective shells 16, 18. The fastening nuts 24, together with the shaft 21, serve to maintain the housing shells 16, 18 in fixed relation with each other. Journaled on the supporting shaft 21, but restrained against appreciable axial movement therealong, is a sheave 25 adapted to receive a length of cord or hose and to store the same in convolutions thereon. In the present instance, the sheave is provided with a length of two-conductor electric cord 26 having a free end which extends from the sheave tangentially, passing out via an enlarged circumferential aperture in the housing 15 and thence through opening 27 of a rewinding abutment 29 which overlies the aperture in the housing. The opening 27 is of suitable size to permit free passage of the cord 26 therethrough but small enough to intercept resilient stop 28 attached to the free end of the cord 26. The edges of the opening 27 are preferably curled to prevent chafing of the cord. The sheave 25 is biased toward its rewound position as by means of a relatively heavy spirally wound clock spring 30 fixedly connected thereto at one end and having its other end connected to the shaft 21 as by means of an overrunning clutch connection (not shown). The purpose of such clutch connection is to preclude breakage of the spring 30 in the event of overrunning of the sheave 25 due to inertia upon rewinding. Operatively associated with the sheave 25 and the housing 15 is a releasable locking mechanism 31 which enables a predetermined length of cord to be unwound and the sheave subsequently locked in such position, the mechanism 31 also permitting the automatic rewinding of sheave 25 under the action of the spring 30 after a short unwinding movement of the cord 26. Also associated with the sheave 25 and the housing 15 of the

illustrative reel assembly is a sliding contact assembly 32 adapted to supply power from fixed terminals in the housing to the cord 26 on the sheave.

Turning now to the locking mechanism 31 per se, it will be perceived that the same comprises in general one or more dog members 33 and one or more coacting abutment members 34. For purposes of description herein, a single dog member and its coacting abutment member will be dealt with, it being understood that a plurality of such members may be used if desired. The members 33, 34 are mounted for bodily rotation relative to one another, one of them being mounted upon a first support and the other upon a second support disposed for rotation relative to the first support. In the present instance, the dog member 33 comprises a substantially cam-shaped dog 35 having a hollow stem 36 which is adapted to telescope over an upstanding boss 38 fixed in perpendicular relation adjacent the end portion of one of the brackets 19 and projecting toward the sheave 25. Disposed in surrounding relation with the stem 36 of the dog is a biasing spring 39 which happens to be of helical shape. One end of the spring 39 engages an aperture 40 in the dog 35 while its other end is hooked about a stop element 41 defined in the present instance by a tongue upstruck from the plane of the bracket 19. The spring 39 is adapted to bias the dog 35 in a counterclockwise direction as viewed in Figs. 5 to 8, inclusive, normally tending to maintain the dog in the position of Fig. 5 wherein a generally radial step or shoulder 42 in the periphery of the dog 35 abuttingly engages edge 44 of the stop 41. The dog 35 is maintained in pivoted relation with the boss 38 as by means of an overlying washer 45 secured by screw 46 which is threaded into the boss.

The member 34 comprises a rigid abutment 48 in the form of an upturned skirt defining an arcuate cam surface 49. The abutment member 34 in the illustrative reel 10 is mounted upon one of the flanges of the sheave 25 for bodily rotation therewith and is so positioned that the radial distance between the pivotal axis of the dog 35 and the circle of rotation of the arcuate cam surface 49 will be substantially shorter than the greatest radial dimension of the dog 35. Adjacent one end of the upstanding skirt 48 and in close proximity to the end of the cam surface 49 is a yieldable abutment 50 which in the present instance happens to be a spring loaded plunger 51. As indicated in the drawing, the plunger 51 is slidably housed within a generally rectangular guideway 52 defined between the underlying flange 54 of the reel sheave and an offset 55 in the abutment member 34. The plunger 51 is thereby disposed for sliding movement in a direction generally radially of the sheave 25. While the plunger 51 may be fabricated in a variety of different ways, it has been found highly satisfactory to fashion the same as a relatively light rectangular sheet metal stamping having an upturned peripheral skirt 56 running about its entire perimeter. At its radially outward end, the skirt 56 extends upwardly to define a stop lug 58 which intercepts the offset 55 of the abutment member and thereby defines the extreme radial inward position of the plunger. Attached to the stop lug 58 and housed within slot 59 in the offset 55 is a tensile spring 60 having its other end connected to the end of the offset remote from the stop lug 58. Accordingly, the spring 60 serves to bias the plunger 51 into radially projecting relation with respect to the cam surface 49, the projecting end of the plunger normally defining a circular path located substantially closer to the pivotal axis of the dog 35 than that of the arcuate cam surface 49 when the sheave is rotated.

Upon further reference to Figs. 5 to 8, inclusive, the operation of the locking mechanism 31 will become readily apparent. Assume first that the sheave 25 is in an angular position such as that indicated in solid lines in Fig. 5 where the abutment member 34 is entirely out of engagement with the dog member 32. When the sheave 25 is rotated clockwise to unwind cord therefrom, the

yieldable abutment or plunger 51 will be accosted by the nose of the dog 35. Further clockwise movement of the sheave will thereupon cause the plunger 51 to rock the dog 35 in a clockwise direction against the force of its biasing spring 39, as indicated in Fig. 6. With still further clockwise movement of the sheave 25, the plunger 51 will force the dog 35 into its extreme clockwise position and thereupon cam over the projecting nose of the dog, resulting in the relationship indicated in Fig. 7. With the mechanism in the condition shown in Fig. 7, the sheave 25 is effectively precluded from rewinding because the nose of the dog 35 is wedged tightly against the trailing side of the plunger 51 and the arcuate face 49 of the rigid abutment 48. This locking action obtains because the dog 35 is neatly precluded from swinging through dead center and into its unloaded position. If, under the foregoing conditions, the cord 26 should be displaced through a short linear distance so as to unwind the sheave 25 through an angular distance slightly in excess of the arc subtended by the rigid abutment, the surface 49 will slide out of contact with the nose of the dog 35 and the latter will return to its unloaded or neutral position, indicated in Fig. 5, swinging counterclockwise under the action of the dog biasing spring 39. With the mechanism 31 in this condition, the sheave is free to rewind automatically under the action of its main loading spring 30. Since the dog now occupies its neutral position, and the sheave is moving in a counterclockwise direction, the plunger 51 merely cams radially over the nose of the dog 35 without being halted by the same and the rewinding process is permitted to continue to the end.

Referring next to the sliding contact assembly 32, it will be noted that the same is adapted to connect conductors 64 of the sheave cord 26 with a plurality of terminals 65 fixedly mounted in the housing 15. The terminals 65 are, in turn, connected via suitable jumpers to another sliding contact assembly (not shown) located within the swivel plate 12 and supporting flange 11, such contact assembly being susceptible of connection to an external power supply. To further the compactness of the reel 10, the contact assembly 32 is comfortably nested within the locking mechanism 31 and the sheave 25. Accordingly, the terminals 65 are imbedded in a terminal block 68 of suitable insulating material. The latter in the present instance is of generally rectangular shape and is secured on the bracket 19 adjacent the locking mechanism, such bracket being attached to the housing shell 16. The block 68 is fixed in place on the bracket 19 as by means of a pair of screws 69 which engage corresponding lateral enlargements on the block 68 and the bracket. The block 68 is formed with a central aperture 70 for telescopically receiving that portion of the sheave supporting shaft 21 adjacent the bracket 19. The block is also fashioned with a pair of relatively short rectangular bosses 71 disposed in surrounding relation with the terminals 65 and adapted to project through corresponding openings 72 in the bracket. This construction enables the bracket 19 to define a wireway for the jumpers leading from the terminals 65 to the contact assembly in the swivel mounting mechanism. Rigidly fixed to the terminal block 68 and possessing both mechanical and electrical continuity with the terminals 65 are a corresponding number of resilient contact members 73. While the latter may be fashioned in various ways, it has been found satisfactory to make them of resilient material such as Phosphor bronze and to construct each of them as a plate with reversely bent prongs terminating in contact buttons 74 of silver or the like. Nested within a circular recess 75 formed in the outer face of flange 54 of the reel sheave and operatively associated with respective ones of the contact members 73 are a plurality of slip rings 76, the contact buttons 74 of each contact member bearing against a corresponding one of the slip rings 76. The latter have extensions 78 integral therewith and

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sandwiched between a pair of closely spaced insulating panels 79 fixed to the sheave flange 54. The terminal end of each of the conductors 64 of cord 26 is connected to a respective one of the extensions 78 in any suitable manner (refer to Fig. 5).

To adapt the reel assembly 10 for operation with cord having four or more conductors, for example, it is preferable to incorporate into the reel structure another sliding contact assembly such as the assembly 32 but on the opposite side of the sheave. While such duplication is not directly claimed and is not illustrated in the drawing, it will be apparent that with the locking mechanism and contact structure both compactly supported on a single bracket at one side of the sheave, a second contact structure may advantageously be located on the opposite side of the sheave. This may readily be done since the other sheave flange 54A is fashioned with a circular recess 75A similar to the recess 75 and is thereby able to accommodate the contact assembly effectively. Since the opposite housing shell 18 is provided with a bracket 19 of identical construction to the one just described, a ready mounting means is provided on the opposite side of the reel for another terminal block such as the block 68. The foregoing arrangement is also advantageous in instances where the cord 26 has only one or two conductors, since it permits optional mounting of the sliding contact assembly 32 on the opposite side of the sheave from the locking mechanism 31.

While the illustrative reel 10 has been shown as adapted for use with an electrical cord 26, it might be observed here that the reel assembly and particularly the locking device 31 are equally susceptible of use with flexible hose or conduit. In such event, the slip ring assembly 32 is replaced by an appropriate swivel type hose or conduit connection. The recessed construction of the sheave flanges is advantageous in an installation of this kind since it permits the use of a compact swivel connection.

I claim as my invention:

1. A take-up reel assembly comprising, in combination, a housing, a spring loaded sheave journaled in said housing, said sheave and said housing respectively defining a first support and a second support rotatable relative thereto, means defining a generally arcuate cam surface on one of said supports, a dog pivotally mounted upon the other of said supports, a dog stop and means for yieldably biasing said dog against the stop, said dog having a longer extreme radial dimension than the distance between the cam surface and the pivotal axis of said dog when said sheave is in a particular operative position relative to said housing, and a yieldable abutment mounted on said one of said supports, said abutment being normally disposed for interception of said dog upon relative rotation between said sheave and said housing to thereby momentarily deflect the dog against its biasing means so that the dog snaps into wedging engagement with said cam surface and abutment.

2. A take-up reel assembly for linear materials such as flexible hose and electric cord and comprising the combination of a housing and a spring loaded sheave journaled therein, said housing and said sheave respectively defining a fixed and a movable support, a dog pivoted on one of said supports, means defining an arcuate cam surface on the other of said supports, means for normally biasing said dog about its pivot to a position clear of said cam surface, said sheave having an operative position wherein the cam surface is located closer to the pivotal axis of said dog than the radial distance from such axis to the extremity of said dog, and a yieldable abutment mounted on said other of said supports adjacent one end of the cam surface, said abutment being normally disposed in projecting relation from said cam surface toward the pivotal axis of said dog to thereby momentarily deflect the latter against the biasing means upon relative rotation of the sheave and

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housing so that said dog then snaps into locking engagement against said cam surface and abutment.

3. The combination set forth in claim 2 further characterized in that an electric cord is wound on said sheave, a channel shaped bracket is fixed to the interior of said housing at one side of the sheave to support said dog and stop means, and wherein two cooperating, insulated sliding electrical contacts are mounted respectively on said bracket and said sheave, said bracket thereby supporting both said dog and one of said contacts to form a compact unit and serving as a wireway for electrical conductors leading to said contacts.

4. A locking mechanism for take-up reels of the type adapted to release upon the application of tensile force to the material wound upon the reel, said mechanism comprising the combination of a first support, a second support disposed for rotation relative to said first support, means defining a generally arcuate cam surface fixed to one of said supports, a dog pivotally attached to the other of said supports, a dog stop for limiting pivotal movement of said dog and means for normally biasing the dog against the stop, said dog having a longer extreme radial dimension than the distance between the cam surface and the pivotal axis of the dog when said supports are in a given operative position relative to each other, and a yieldable abutment mounted on said one of said supports, said abutment being normally positioned to intercept said dog and rock it against its biasing means upon relative movement between said supports so that the dog snaps into locking engagement with said abutment and cam surface.

5. A releasable locking device for take-up reels, said device comprising the combination of a fixed support, a rotatable support, a dog pivoted on one of said supports, a dog stop for limiting pivotal movement of said dog and means for normally biasing the dog against the stop, means defining an arcuate cam surface on the other of said supports, the latter having an operative position relative to said one support wherein the cam surface is located closer to the pivotal axis of said dog than the distance from such axis to the radial extremity of said dog, and a yieldable abutment mounted on said other of said supports adjacent one end of the cam surface, said abutment being normally disposed in projecting relation from said cam surface toward the pivotal axis of said dog so that it momentarily deflects the dog against the force of said biasing means upon relative rotation of said supports and the dog then snaps into locking engagement with said cam surface and abutment to prevent relative rotation of said supports in the opposite direction.

6. In a self-rewinding take-up reel having a housing and a sheave rotatably mounted therein, a releasable locking device comprising the combination of a rigid abutment mounted on the rotatable sheave, said rigid abutment having an arcuate surface, a yieldable abutment mounted on the sheave at one end of the rigid abutment and in close proximity thereto, a dog pivotally mounted on said housing, spring means for urging said pivoted dog to a normal limit position, said dog having an extreme radial dimension greater than the distance between its pivotal axis and the circular course defined by the arcuate surface of the rigid abutment as said sheave is rotated, said dog being adapted to cam over said yieldable abutment and into locking engagement between the trailing end of the same and the arcuate face of said rigid abutment upon rotation of the sheave in a direction to compress the dog spring, said yieldable abutment being adapted to cam freely over said dog when the latter is in its normal position upon rotation of the sheave in the opposite direction.

7. In a self-rewinding take-up reel, the combination comprising a housing, a spring loaded sheave rotatably mounted in said housing, a rigid arcuate abutment mounted on the rotatable sheave, a substantially radially

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movable spring loaded plunger mounted on the sheave and defining a yieldable abutment at one end of the rigid abutment, the end of said plunger projecting radially of said arcuate abutment, a dog pivotally fixed to said housing, biasing and stop means normally holding said dog in a limit position, to intercept said rigid abutment upon rotation of said sheave, said dog being adapted to cam over the projecting end of said plunger and into locking engagement between one lateral edge of the same and the arcuate face of said rigid abutment upon rotation of the sheave in a direction to compress the dog loading spring, said yieldable abutment being adapted to yield and cam freely over said dog when the latter is in its limit position upon rotation of the sheave in the opposite direction.

8. A take-up reel assembly of the character set forth having first and second relatively rotatable parts, the combination comprising an arcuate abutment fixed to one of the supports and a yieldable plunger projecting radially inward from the abutment, a cam-shaped locking dog having a first portion of its periphery smoothly curved and terminating in an abrupt, substantially radial shoulder and having another portion of its periphery substantially straight, said dog also having a bore therein terminating in a hollow stem, an upstanding boss projecting from the other of the supports and recessed within said stem for pivotally mounting said dog, a stop abutment upstanding from said other support and adapted to intersect the radial shoulder of said dog as the same pivots upon said boss, and a torsional loading spring

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rotationally biasing said dog so that said shoulder normally engages against said stop abutment, said torsional spring being disposed in concentric relation with said hollow stem of said dog, whereby said plunger may yield and ride over said straight peripheral portion of said dog when the two engage upon relative rotation of said supports in a first direction, and said plunger cams said dog against the force of said loading spring into reverse locking engagement with the plunger and arcuate abutment when the two supports rotate relatively in the opposite direction.

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