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WIRE UNREELING DEVICE

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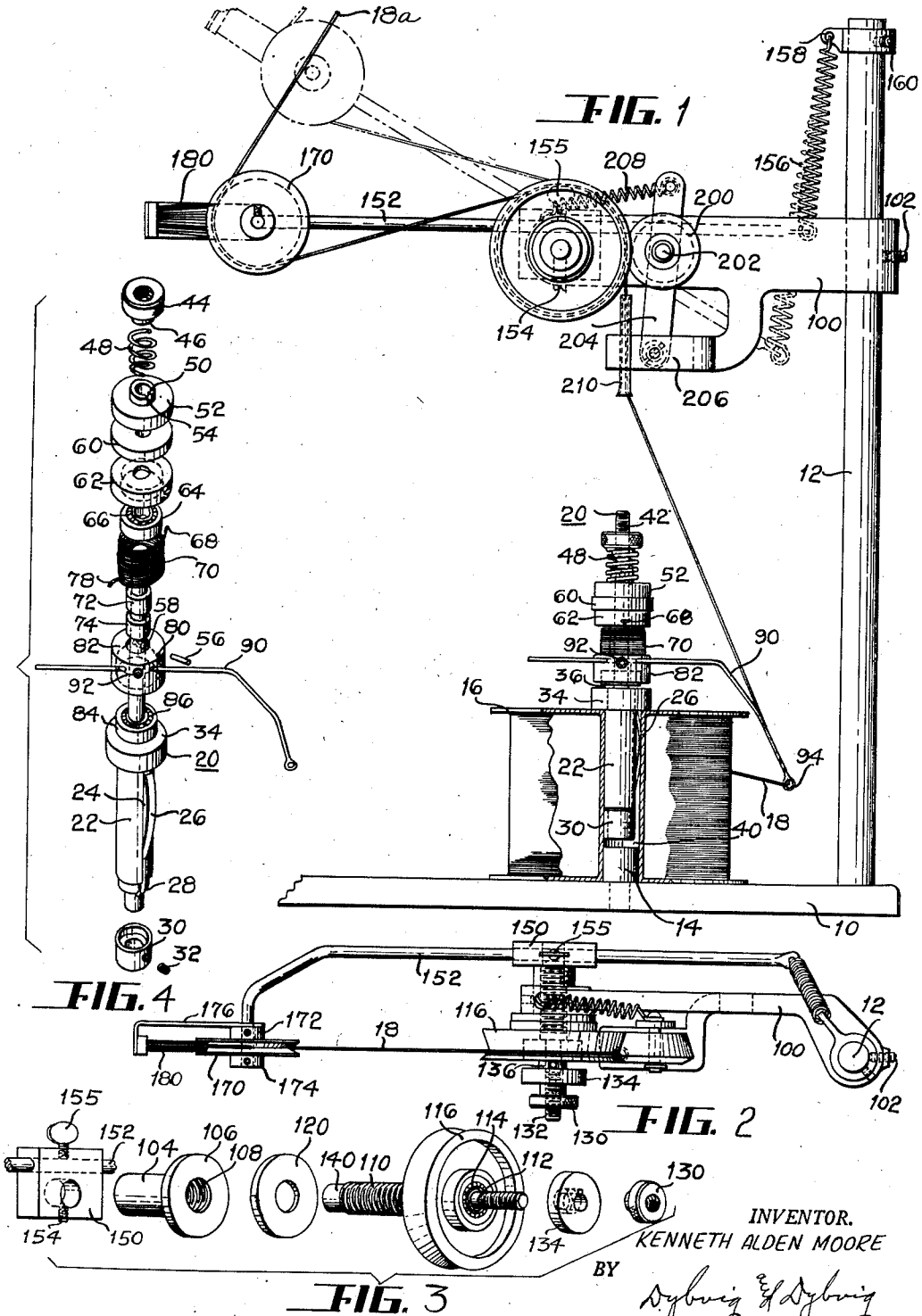

FIG. 1

FIG. 4

FIG. 2

FIG. 3

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WIRE UNREELING DEVICE

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1 Claim. (Cl. 242—128)

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This invention relates to an unreeling device and more particularly to a high speed unreeling device which may be suddenly stopped without any danger of snarling the wire.

An object of this invention is to provide an unreeling device whereby the material to be unwound, such as wire, may be unwound at a very high rate of speed, which device may be suddenly stopped at any time without snarling the wire.

Another object of this invention is to provide an unreeling device including a guide member that rotates so as to feed the wire from the spool, which member winds a spring motor which functions to rewind wire on the spool in the event the withdrawal of wire is suddenly interrupted. Furthermore, upon the gradual withdrawal of the wire, a clutch member continues to rotate after the withdrawal of the wire has been discontinued, to thereby release the tension on the wire so that in the event the withdrawal operation is suddenly resumed, the material to be unwound may be rapidly accelerated without breaking the wire.

Another object of this invention is to provide a tensioning device including a wheel around which the wire is wrapped, which wheel is acted upon by a clutch member, the adjustment of which is adjusted by a tension arm used in releasing the clutch member.

Another object of this invention is to provide a pair of tensioning devices for wire withdrawn from the spool, one of said tensioning devices being controlled by an adjustably mounted spring-urged clutch member, the other tensioning device being controlled by a spring-urged tensioning arm controlling the adjustment of a clutch.

Another object of this invention is to provide a grooved idle wheel upon a tensioning arm provided with a stranded retaining device which permits the insertion of wire into the groove, but prevents the wire from escaping or jumping out of the groove.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

Referring to the drawings,

Figure 1 is a side elevational view of the unreeling device, showing parts of the spool broken away.

Figure 2 is a top plan view of the tensioning device removed from the base and its standard.

Figure 3 is an exploded view of a clutch mechanism and the parts associated therewith.

Figure 4 is an exploded view of the spinner assembly.

In the drawings, the reference character 10 indicates a base supporting a standard 12. The base 10 supports a stub spindle 14 used in supporting a spool 16 of wire 18. A spinner assembly 20 for feeding the wire 18 from the spool will now be described.

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This spinner assembly includes a core member 22 provided with a vertically disposed slot 24 receiving a leaf spring member 26 curved outwardly, as clearly seen in Figures 1 and 3. The lower end of the spring 26 is held in position by a cylindrical capping member 30 provided with a suitable set screw 32. A collar 34, fixedly attached to a reduced spindle portion 36 integral with core member 22 functions as a spring retainer and as a stop for supporting the core member 22 in an aperture 40 in the spool 16. The spring 26 cooperates with the core member 22 to resiliently hold the spinner assembly 20 in position.

The upper end of the reduced spindle 36 is provided with threads 42. A nut 44 provided with an annular flange 46 threadedly engages the threads 42 and is used in compressing a tension spring 48 seated upon a flange 50 integral with a clutch member 52. The clutch member 52 is provided with a slot 54 extending parallel to the reduced spindle portion 36 and receives a pin 56 passing through a suitable aperture 58 in the reduced spindle portion 36. When assembled, the pin 56 is seated in the slot 54, so that member 52 is non-rotatably mounted upon the reduced spindle portion 36, but may be adjusted axially.

A friction clutch member 60 is mounted upon the reduced spindle portion 36 in contact with the clutch member 52. Member 60 may be made from leather, fibrous material or any other suitable material. A floating clutch member 62 is mounted in contact with member 60 and is free to rotate upon the spindle portion. Member 62 is mounted for rotation upon the outer race 64 of a roller bearing assembly 66 mounted upon the spindle 36. The floating member 62 is provided with an annular recess in which the outer race of the bearing assembly 66 is mounted. The floating member 62 is provided with an aperture receiving the upper end 68 of a torsion spring 70, used as a spring motor, mounted upon the cylindrical members 72 and 74. The lower end 78 of the torsion spring 70 is seated in a suitable aperture 80 in a rotatably mounted collar member 82 positioned for rotation upon the outer race 84 of the roller bearings 86 mounted upon the spindle 36. Collar member 82 adjustably supports a wire guide member 90 held in adjusted position by a suitable set screw 92 engaging member 82. The outer end of the wire guide member 90 is provided with an eye 94 through which the wire 18 passes.

It can readily be seen that as the wire 18 is unwound from the spool, this wire will cause guide member 90 to rotate with the collar member 82. As the collar member 82 rotates, it winds the torsion spring 70 until such time that the floating clutch member 62 slips with respect to the clutch member 52. The force required to cause slippage of the floating member 62 and the clutch member 52 is determined by adjustment of the nut 44 and the tension of the spring 48. The operation of the spinner assembly 20 will be more fully described later.

The standard 12 supports a bracket member 100 in adjusted position. The bracket member is held in adjusted position by tightening the set screw 102. The outer end of the bracket 100 has mounted therein a tubular sleeve 104 provided with a clutch flange 106. The sleeve 104 is non-rotatably mounted in the bracket 100. A suitable set screw may be used for holding the sleeve 104 in fixed position with respect to the bracket. The tubular sleeve 104 is provided with internal threads 108 threadedly receiving a spindle 110 having a reduced portion 112 supporting roller bearings 114, the outer race of which is seated in a suitable recess in the grooved clutch pulley 116. The grooved pulley 116 is mounted for rotation upon the roller bearings 114. A friction clutch member 120 is mounted between the grooved pulley 116 and the clutch flange 106. By rotating spindle member 110, the clutch members, including the clutch flange 106, the friction clutch member 120 and the clutch face of the grooved pulley 116, are loosened and tightened by unscrewing or screwing spindle member 110 into the tubular sleeve 104. The effective position at which the clutch members grip may be adjusted by tightening a nut 130 threadedly engaging the outer end 132 of the spindle 110. The nut 130 engages a member 134 provided with a tubular flange portion 136 engaging the inner race of the bearing 114.

The spindle member 110 is provided with a cylindrical end portion 140 projecting beyond the tubular sleeve 104, having adjustably mounted thereon a block 150 having mounted therein a rod 152. The block 150 is held in position upon the reduced end portion 140 by a suitable set screw 154. The rod member 152 may be adjusted axially with respect to the block 150 by loosening the set screw 155, as will appear more fully later. A tension spring 156 biases the rod 152, together with the block 150 and the spindle member 110, in a counterclockwise direction, as viewed in Figure 1. One end of the tension spring 156 is hooked into an eye in the end of the rod 152 and the opposite end attached to a bracket 158 held in adjusted position by a set screw 160 on the upper end of the standard 12.

The end of rod member 152 opposite the spring 156 supports an idler pulley 170, held in position by a pair of collars 172 and 174. A bracket 176 attached to the collar 172 supports strands 180 projecting into the groove in the pulley 170. These strands may be any suitable material, such as nylon, wire, bristles, et cetera.

A resilient friction wheel 200 that is bevelled, so as to be seated in a groove of the pulley 116, is mounted for rotation upon a pintle 202 fixedly mounted in a lever 204 mounted upon an arm 206 integral with the bracket 100. The upper end of the lever 204 is biased in a counterclockwise direction by a suitable tension spring 208, having one end attached to the bracket 100. The wide surface 116a of the pulley 116 forms a

23° angle with respect to the axis of rotation of the pulley 116.

The arm 206 supports a tubular wire guiding member 210, so that as the wire 18 is unwound from the spool 16 and leaves the eye 94 of guide member 90, the wire passes through the tubular wire guiding member 210 so as to be wrapped around the pulley 116 several convolutions, the number depending entirely upon the particular requirements of the assembly. The wire, as it is unwound, gradually slides down into the bottom of the V-shaped groove of the pulley 116, so that the last convolution is located in the deepest portion of the groove. The 23° angle slope to the surface 116a expedites this movement of the convolutions. The wire 18, upon leaving the pulley 116, passes under the pulley 170. The bristles 180 yield when inserting the wire 18 into the groove in the pulley 170.

The nut 130 is preferably so tensioned that when the rod 152 is in the full line horizontal position, as viewed in Figure 1, the clutch members 106, 120, and the clutch face of member 116, hold the parts in a nonrotatable manner, in other words, lock the pulley 116 in position. When there is a demand for wire, the upper end 18a of the wire, as viewed in Figure 1, is pulled and the rod 152 is raised into an inclined position, as illustrated by the dot-dash position, thereby unscrewing the spindle 110 a fraction of a revolution, so as to release the tension upon the clutch members 106, 120 and 116, thereby permitting the pulley 116 to rotate, withdrawing wire from the spool 16. The rod 152 may oscillate slightly, depending upon the rate at which the wire is withdrawn from the spool.

As the wire is withdrawn from the spool, guide member 90 together with the floating member 82 rotates, so as to tension the torsion spring 70, eventually causing the floating clutch member 62 to slip, member 62 continuing to slip while the wire is withdrawn.

In the event the withdrawal of the wire is suddenly stopped, the rod 152 drops into a horizontal position, arresting the rotation of the pulley 116. When this takes place, there may be a tendency, due to the inertia of the wire and the rotating parts, for the wire to continue unreeling. However, due to the action of the clutch members 52, 60 and 62, the rotation of guide member 90 is arrested. When guide member 90 is arrested, the energy stored up in the spring motor 70 rotates the member 90 in a counter direction to the direction of rotation of the wire that is unwound, so as to rewind any slack in the wire.

In the event the withdrawal of the wire is gradually slowed up, so that no wire is unwound in excess of requirement, the energy stored up in the spring 70 will cause member 62 to continue to rotate until the tension in the spring 70 has decreased beyond the force required to cause the clutch members to slip. Due to the release of the tension of the spring 70, either by rewinding wire upon the spool or by slippage of the clutch members, or both, it can readily be seen that the resistance exerted by member 90 is less during the initial withdrawal of the wire than after the wire has been withdrawn for a considerable period of time, so as to tension the spring 70. In other words, the tension exerted by member 90 is not as great during the initial unwinding operation as it is when the wire has been unwound for a period of time. This results in a reduction of the breakage of wire.

With some types of unwinding machines the wire may be unwound by the machine at the rate of 100 miles per hour. It can readily be seen that the forces required to withdraw the wire at such a rapid speed, especially in initiating the withdrawal of the wire, are very great. That being the case, if the tension upon member 90 were not released when the withdrawal operation ceases, there would be a tendency for the wire to break.

The unwinding of the spring motor 70, either by rewinding wire after the withdrawal of the wire has ceased, or by slippage of the clutch members 58, 60 and 62, releases the tension of the wire to permit the initial withdrawal of the wire to be accelerated at a very high rate of speed without danger of breakage.

"Wire," as used herein, is used to designate any suitable material that may be unwound from a spool. For example, the device could be used for unwinding plastic material having the desired characteristics or any other material presenting the same problem or a similar problem to that of metallic wire.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claim.

Having thus described my invention, I claim:

In an unreeling device for unreeling wire from a hollow spool, the combination including a core member non-rotatably mounted in the spool, said core member being provided with a spindle projecting outwardly from one end of the spool, a pair of roller bearings mounted on the spindle, said roller bearings being mounted in spaced relation from each other, one of the roller bearings being mounted in close proximity to the spool, the other roller bearing being further removed from the spool, a wire guide member, means for attaching the wire guide member to the roller bearing nearest to the spool, said wire guide member having an eye in one end thereof mounted for rotation around the spool, a friction clutch member fixedly mounted upon the outer race of the roller bearing furthest removed from the spool, a helical spring surrounding the spindle, said spring having one end attached to the means for attaching the wire guide member to the roller bearing and the other end attached to the clutch member, a second friction and floating clutch member mounted upon the spindle, said second clutch member being mounted for longitudinal movement upon the spindle, means for adjusting the second clutch member longitudinally upon the spindle, said second clutch member cooperating with the first clutch member to provide slippage, the degree of slippage being adjusted by adjusting the second clutch member, the helical spring being wound in response to the wire guide member unwinding the wire from the spool, the second clutch member slipping with respect to the first clutch member upon the spring being wound, the relative movement between the first clutch member and the second clutch member continuing after the wire guide member has stopped so as to partially unwind the spring to absorb slack in the wire to prevent snarling so as to have the wire in readiness for a succeeding unwinding operation.

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