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2,494,003

AUTOMATIC LEVEL HOSE WINDER

Filed Dec. 24, 1948

3 Sheets-Sheet 1

Fig. 1.

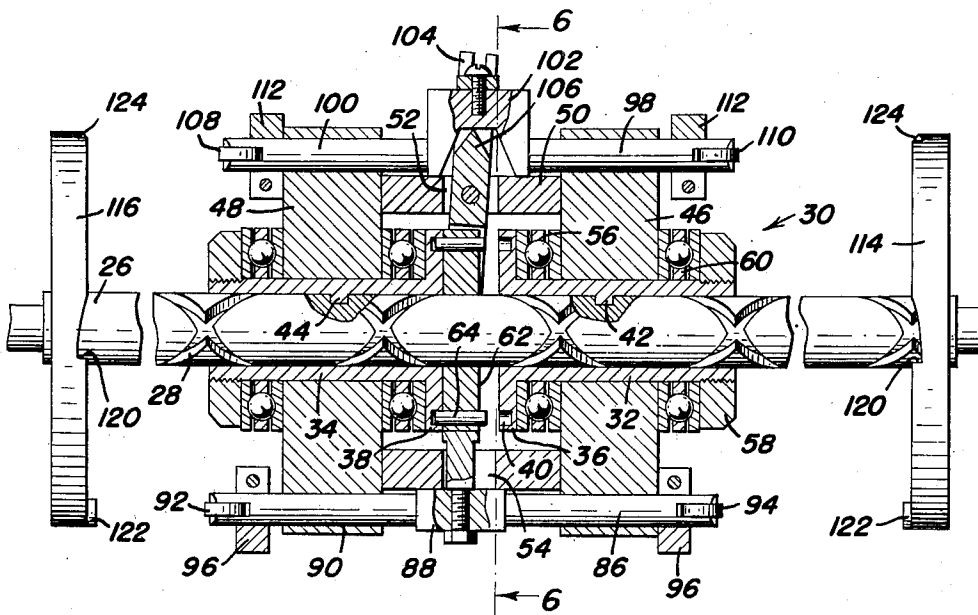
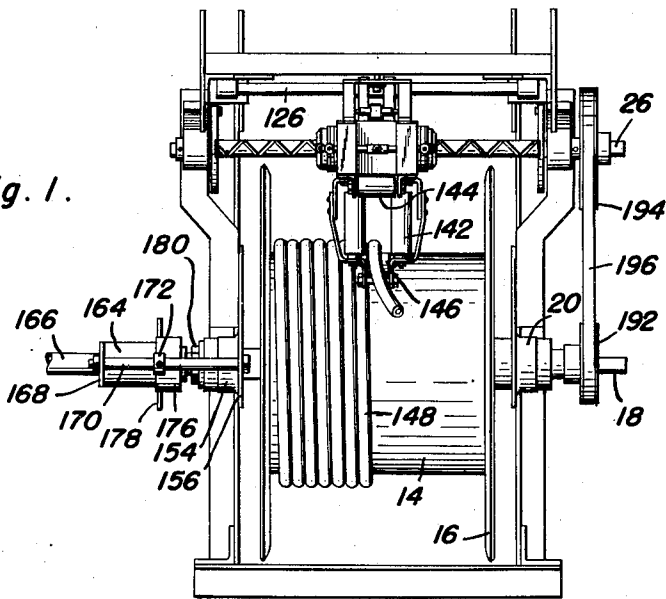


Fig. 5.

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3 Sheets-Sheet 2

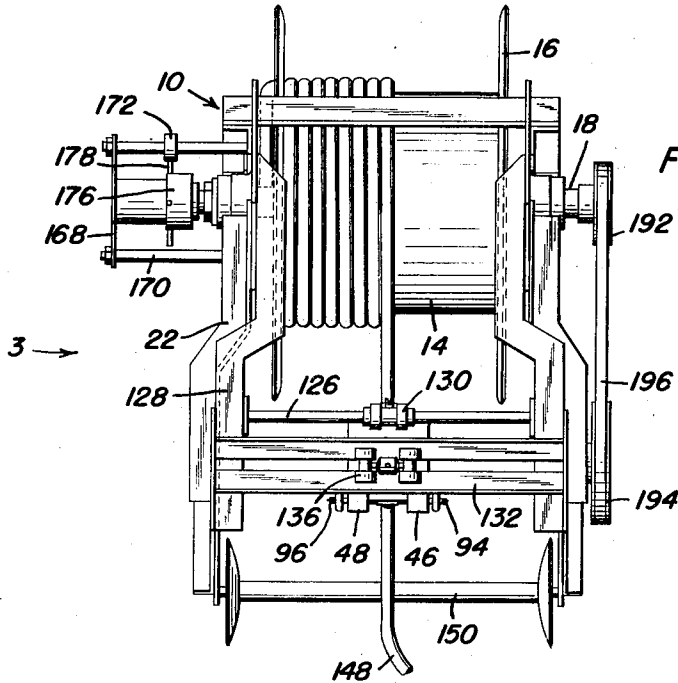
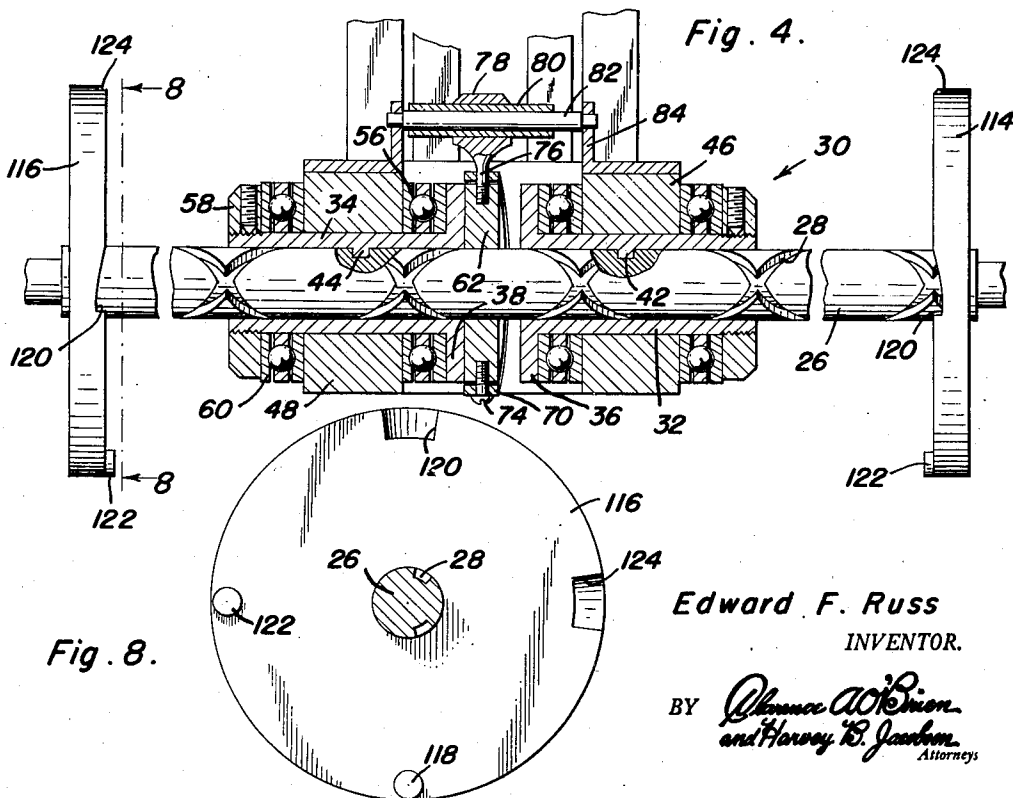


Fig. 2.



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3 Sheets-Sheet 3

Fig. 3.

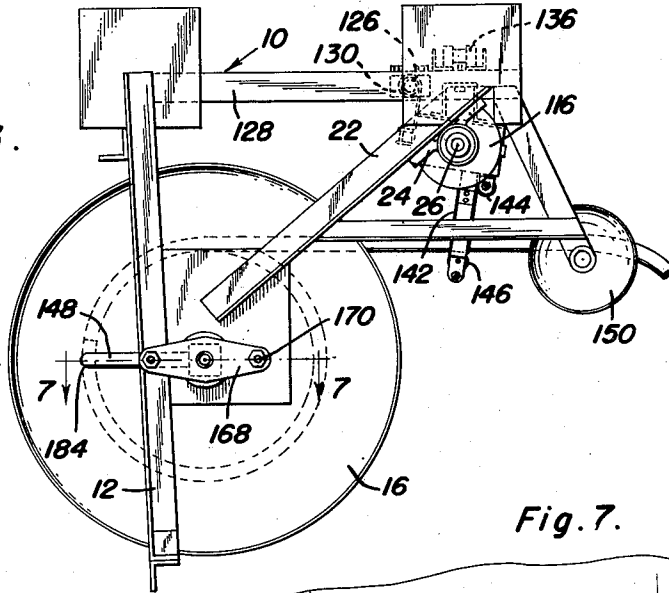


Fig. 7.

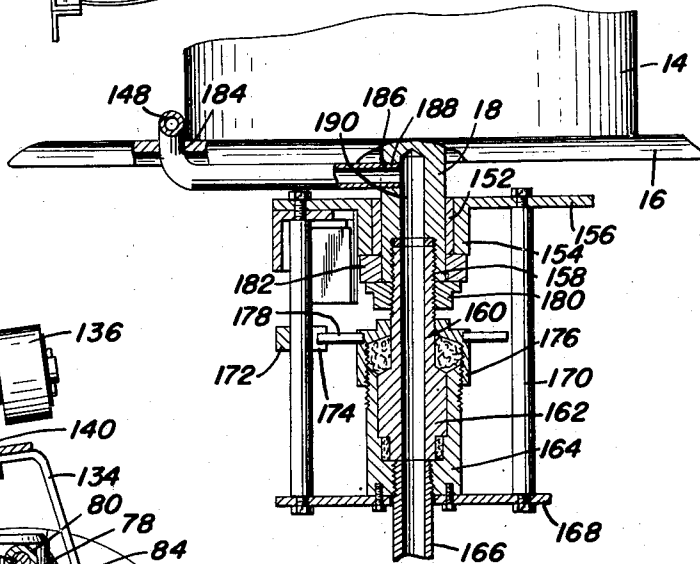
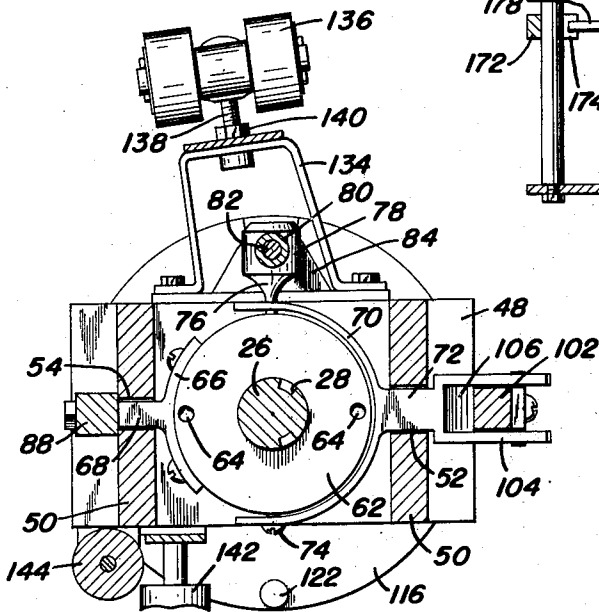


Fig. 6.



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AUTOMATIC LEVEL HOSE WINDER

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Application December 24, 1948, Serial No. 67,114

9 Claims. (Cl. 242—158)

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This invention relates to new and useful improvements in automatic level winders and the primary object of the present invention is to provide a machine for winding and unwinding hose, cord, thread or the like onto or from a drum and which includes a self-reversible traveling member or spooling device.

Another important object of the present invention is to provide an automatic level winder including a double helix screw or figure eight screw, a spooling device having a pair of members which are engaged with the helix groove for normal rotation with the screw, and a novel and improved clutch mechanism engageable with a selected one of the members for movement of both members in one longitudinal direction upon the screw.

A further object of the present invention is to provide a level winder including a spooling device, clutch means controlling the spooling device so that the same will move in a selected longitudinal direction, and novel and improved means controlling the clutch means and adjustable for changing the timing of the clutch means so that the spool may be utilized for unwinding a hose or the like as well as winding the same.

A still further aim of the present invention is to provide an automatic level winder that is simple and practical in construction, strong and reliable in use, small and compact in structure, efficient and durable in operation, neat and attractive in appearance, relatively inexpensive to manufacture, and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings, forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a front elevational view of the present invention and showing the same in use;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a side elevational view of Figure 2 taken substantially in the direction of arrow numbered 3 in Figure 2;

Figure 4 is an enlarged, fragmentary, sectional view showing the parts employed in conjunction with the spooling device;

Figure 5 is an enlarged, fragmentary, sectional view showing the parts employed in conjunction with the spooling device and the operating means for the movable clutch member;

Figure 6 is a sectional view taken substantially on the plane of section line 6—6 of Figure 5;

Figure 7 is an enlarged horizontal sectional

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view taken substantially on the plane of section line 7—7 of Figure 3; and

Figure 8 is a sectional view taken substantially on the plane of section line 8—8 of Figure 4 and illustrating one of the actuating members for the clutch operating rods.

Referring now to the drawings in detail, wherein for the purpose of illustration, there is disclosed a preferred embodiment of the present invention, the numeral 10 represents a suitable frame generally that is supported upon a suitable base (not shown) or upon a structural element, such as a wall or the like, in any suitable manner.

The frame 10 includes a pair of side members 12 between which there is journaled for rotation a drum or spool 14 having end flanges 16, it being understood that the drum 14 is suitably keyed to a first driven shaft 18 that is journaled in suitable bearings 20 carried by the side members 12.

The upper and forward portion 22 of the frame carries bearings 24 in which the reduced ends of a dolstrom screw, figure eight screw or driven shaft 26 having a double helix groove 28 are journaled for rotation.

Spooling mechanism

Attention is now directed more particularly to Figures 4, 5 and 6 wherein there is disclosed the spooling mechanism or traveling member that is used in conjunction with the present invention and which is designated generally by the numeral 30. This spooling device or mechanism 30 includes a pair of spaced clutch members 32 and 34, in the form of sleeves, having end plates 36 and 38 at their inner ends that are formed with lug seats or recesses 40. The inner peripheries of these clutch members 32 and 34 are provided with complete threads or ribs 42 and 44, respectively, that engage the groove 28 and more particularly different helices of the groove 28.

The clutch members are connected by a pair of blocks 46 and 48 having central openings for receiving the clutch members and so that the clutch members may rotate with respect to the blocks 46 and 48. The blocks 46 and 48 are fixed to each other by a suitable number of spacer strips 50 and the central portions of a diametrical opposite pair of the spacer strips are provided with openings 52 and 54 for a purpose which will later be more fully described.

Thrust bearings or ball-bearing races 56 embracing the clutch members 32 and 34 are interposed between the end plates 36 and 38 and the blocks 46 and 48. The outer ends of the clutch members are externally threaded and receivably

engage lock nuts 58. Further thrust bearings or ball-bearing races 60 embrace the clutch members and are clamped between the nuts 58 and blocks 46 and 48. By removing the nuts 58, the bearings 56 and 60 and the blocks 46 and 48 may be removed from the clutch members.

A clutch plate or ring member 62 embraces the shaft 26 and is loosely positioned between the end plates 36 and 38. Clutch or locking pins 64 are carried by the clutch plate 62 and having outwardly projecting end portions for reception in the recesses 40 in the end plates 36 and 38.

An arcuate plate 66 partially embracing and fixed to the outer edge of the clutch plate 62, is provided with an outwardly projecting arm 68 at the center thereof that is loosely received in the opening 54.

Disposed diametrically opposite from the arcuate plate 66, is a further arcuate plate or yoke 70 having its ends pivoted to the diametrically opposite sides of the clutch plate 62. An arm 72 projects outwardly from the central portion of the yoke 70 and is loosely received in the opening 52 for pivotal movement.

The lower end of the yoke 70 is pivoted to the clutch plate 62 by a fastener 74 but the upper end of the yoke 70 is pivoted to the clutch plate by a conical element 76 that projects downwardly from one end of a cylinder 78. A sleeve 80 extends transversely through the cylinder 78 and receives a guide pin 82 that is fixed between ears or support walls 84 rising from the blocks 46 and 48 in order to support the clutch plate.

Clutch operating mechanism

Means is provided for moving the clutch plate 62 so that the lugs or pins 64 carried by the same may be received in the recesses 40 in a selected one of the clutch members. This clutch operating means consists of a first pair of elongated operating members or rods 86 the inner ends of which are joined by a portion 88 which is removably secured to the arm 68 (see Figures 5 and 6).

The rods 86 are slidably received in transverse bores 90 provided in the blocks 46 and 48 and the outer ends of the rods 86 project outwardly from the blocks 46 and 48 and support suitable rollers or anti-friction members 92 and 94.

Stops 96 slidably received on the rods 86 adjacent each end thereof, are adjustable longitudinally on the rods to limit sliding movement of the rod relative to the blocks 46 and 48.

A further operating means is provided for moving the clutch plate into and out of locking engagement with the clutch members, and whereas the first named clutch operating means is utilized during the winding of a hose or the like upon the drum 14, this latest operating means is employed during the unwinding of the hose or the like from the drum 14 and thereby is timed differently than the first mentioned clutch operating means.

This further operating means consists of a further pair of elongated operating members or rods 98 and are slidably received in transverse bores 100 provided in the blocks 46 and 48. The inner ends of the rods 98 are fixed to the leg portions of a substantially U-shaped member 102 that is pivotally secured to the bifurcated end 104 of the arm 72. The web of the bifurcated end or portion 104 is provided with a tapered projection 106 that bears against the web of member 102.

Rollers or anti-friction means 108 and 110 are mounted on the outer ends of the rods 98 for a purpose which will later be more fully apparent.

Stops 112 slidably received on the rods 98, adjacent the outer ends thereof, are adjustable on the rods 98 to limit the sliding movement of the rods 98 relative to the blocks 46 and 48.

Actuating means for clutch operating rods

Means is provided for actuating the rods 86 and 98 as the spooling mechanism 30 is moved longitudinally on the shaft 26 and toward the ends of the shaft 26. This actuating means includes a pair of end members or circular plates 114 and 116 having hub portions that are keyed on the ends of the shaft 26 and in such a manner as to permit the end plates 114 and 116 to be rotated a quarter of a turn relative to the shaft 26 before the same are keyed to the shaft 26; this may be accomplished by providing a single lug in the hub of each ring 114 and 116 and by providing four equally spaced lug receiving recesses in each end of the shaft 26. By such a construction the end plates 114 and 116 may be retained in a selected rotated position relative to the shaft 26.

Since both of the end plates 114 and 116 are similar in construction, hence a description for one will suffice for both. For the purpose of explanation, it will be assumed that the end plate 116 is divided into four equal areas by a pair of diametrical lines that intersect each other at right angles, at the ends of one of the lines there is provided a cam 118 and an arcuate recess or notch 120 and at the ends of the remaining of the lines is provided a cam 122 and an arcuate notch 124.

The cams 118 and 122 are disposed adjacent each other and are disposed diametrically from the recesses 120 and 124 respectively.

The function of these cams and notches will be described in detail in the operation of the instant invention, but briefly it may be stated that the same cooperate with the rollers at the ends of the operating rods during sliding movement of the operating rods.

Spool support

In order to prevent the entire weight of the spooling mechanism from being supported on the shaft 26, there is provided a guide bar 126 that is mounted between the upper members 128 of the frame 10.

Slidably mounted on the guide bar 126, is a bearing 130 that is suitably secured to blocks 46 and 48.

Additional support and guide means are provided for the spooling mechanism in the form of a pair of spaced angle iron guides 132 that are fixed between the upper members 128.

A support 134 secured to and rising from the blocks 46 and 48 supports a plurality of rollers 136 that track upon the angle iron guide members 132. The rollers 136 are adjustably secured to the support 134 through the medium of a bolt 138 and a suitable nut or nuts 140.

Hose guiding means

Secured to and depending from the spooling mechanism 30, by any suitable means, is a plurality of rollers including a pair of spaced substantially vertical rollers 142, an upper substantially horizontal roller 144 and a lower substan-

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tially horizontal roller 146. The rollers are mounted for rotation and are arranged to provide a substantially rectangular opening through which the hose 148 is extended.

Further means is provided for guiding the hose and this means consists of an idler drum or roller 150 that is journaled for rotation on the upper members 128. The idler drum 150 is disposed in a substantially horizontal position, opposes the rollers 142 and is disposed above the central portion of the drum 14.

Hose coupling means

Embracing one end of the shaft 18, is an inner sleeve 152 that is surrounded by an outer sleeve 154. The outer sleeve 154 is provided with a pair of lateral projections 156.

Receivably engaging the internally threaded socket 158 provided in one end of the shaft 18, is a threaded sleeve 160 having an enlarged head portion 162 that is received in a socket member 164. This socket member 164 receivably engages a fluid supply conduit 166 and an end plate 168 is removably secured to the socket member 164.

A plurality of connecting rods 170 extend between and are removably secured to the plates 156 and 168 and one of these rods forms a guide for a slidable keeper 172 having an opening or slot 174.

The socket member 164 is externally threaded and receivably engages a packing nut 176 having a plurality of circumferentially spaced, radially extending arms 178 projecting therefrom for positioning in the opening 174 to hold the nut 176 against rotation.

A lock nut 180 threaded on the sleeve 160 abuts a washer 182 about the shaft 18 and urges the same toward the sleeves 152 and 154 as shown best in Figure 7 of the drawings.

One flange of the drum 14 is provided with an opening 184 that receives one threaded end 186 of the hose 148, and the end 186 is receivably engaged in a threaded socket 188 provided in the shaft 18 and communicates with a longitudinal passage 190 in the shaft 18.

Obviously, the above described hose coupling rotates with the drum 14 and a fluid from a suitable source passes through the conduit 166, sleeve 160, passage 190 and hence into the hose 148.

Means is provided for connecting the shafts 18 and 26 so that the drum 14 and shaft 26 will be rotated together and in the same direction. This means comprises a pair of pulleys 192 and 194 that are keyed on the shafts 18 and 26, respectively, and which are connected by an endless belt 196. Obviously, other means could be utilized for this purpose such as gears, reduction gearing, multiple-pulleys or the like.

It should be noted that the shaft 18 or the shaft 26 may be suitably connected to a motor or other source of power whereby the same will be driven. It is preferred that a reversible motor be employed so that the shaft 26 may rotate in either a clockwise direction or counter-clockwise direction depending on whether the hose is to be wound upon the drum 14 or unwound from the drum 14.

Winding operation

Reference is now directed more particularly to Figure 5 for the operation of the spooling mechanism. It will be understood that the shaft 26 in rotating in a counter-clockwise direction and spooling mechanism 30 is moving longitudinally upon the shaft 26, from right to left as shown in

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this figure since the clutch pins 64 are received in the recesses 38 in the end plate 38, and that the roller 92 is in its outermost position, the roller 94 is in its innermost position, the roller 108 is in its innermost position, and the roller 110 is in its outermost position.

As the spooling mechanism 30, including the clutch members 32 and 34, moves toward the end plate 116, the roller 92 will come to the edge of the notch 120.

The shaft 26 and end members 114 and 116 are still turning counter-clockwise and roller 92 bears against the inner face of end members 116 and starts rolling imparting a rightward movement of the rod 86 and disengaging the clutch plate 62 from the end plate 38 and moving the rod 98 and roller 108 leftward until the roller 108 also engages and rolls on the inner face of the end member 116. When in this latest position, the mechanism 30 is arrested and in a neutral position for quarter pause.

Shaft 26 and the end members 114 and 116 still rotating in a counter-clockwise direction, cam 122 engages the roller 92 and urges the rod 86 to the right to engage clutch plate 62 with end plate 38 while rod 98 moves leftward and the roller 108 is received in notch 124.

It will be noted that the same rod that disengages the clutch plate 62 from end plate 38 also engages the clutch plate 62 with the end plate 38.

The above operation is repeated with rod 86 and rod 98 with end member 114 still turning counter-clockwise with roller 94 missing notch 120 and engaging cam 122 and roller 110 being received in notch 124 as the mechanism moves from left to right on the screw 26.

When shaft 26 and end members 114 and 116 are rotating in a clockwise direction, rod 98 now accomplishes the indexing with roller 108 missing the edge of notch 124 and cam 118 comes around to engage the roller 108. Roller 92 is received in notch 120 of end member 116 and rod 98 and roller 110 are now in position for return to end member 114, roller 110 to notch 124 and cam 118 comes around to engage same and roller 94 goes in notch 120 of end member 114.

Unwinding operation

Now since the mechanism 30 may be situated upon the shaft 26 for movement toward one of the end members with the roller or one of the rods 86 inwardly so that the same could not engage the end member that the mechanism 30 is approaching, it is evident that one of the rollers on one of the rods 98 will then engage the cam 118 on the end member that the mechanism is approaching to move the rods 86 and 98 in opposite directions whereupon the rollers on the rods 98 will always engage the cam 118 on the end members to move the rods 86 and in such instances the rollers on the rods 86 will enter the notches 120 in the end members.

To further emphasize the operation of the present invention, it is noted that when the roller 92 is in its outer position the roller 110 is also in its outer position and that the rollers 94 and 108 will be in their innermost positions, so that regardless of the longitudinal directional movement of the mechanism 30, one roller will always engage a cam on the end members thus permitting automatic operation of the spooling mechanism for both winding and unwinding hose or such other material on the drum 14.

It is further noted that when one of the rollers

of one of the operating rods, for example, roller 92, is engaged with a cam of one of the end members, one of the rollers of the remaining of the operating rods, for example roller 108, is entering the notch in the one of said end members.

It is noted, that when the shaft 26 is turning counterclockwise and the driving means is stopped and the mechanism 30 is arrested at substantially the center of shaft 26 and the shaft 26 is then rotated clockwise, the mechanism 30 will return to the same end member from which it left prior to the stopping of the machine and the same rod and roller that engaged the end member previously, will then disengage the end member and the other rod will engage the end member.

When mechanism 30 is at either end and in pausing position, machine can be stopped and started counterclockwise, and rod 86 and cam 122 will engage and when started clockwise rod 98 and cam 118 will perform the engaging with the end member.

When the mechanism 30 is in pausing position, rollers 92, 94, 108 and 110 are extended toward the end members equal amounts.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the construction, operation and advantages of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In an automatic level hose winder including a frame and a drum journaled for rotation on said frame, a driven shaft having a double helix groove in its outer periphery, a spooling device movable back and forth on said driven shaft, a clutch controlling the directional movement of said spooling device, means for rotating said drum and said shaft, a slidable operating rod connected to said clutch for operating the same, said rod having first and second end portions, first and second end members mounted on and rotatable with said shaft, means carried by said first end member engageable with the first end portion of said rod during movement of said spooling device in one direction to change the directional movement of said spooling device, and means carried by said second end member engageable with the second end portion of said rod during movement of said spooling device toward said second end member for changing the directional movement of said spooling device.

2. The combination of claim 1, wherein said means carried by said first and second end members includes cams.

3. In an automatic level winding machine, a driven shaft having a double helix groove in its outer periphery, a spooling device movable back and forth on said shaft, said spooling device including first and second clutch members, said first member being engaged with one helix of the groove for rotation with the shaft normally, said second member being engaged with the remaining helix of the groove for rotation with the shaft normally, means connecting said members, a clutch carried by said connecting means and

engageable with a selected one of said members for movement of both of said members in one direction, means operating said clutch for engaging the same with a selected one of said members, and actuating means at the ends of said shaft engageable with said operating means during movement of said members on said shaft to change the directional movement of said members.

4. In an automatic level winding machine, a driven shaft having a double helix groove in its outer periphery, a spooling device movable back and forth on said shaft, said spooling device including first and second clutch members, said first member being engaged with one helix of the groove for rotation with the shaft normally, said second member being engaged with the remaining helix of the groove for rotation with the shaft normally, means connecting said members, a clutch carried by said connecting means and engageable with a selected one of said members for movement of both of said members in one direction, a slidable operating rod carried by said connecting means and operatively applied to said clutch for moving the latter into engagement with a selected one of said members, said rod having first and second end portions, first and second end plates mounted on said shaft for rotation therewith, means carried by said first end plate engageable with said first end portion to move said clutch out of engagement with said first member and into engagement with said second member upon movement of said members toward said first end plate to change the directional movement of said members, and means carried by said second end plate engageable with the second end portion to move said clutch out of engagement with said second member and into engagement with said first member upon movement of said members toward said second end plate to change the directional movement of said members.

5. The combination of claim 4, and means carried by said rod, adjacent the ends thereof, for limiting the sliding movement of said rods relative to said connecting means.

6. The combination of claim 5, wherein said means includes a pair of stops adjustably mounted on said rod and engageable with said connecting means.

7. The combination of claim 4, wherein said means carried by said end plates includes a plurality of cams, and rollers on the end portions of said rod engageable with said cams.

8. In an automatic level winding machine, a driven shaft having a double helix groove in its outer periphery, a spooling device movable back and forth on said shaft, said spooling device including first and second clutch members, said first member being engaged with one helix of the groove for rotation with the shaft normally, said second member being engaged with the remaining helix of the groove for rotation with the shaft normally, means connecting said members, a clutch carried by said connecting means and engageable with a selected one of said members in one direction, a first operating means applied to said clutch for moving the latter into engagement with a selected member, a second operating means applied to said clutch for moving the same into engagement with a selected member, means at one end of the shaft engaging said first operating means upon movement of said members in one reciprocating direction for disengaging said clutch from one of said members and engaging the clutch with the remaining of said members

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to change the directional movement of said members when said shaft is rotating in a clockwise direction, said last-mentioned means being engageable with said second operating means to disengage said clutch from one of said members and engage the clutch with the remaining of said members to change the directional movement of said members when said shaft is rotating in a counter-clockwise direction, and means at the other end of said shaft engaging said first operating means upon movement of said members in one reciprocating direction to change the directional movement of said members when said shaft is rotating in a clockwise direction, said last-named means being engageable with said second operating means during movement of said members in one reciprocating direction when said shaft is rotating in a counter-clockwise direction for changing the directional movement of said members.

9. The combination of claim 8, wherein said last-mentioned means includes an end plate

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mounted on and rotatable with said shaft, a cam carried by said plate engageable with a selected one of said operating means during rotation of said shaft in one direction, said plate having a recess for receiving the remaining of said operating means when said cam is engaged with one of said operating means, said cam being also engageable with one of said operating means during rotation of said shaft in an opposite direction, and a further cam carried by said plate engageable with the remaining of said operating means when said shaft is in rotation in said last-mentioned direction.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Country	Date
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