

[54] POWERED WINCH

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[51] Int. Cl. B65d 1/00
[58] Field of Search 254/180, 186, 185, 254/187; 192/41 S

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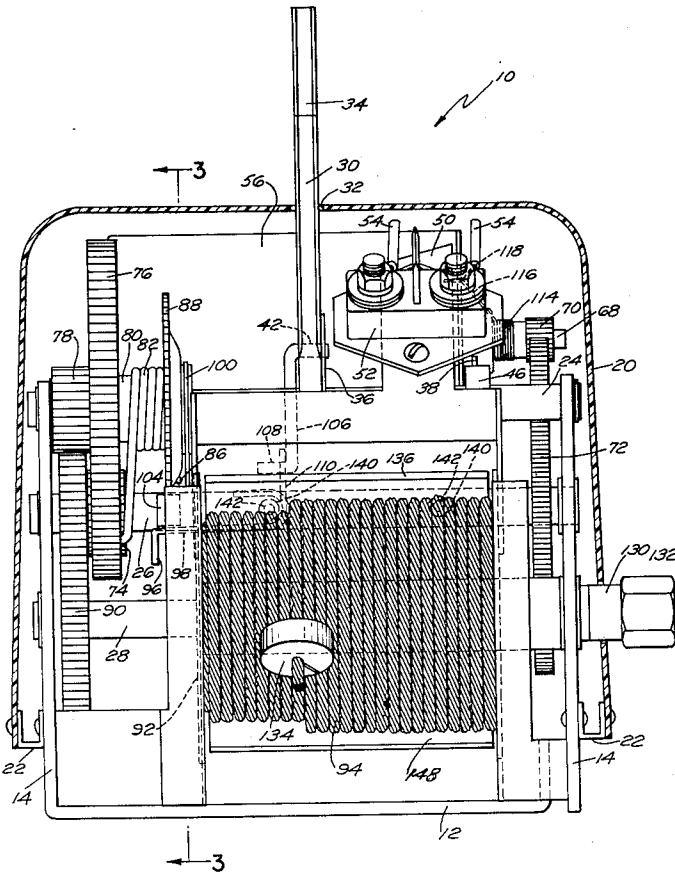
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[57] ABSTRACT

A powered winch comprising a motorized clutch drive, an operating lever selectively movable between a hold position in which the motor is deenergized but in which the clutch is engaged; a free position in which the motor is still deenergized but in which the clutch is disengaged; and a haul or wind position in which the motor is energized and the clutch engaged. Automatic and adjustable stop means are provided for causing movement of the operating lever from haul to hold position after a predetermined amount of cable has been wound.

3 Claims, 8 Drawing Figures



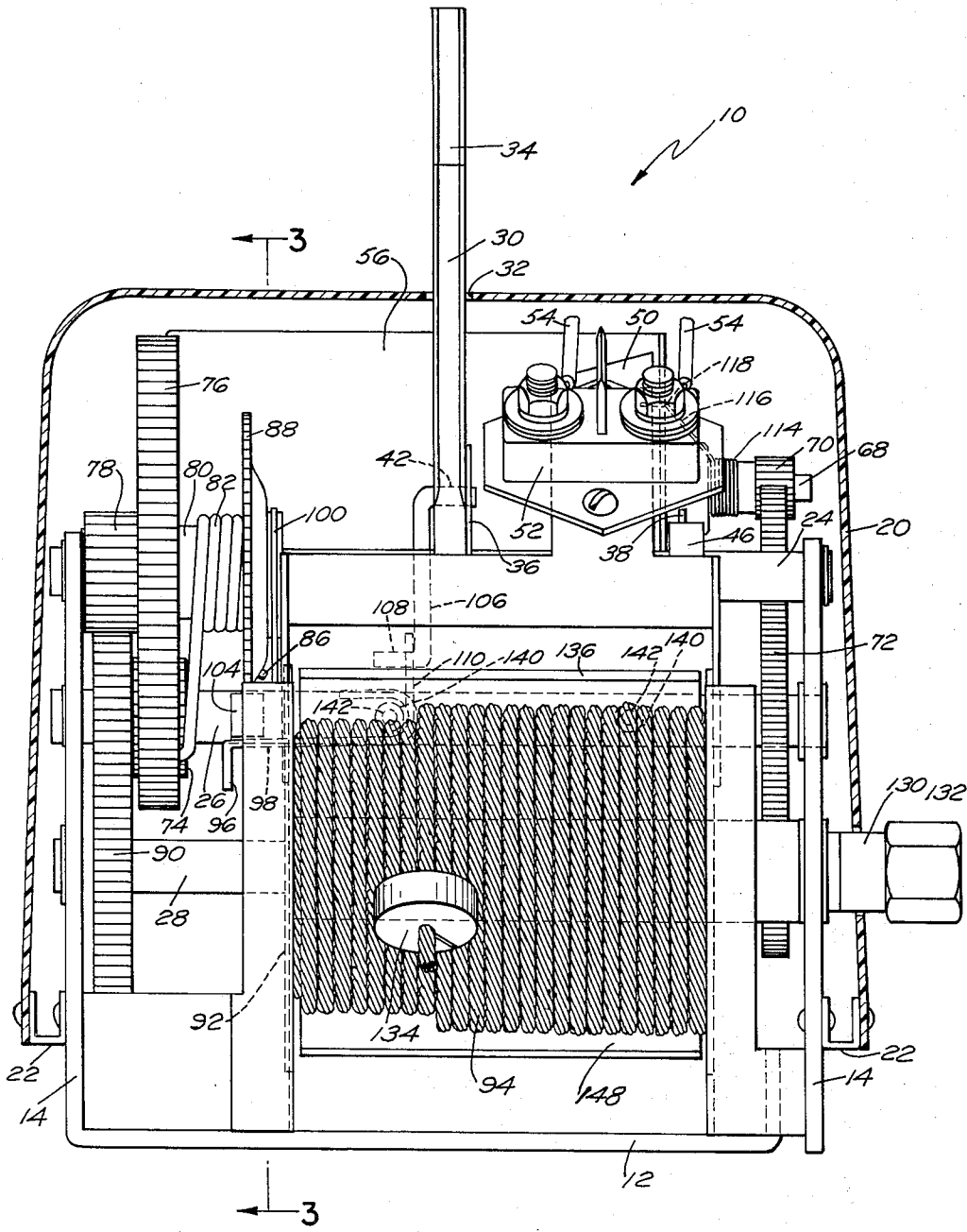


FIG. 1

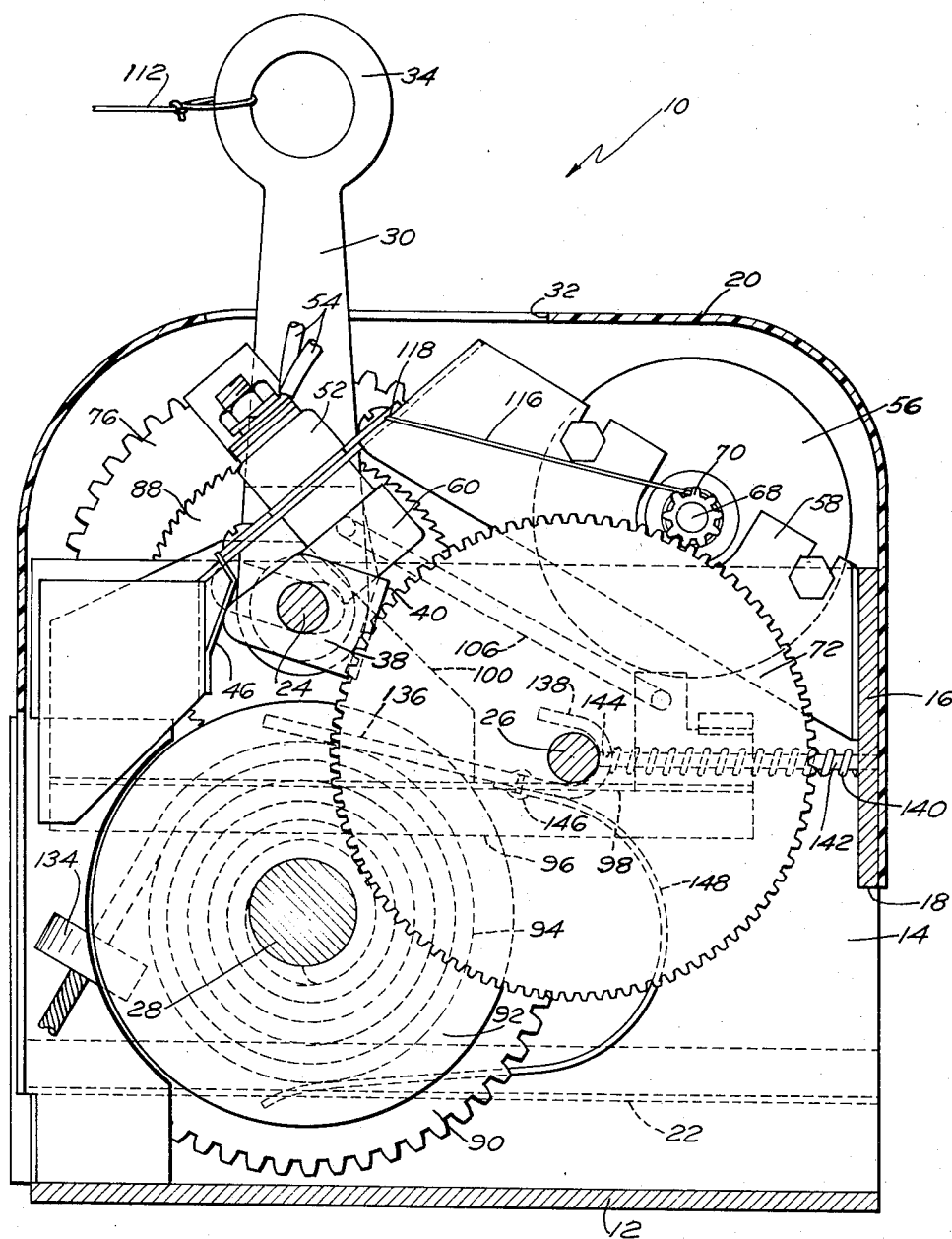


FIG. 2

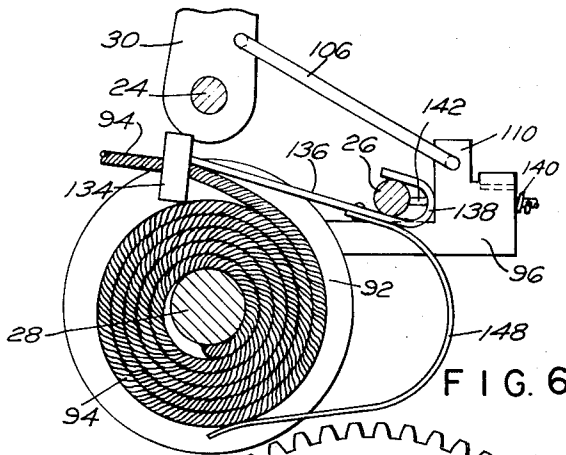


FIG. 6

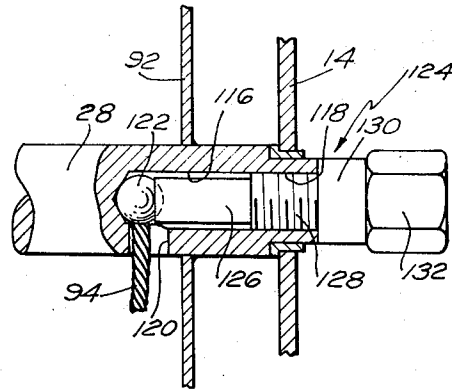


FIG. 7

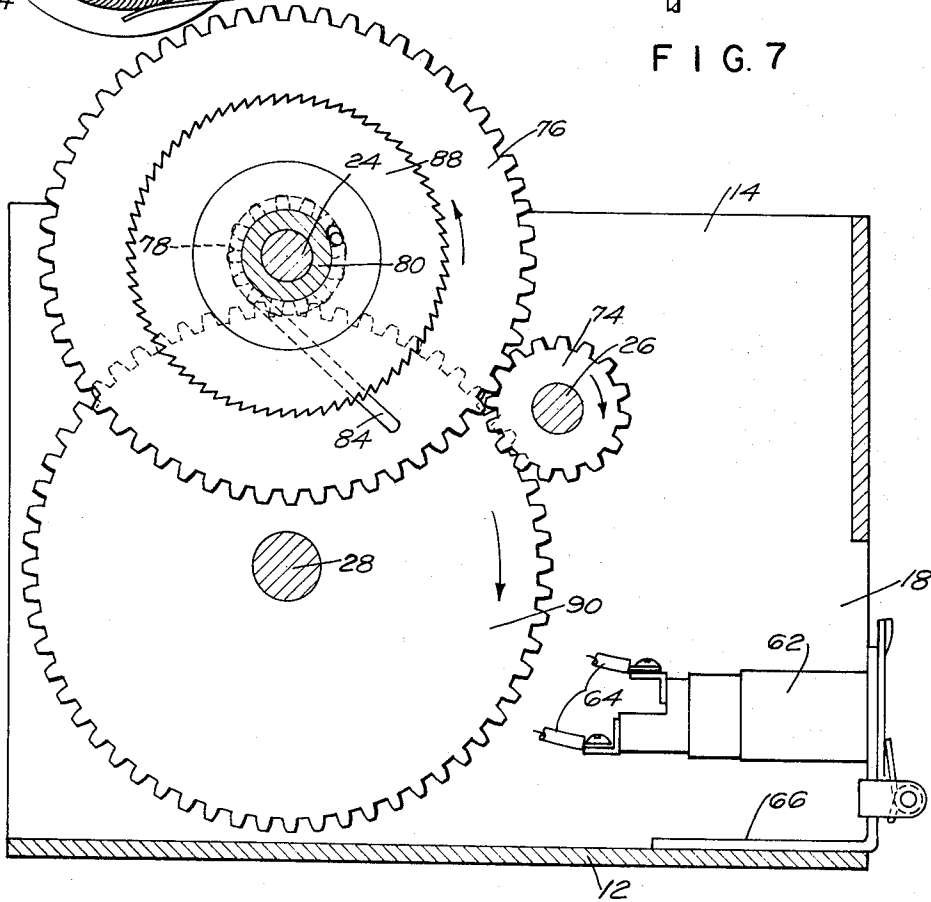


FIG. 3

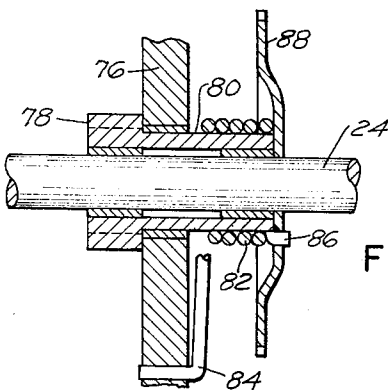


FIG. 8

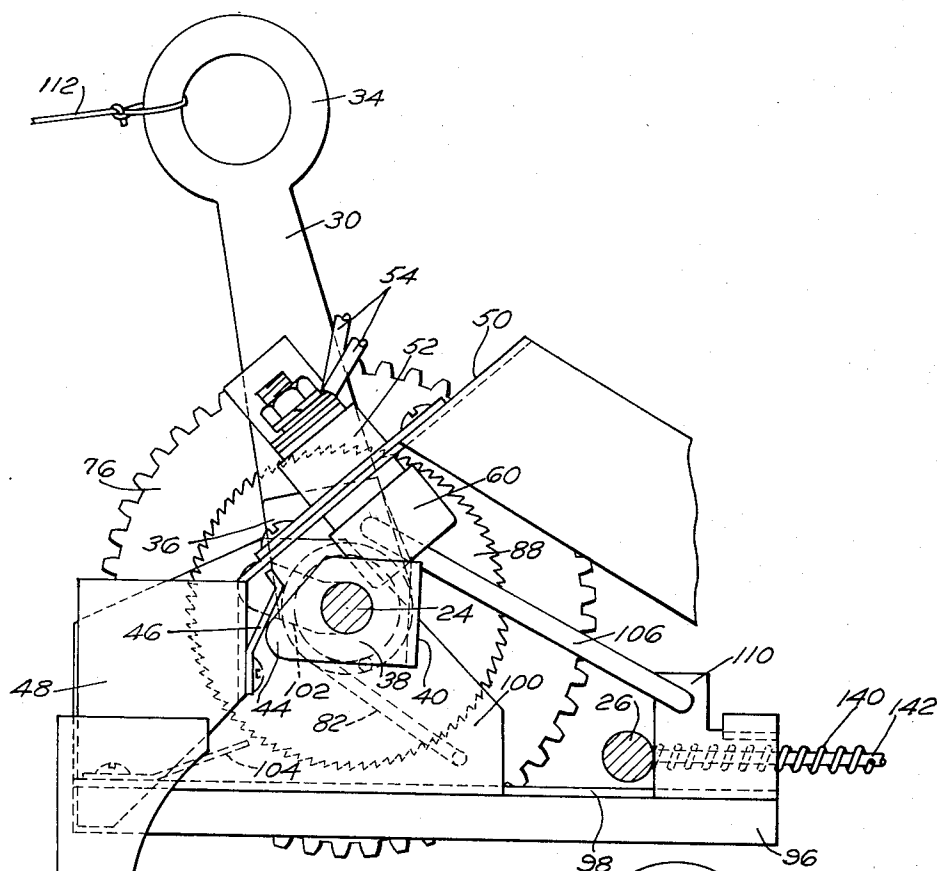


FIG. 4

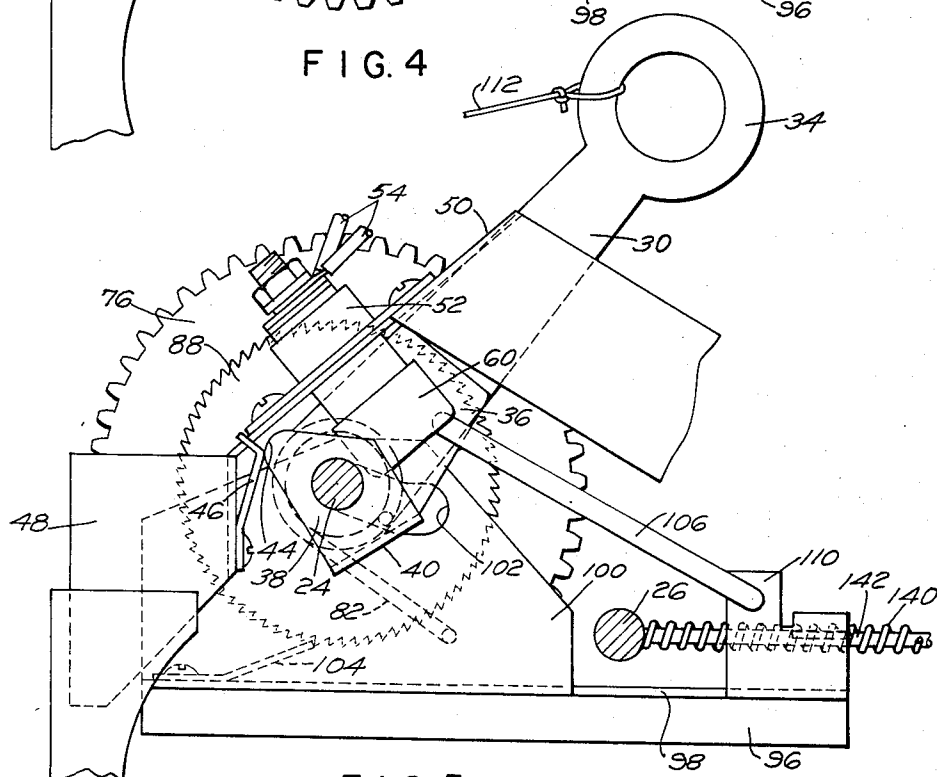


FIG. 5

POWERED WINCH

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates generally to a winch of the type used for hauling boats onto a trailer, or, conversely, for letting a boat down into the water from a trailer; although obviously the present invention is not specifically limited to such usage.

Winches of this general type are now and have long been in common use, but these prior and present winches do not incorporate certain desirable features that form a part of the present invention.

More specifically, it has long been desirable to provide a winch having a motorized clutch drive having a single lever control, said lever being selectively movable between a hold position wherein the motor is deenergized and the clutch means engaged to effectively lock the cable drum shaft against movement in unwind direction; a free position wherein the motor remains deenergized but wherein the clutch is disengaged, thus permitting free movement of the cable drum shaft in an unwind direction to permit paying out of the cable; and a haul position wherein the motor is automatically energized and the clutch engaged to drive the cable drum shaft in a wind direction to effect the desired hauling operating. By providing all of these controls off of one operating lever, it becomes possible to effectuate movement of the lever from free to haul position from a point remote from the winch, such as by actuating a control line attached to the lever. This permits a user of the winch to manually move the lever to its free position, after which the free end of the cable may be manually grasped and unwound until the cable is manually secured or attached to the boat or other article to be hauled in. From that location, and without having to go back to the winch, the operator may actuate the control line to move the lever from free to haul position, whereupon the winch will automatically commence to wind to haul in the boat or other article. By providing resilient means normally urging the control lever from its haul to its hold position, winding or hauling of the winch may be interrupted from the remote location at any time such may become necessary or desirable, simply by releasing the pull on the control line.

Accordingly, it is a primary object of the present invention to provide a winch having a single lever control as described above.

A further object of the present invention is the provision of a powered winch of the character described having adjustable stop means for automatically moving the operating lever from haul to hold position in response to a predetermined amount of cable being wound. Although automatic stop devices in powered winches of this type are not broadly new, the idea of utilizing such a stop device to mechanically move an operating lever from haul to hold position is thought to be novel.

The present invention further comprises novel means for releasably securing one end of the cable to the cable drum shaft, said means comprising as a part thereof a threaded stud axially received in an end of the cable drum shaft, whereby said stud not only performs the function of releasably securing the cable end to the shaft, but also functions as a means for imparting manual turning movement of the cable drum shaft in a haul or wind direction should such ever become necessary

or desirable, such as where there is a failure of the power supply.

Other objects, features and advantages of the invention will become obvious as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

DESCRIPTION OF THE DRAWINGS

In the drawings which illustrate the best mode presently contemplated for carrying out the present invention:

FIG. 1 is a front end elevational view of a powered winch constructed in accordance with the invention, the front portion of the outer casing being removed for purposes of illustration;

FIG. 2 is a side elevational view thereof with the adjacent side wall of the casing removed for purposes of illustration;

FIG. 3 is a section taken on line 3—3 of FIG. 1;

FIG. 4 is a fragmentary elevational view, in section showing the operating lever in haul position;

FIG. 5 is a view similar to FIG. 4 with the operating lever shown in free position;

FIG. 6 is a fragmentary elevational view showing some of the details of the automatic stop means that form a part of our invention;

FIG. 7 is a fragmentary view, partly in section, showing the means for releasably locking one end of the cable to the cable drum shaft; and

FIG. 8 is a fragmentary sectional view showing certain details of the clutch means which form a part of the present invention.

DESCRIPTION OF THE INVENTION

Referring now to the drawings, a powered winch embodying the present invention is shown generally at 10 and comprises a housing having a bottom wall 12, side walls 14, and a rear wall 16 that extends between the upper half of side walls 14, leaving a lower rear opening 18 as shown most clearly in FIG. 2. A casing 20 covers the housing and the parts contained therein and is removably secured to U-shaped channel members 22 extending longitudinally along the outer surface of side walls 14 adjacent the bottom ends thereof, as shown most clearly in FIG. 1.

Extending between side walls 14 are three shafts, i.e., control shaft 24 which is fixedly or nonrotatably mounted between said side walls, transmission shaft 26, and cable drum shaft 28, both of which are rotatably mounted in suitable bearings carried by said side walls. Rotatably mounted on control shaft 24 is an operating lever 30, said lever extending upwardly through a slot 32 provided in the top wall of casing 20 and terminating in a circular eye portion 34, it being apparent that slot 32 permits sufficient pivotal movement of operating lever 30 around shaft 24 to assume the positions and perform the functions hereinafter described.

Also pivotally mounted on control shaft 24 and secured to operating lever 30 for movement therewith as a unit is a switch actuator member comprising spaced side walls 36 and 38 interconnected by an integral rear wall 40 to define a generally U-shaped member. Shaft 24 extends through suitably provided openings in the side walls 36, 38; and, as aforesaid, the actuator member is secured to lever 30 for rotatable movement therewith, such as by means of link pin end 42, said end extending through lever 30 and wall 36, as shown most

clearly in FIG. 1, to interconnect the lever and the actuator member. Thus, as lever 30 pivots about control shaft 24, the U-shaped actuator member pivots therewith as a unit. As will be seen most clearly in FIGS. 2, 4 and 5, wall 38 of the actuator member is provided with a rounded lower corner 44 which cooperates with a detent spring 46 secured to suitable bracket means 48, which bracket means in turn are secured to base 12. The configuration of spring 46 is such as to releasably maintain operating lever 30 in its rearmost position, as illustrated in FIG. 5. However, the lever 30 may manually be moved against the action of spring 46 to assume either the upright position of FIG. 2 or the forward position of FIG. 4.

Bracket means 48 has an angularly extending portion 50 to which is mounted a switch 52 electrically connected by suitable wiring 54 to a motor 56 mounted in the housing by means of suitable brackets 58. The switch 52 is of the normally open type, and comprises a spring loaded plunger 60 positioned between the walls 36, 38 of the switch actuator so that when lever 30 is moved to its forward position, as illustrated in FIG. 4, the upper edge of rear wall 40 engages the plunger 60 to depress same to close switch 52 and energize motor 56. However, when lever 30 is in the upright position of FIG. 2 or the rearward position of FIG. 5, rear wall 40 of the actuator member has moved away from plunger 60, thus permitting the switch to resiliently and automatically move to its normally open position, which in turn deenergizes motor 56. Any suitable power source, such as a car battery, may be utilized for supplying electrical energy to motor 56, and to this end, suitable connector means 62 are provided at the rear open portion 18 of the housing for receiving a suitable plug in order that the desired electrical energy may be introduced to the motor through suitable and conventional wiring 64. Connector 62 may be mounted by any suitable means, such as bracket 66 secured to bottom wall 12, note FIG. 3.

Drive shaft 68 of motor 56 has a spur gear 70 fixedly secured thereto, said spur gear meshing with gear 72 fixedly mounted on transmission shaft 26. At its opposite extremity, shaft 26 has secured thereto a spur gear 74 which in turn meshes with and drives gear 76 rotatably mounted on control shaft 24. To be more accurate, and as will be seen most clearly in FIG. 8, gear 76, hereinafter called the clutch gear, is rotatably mounted on clutch pinion 78, which pinion is rotatably mounted on shaft 24. Pinion 78 comprises a sleeve portion 80 on which gear 76 is rotatably mounted, said sleeve portion having a clutch spring 82 coiled therearound with one end 84 of the clutch spring secured to gear 76 and with the other end, 86, secured to a ratchet wheel 88 rotatably mounted on shaft 24. It will be understood that when clutch gear 76 is driven by motor 56 through the gear train above described, its direction of rotation will be such as to cause clutch spring 82 to tightly grip sleeve 80 to impart corresponding rotation to clutch pinion 78, which in turn meshes with gear 90 to drive cable drum shaft 28 to which gear 90 is secured. This causes winding rotation of cable drum 92 secured to shaft 28 and hence causes winding of cable 94 associated with drum 92. This constitutes the "engaged" position of the clutch means, and specifically the clutch spring 82, in which position motor 56 is drivingly connected to shaft 28 to cause winding or hauling rotation of the latter.

In order to move the clutch means, and specifically the clutch spring 82, to its disengaged position, means are provided for imparting a small degree of rotation to ratchet wheel 88 in a direction reversed to the winding of spring 82. It will be apparent that since the end 86 of spring 82 is secured to ratchet wheel 88, such movement of the ratchet wheel will impart an unwinding force to spring 82, thus releasing the clutching engagement between said spring and sleeve 80 of clutch pinion 78. Thus, with the motor 56 deenergized, clutch pinion 78 is free to rotate even though clutch gear 76 is frozen against movement. This means that shaft 28 is free to be turned in an unwind direction such as, for example, when it is desired to pay out cable 94 for any reason.

In order to effect the above described movement of ratchet wheel 88, which in turn effects declutching of clutch spring 82, a ratchet slide 96 is provided. Ratchet slide 96 is provided with a base portion 98 having an upstanding wall 100, said wall having an elongated opening 102 of predetermined configuration through which control shaft 24 extends. Base portion 98 has mounted thereon a ratchet wheel spring 104 in alignment with the teeth of ratchet wheel 88 but disengaged therefrom when operating lever 30 is in either its upright position of FIG. 2 or its forward position of FIG. 4. However, when operating lever 30 is moved to its rearwardmost position shown in FIG. 5, pin 106, connected at its one end 42 to lever 30 and at its other end 108 to upward extension 110 carried by slide 96, causes the slide to move rearwardly along the path defined by opening 102 to cause the end of ratchet wheel spring 104 to engage the teeth of ratchet wheel 88 and at the same time impart a small degree of counterclockwise rotation thereto, as viewed in FIGS. 4 and 5. As previously described, this counterclockwise rotation of ratchet wheel 88 imparts an unwinding force to clutch spring 82 to cause disengagement of said clutch means.

In summarizing the structure described up to this point, and the operation of such structure, it will be seen that when operating lever 30 is in its upright position, as illustrated in FIG. 2, rear wall 40 of the switch actuator is not depressing switch plunger 62, and hence the switch is in its normally open position, causing motor 56 to be deenergized. At the same time, ratchet wheel spring 104 has not as yet engaged the teeth of ratchet wheel 88 due to the fact that ratchet slide 96 has not moved rearwardly a sufficient distance to effect such engagement. Thus, in this position, clutch spring 82 grippingly engages sleeve 80 of clutch pinion 78, whereupon the pinion 78 is locked against rotation, since gear 76, to which it is clutchingly engaged, is locked against rotation due to the gear train interconnection between gear 76 and deenergized motor 56. This constitutes the "hold" position of operating lever 30, and it is again emphasized that in such position the entire winch, including cable drum shaft 28, is securely locked against movement in the unwind direction.

When operating lever 30 is moved to its rearwardmost position, as illustrated in FIG. 5, the upper edge of rear wall 40 of the switch actuator has moved even farther away from switch plunger 60, and hence the switch remains in its open or off position, and motor 56 remains deenergized. However, as previously described, rearward movement of operating lever 30 to the position illustrated in FIG. 5 causes corresponding rearward movement of ratchet slide 96 through the

path defined by the opening 102 in wall 100, through which opening the control shaft 24 extends. This movement of ratchet slide 96 causes the edge of ratchet wheel spring 104 to engage the teeth of the ratchet wheel 88 to impart a small degree of counterclockwise rotation thereto, when viewed in FIGS. 4 or 5. This movement of ratchet wheel 88 declutches the clutch spring 82, thereby freeing clutch pinion 78 for rotation about shaft 24, even though clutch gear 76 remains locked against movement. Since clutch pinion 78 is now free to rotate, it follows that cable drum shaft 28 is now free to turn in an unwind direction, whereby the cable 94 wound on cable drum 92 may be manually unwound or paid out. This comprises the "free" position of operating lever 30, it being understood that the lever is releasably maintained in said position by detent spring 46, so that during normal use of winch 10, and while the latter is in its said "free" position, the free end of cable 94 may be grasped and manually pulled from the winch, causing the cable drum shaft 28 to unwind, until the free end of cable 94 reaches the boat or other object that it is desired to haul in. At this point, the free end of the cable is connected to the boat or other object by conventional means; and then, without having to go back to the winch 10, a control line 112 connected to the eye portion 34 of handle 30 may be manually pulled from the remote location to pull lever 30 forwardly to the position illustrated in FIG. 4. In this position, the upper edge of rear wall 40 of the switch actuator engages and depresses the switch plunger 60 to close switch 52 and energize motor 56. At the same time, ratchet slide 96 is positioned so that ratchet wheel spring 104 is disengaged from the teeth of ratchet wheel 88, whereupon clutch spring 82 grippingly engages sleeve 80 of clutch pinion 78 to drivingly interconnect clutch gear 76 and clutch pinion 78, which in turn, due to the engagement of clutch pinion 78 and gear 90, causes cable drum shaft 28 to be driven in a wind or haul direction. This defines the "haul" position of operating lever 30. It will be understood that the spring action of plunger 60 of switch 52 will normally urge the switch actuator and hence operating lever 30 to the upright or hold position illustrated in FIG. 2. However, the lever will be maintained in the forward position of FIG. 4 as long as tension is maintained on control line 112, and the winch will continue to haul, although if at any time during the hauling operation it becomes necessary or desirable to temporarily stop winding of the winch, all one has to do is to release tension on control line 112 sufficiently for the spring loaded plunger 60 to move to its normally open or off position, thus automatically resulting in movement of the lever 30 from haul to hold position, as above described.

In order to prevent undesirable back-up or reverse rotation of motor 56, such as might happen where a load is being hauled in and then the motor is suddenly deenergized, motor drive shaft 68 has coiled therearound a spring 114, note FIG. 1, one end of which extends as at 116 to any suitable point of securement, as at 118. Thus, spring 114 actually functions in the same general manner as aforescribed clutch spring 82 in that during the normal operation of the motor 56, shaft 68 rotates in a direction opposite to the direction of winding of spring 114, thus tending to uncoil the spring, whereby the spring actually has no effect on the motor when it is energized. Should there be a tendency for

motor shaft 68 to reverse or back up upon sudden deenergization of motor 56, said reverse rotation, being in the direction of the winding of spring 114, will cause the spring to quickly grip shaft 68 to prevent any appreciable reverse rotation of same.

Another important feature of the present invention resides in the means provided for releasably securing one end of the cable 94 to the cable drum shaft 28. As will be seen most clearly in FIG. 7, one end of shaft 28 extends outwardly of side wall 14, and said end has an axially extending bore 116 provided therein, said bore having a threaded portion 118 adjacent its outer extremity. A radially extending passage 120 extends through shaft 28 into communication with bore 116, it being important to note that passage 120 is inwardly offset from the end of said bore. The end of cable 94 to be secured has an enlarged body, such as ball 122 connected thereto, it being understood that the passage 120 is sufficiently large so as to permit ball 122 to be inserted therethrough until the ball is positioned within bore 116. A stud member 124 having an inner reduced shaft 126, a threaded portion 128, an enlarged shoulder 130, and a hex head 132, is threadably engaged in bore 116, whereupon shaft 126 forces the ball 122 against the end of bore 116 to prevent removal of the ball through passage 120. Thus, the end of cable 94 may be easily secured to shaft 28 simply by loosening stud member 124 and then inserting ball 122 through passage 120, after which the stud member 124 is again tightened to maintain the cable in its attached position. In addition to performing the function of maintaining the end of the cable secured to shaft 28, the stud 124 serves another important function. Reference is made to the fact that after the stud 124 has been tightened with respect to shaft 28, further rotational movement of said stud will cause the shaft 28 to rotate in a wind or haul direction. Thus, the stud 124 provides means for manually turning the shaft 28 in a haul or wind direction, should such ever become necessary due to a failure or lack of power in the vicinity. The hex head 132 had been specifically designed to accommodate a conventional auto lug wrench, whereby the latter may be used when it is desired to effect manual turning of the shaft 28. The clutch spring 82 does not in any way impede the aforesaid manual turning of shaft 28 because the rotation of clutch pinion 78 pursuant to such manual turning is in a direction opposed to the direction in which spring 82 is wound, thus tending to uncoil the spring. It is important to note, however, that the clutch spring 82 does perform an important function during manual turning of shaft 28, and reference is made to the fact that during such manual turning, the spring 82 will prevent back-up or reverse rotation of shaft 28. This is important in the event that the turning wrench should slip off of the stud 124 or in the event that one becomes tired when manually turning the shaft 28 and desires to rest. Without clutch spring 82, the winch would simply unwind if a load were being manually hauled in and the turning or holding force was suddenly removed from stud 124.

Another important feature of the present invention resides in the provision of adjustable stop means for automatically moving operating lever 30 from haul to hold position when a predetermined amount of cable has been wound onto the cable drum 92. To this end, a disc-like collar member 134 is secured by any suitable means, such as a set screw, not shown, to cable 94 at

a predetermined location on said cable. The stop member 134 is adapted to cooperate with a stop plate 136 having a U-shaped rear portion 138 that extends around transmission shaft 26, as shown most clearly in FIGS. 2 and 6. Stop plate 136 extends laterally around most of drum 92 and is spring loaded to the forward position illustrated in FIG. 2 by means of springs 140 surrounding pins 142, said pins slidably extending through suitable openings 144 in rear portion 138 into engagement with shaft 26. The stop plate 136 is secured as at 146 to the upper forward edge of cable control spring 148, which also extends substantially from side to side of drum 92. It will be seen that the spring 148, and the plate 136 attached thereto, apply tension to the top and bottom of the cable 94 as the latter is being wound and unwound, thus insuring level winding and unwinding of the cable with respect to drum 92.

When stop member 134 engages the forward edge of plate 136, stop plate 136 is forced rearwardly against the action of springs 140. As stop plate 136 is forced rearwardly, as illustrated in FIG. 6, the curved rearward portion 138 of the stop plate physically engages the upstanding portion 110 of ratchet slide 96 to forceably move the latter rearwardly, whereupon connecting link 106 forceably pulls operating lever 30 rearward from haul to hold position, thus deenergizing the motor and stopping further movement of the winch.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

What is claimed is:

1. A powered winch comprising an operating lever movable between free, hold and haul positions, a cable drum shaft, power means operatively associated with said shaft, clutch means intermediate said power means and said shaft and movable between an engaged position in which said power means is drivingly coupled to said shaft and a disengaged position in which said power means is disconnected from said shaft, means causing said clutch to assume its engaged position when said lever is in hold or haul position and its disengaged position when said lever is in free position, means causing said power means to be energized when said lever is in haul position and deenergized when said lever is in hold or free position, whereby when said lever is in haul position, said shaft is driven in a haul or wind direction, whereas when said lever is in hold position said shaft is locked against movement in an unwind direction, while when said lever is in free position, said shaft is free to move in an unwind direction, the combination further comprising a cable wound around said shaft, a stop member adjustably mounted on said cable, and movably mounted means engageable by said stop member when said cable is wound beyond a predetermined

amount, and means interconnecting said movably mounted means and said operating lever whereby movement of the former pursuant to engagement by said stop means forces the lever to move from haul to hold position, said movably mounted means comprising a generally U-shaped spring, the opposite legs of which resiliently engage the top and bottom of the wound cable to effect level winding and unwinding thereof.

2. A powered winch comprising an operating lever movable between free, hold and haul positions, a cable drum shaft, power means operatively associated with said shaft, clutch means intermediate said power means and said shaft and movable between an engaged position in which said power means is drivingly coupled to said shaft and a disengaged position in which said power means is disconnected from said shaft, means causing said clutch to assume its engaged position when said lever is in hold or haul position and its disengaged position when said lever is in free position, means causing said power means to be energized when said lever is in haul position and deenergized when said lever is in hold or free position, whereby when said lever is in haul position, said shaft is driven in a haul or wind direction, whereas when said lever is in hold position said shaft is locked against movement in an unwind direction, while when said lever is in free position, said shaft is free to move in an unwind direction, the combination further comprising a gear train drivingly interconnecting said power means and said shaft, said clutch means being located in said gear train and comprising a clutch gear, a clutch pinion and a clutch spring connected to said clutch gear and extending around said clutch pinion to effect a driving connection from said gear to said pinion when said clutch means is in its said engaged position, said clutch means being movable to its said disengaged position by the application of an unwinding force to the free end of said spring, and means effecting said unwinding force when said lever is moved to free position, said last mentioned means comprising a ratchet wheel secured to the free end of said clutch spring, a ratchet slide movable between a first position wherein it is disengaged from said ratchet wheel and a second position wherein it engages and imparts rotation to said ratchet wheel to unwind said clutch spring, and means interconnecting said lever and said slide whereby the latter is in its said first position when said lever is in hold or haul position, but is moved to its said second position when said lever moves to free position.

3. In the powered winch of claim 2, the combination further comprising a cable wound around said shaft, a stop member adjustably mounted on said cable, and movably mounted means engageable by said stop member when said cable is wound beyond a predetermined amount, said movably mounted means including said ratchet slide, whereby movement of said slide transmits corresponding movement to said lever through said interconnecting means to force the lever to move from haul to hold position.

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