United States Patent [19]

Pityo

[11] 3,834,670

[45] Sept. 10, 1974

[54] BOAT ANCHOR WINCH MECHANISM

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[73] Assignee: Reel Power Equipment, Inc., St. Petersburg, Fla.

[22] Filed: Oct. 11, 1973

[21] Appl. No.: 405,586

[52] U.S. Cl. ..... 254/150 R, 114/210, 242/54 R, 254/187 R

[51] Int. Cl. B66d 1/24

[58] Field of Search ..... 254/150 R, 187 R; 114/210, 114/235 WS, 235 B; 242/86.5 R, 86.5 A, 54 R

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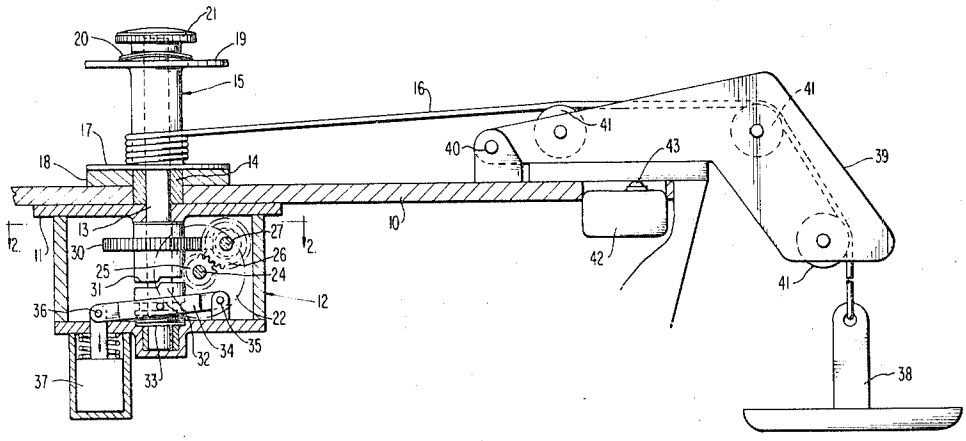
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Primary Examiner—Lloyd L. King
Assistant Examiner—Randolph A. Reese
Attorney, Agent, or Firm—B. P. Fishburne, Jr.

[57] ABSTRACT

A fully enclosed housing for recuction gearing and clutch means is secured to the bottom of a boat deck with only a vertical axis winch spool and shaft projecting above deck. An electric motor attached to one side of the housing below deck forms a right angular drive through the reduction gearing with the winch spool shaft. A winch spool clutch is normally engaged by a spring means and can be disengaged remotely by a mechanical device or by the operation of a motor reversing switch and an associated solenoid to allow free-falling of the anchor.

14 Claims, 5 Drawing Figures



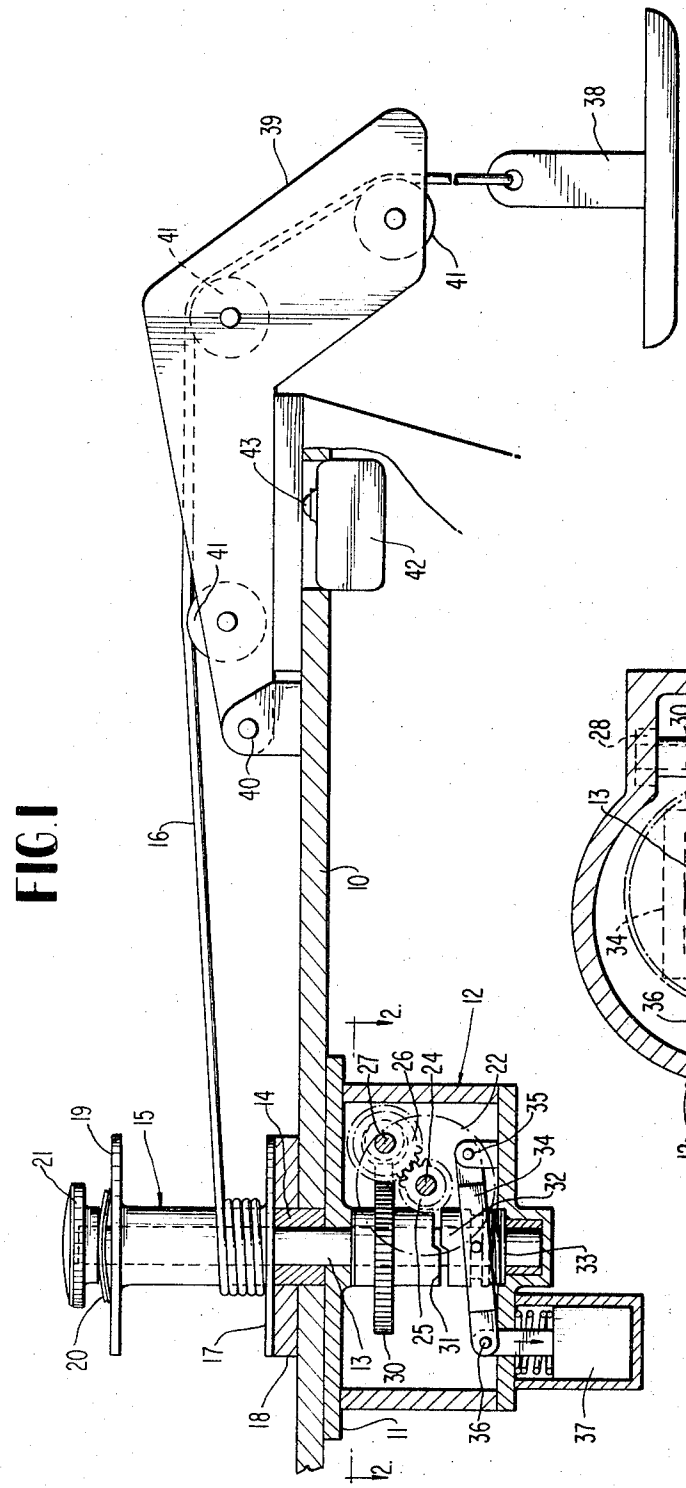


FIG. 1

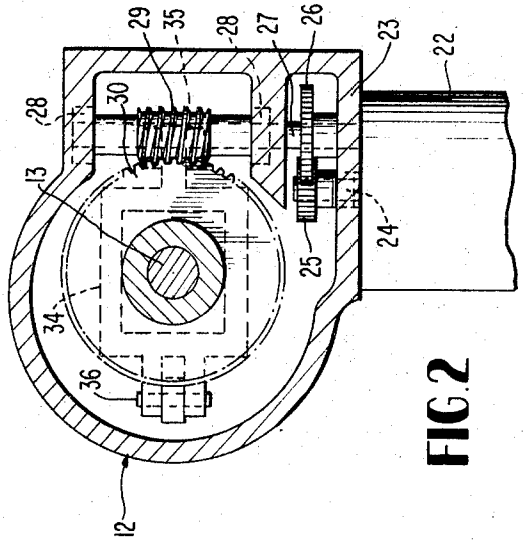


FIG. 2

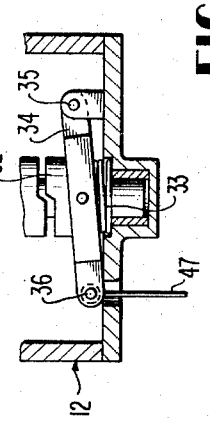


FIG. 5

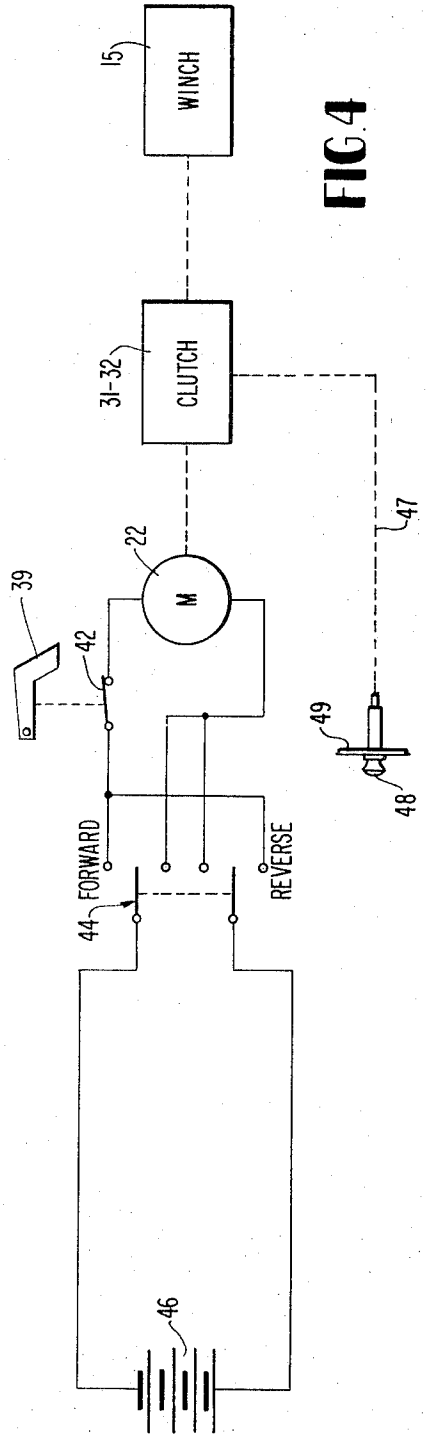

15
WINCH
31-32
CLUTCH
22
M
39
42
47
49
48
FORWARD
REVERSE
44
46

FIG. 4

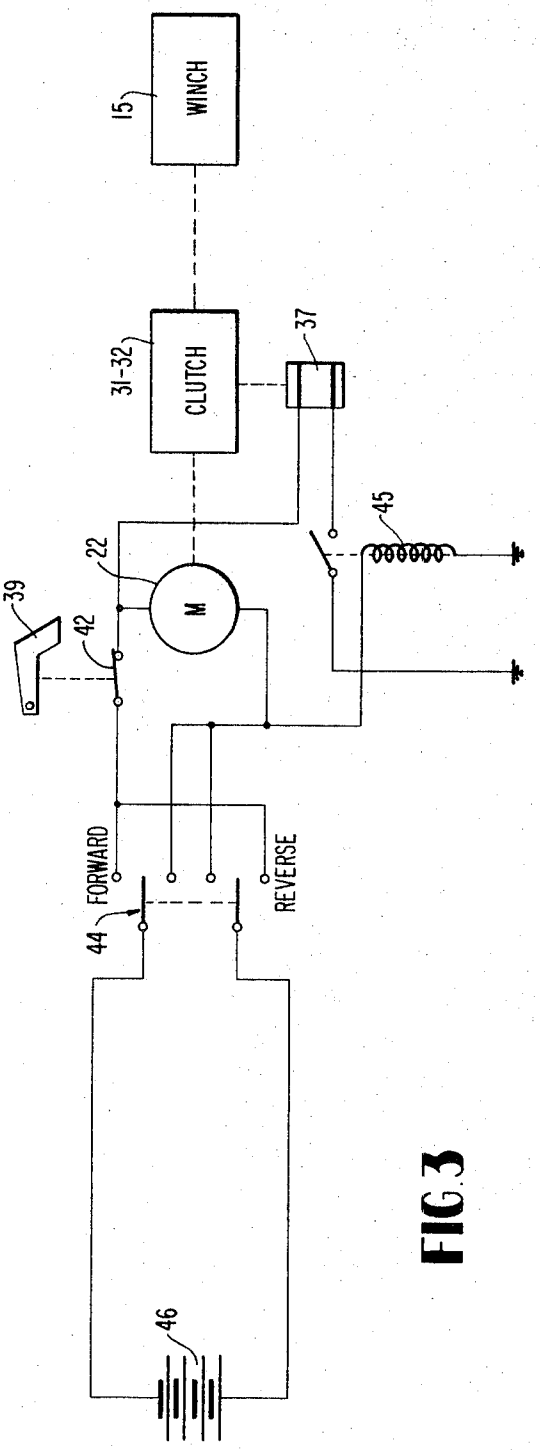

15
WINCH
31-32
CLUTCH
37
45
22
M
39
42
FORWARD
REVERSE
44
46

FIG. 3

BOAT ANCHOR WINCH MECHANISM

BACKGROUND OF THE INVENTION

Boat anchor winches and hoisting mechanisms are known in the art including electrically driven devices. Some examples of the patented prior art are shown in U.S. Pat. Nos. 3,603,561; 3,658,299; 3,709,466 and 2,669,427. In general, such prior art devices have not been widely adopted because they have tended to be excessively costly, rather complex and bulky, including the arrangement of relatively large components above the deck which is awkard and undesirable.

Accordingly, the objective of the present invention is to provide a power-operated boat anchor hoist or winch which is extremely simple in construction, compact and economical to manufacture and install. At the same time, the mechanism of the invention possesses maximum flexibility and simplicity of operation in allowing for a free-fall descent of the anchor or a controlled powered descent or raising thereof, when desired. This flexible or varied operational capability of the mechanism is based upon the provision of a simple clutch device which is normally engaged with a drive gear component but may be released at the will of an operator by merely depressing a push button switch. The winch spool is also equipped with a variable tension spring washer means which serves as an adjustable friction clutch for the spool. In some instances, the clutch may be manually released by a mechanical device such as a push-pull cable having an operating knob arranged on the dashboard of the boat. In all cases, the clutch is spring-biased to an engaged position so that the winch spool is locked when the electric motor is off.

Other features and advantages of the invention will be apparent during the course of the following detailed description.

BRIEF DESCRIPTION OF DRAWING FIGURES

FIG. 1 is a central vertical section through an anchor winch mechanism and associated parts embodying the invention.

FIG. 2 is a horizontal section taken on line 2—2 of FIG. 1.

FIG. 3 is a wiring schematic illustrating the control circuit for the mechanism.

FIG. 4 is a similar view showing a modification.

FIG. 5 is a fragmentary vertical section showing the modification.

DETAILED DESCRIPTION

Referring to the drawing in detail wherein like numerals designate like parts, the numeral 10 designates the deck plate of a boat, to the lower side of which is fixedly secured a mounting flange 11 of an enclosed waterproof housing 12 of the winch unit. Journaled upon the housing 12 is a vertical axis shaft 13 which extends above the mounting flange 11 and through a suitable deck bearing 14 to a point above the deck. Mounted upon the shaft 13 above the deck to turn therewith and having limited axial movement relative to the shaft is a winch spool or reel 15 to which an anchor cable 16 is attached. The lower flange 17 of spool 15 bears against a fixed friction plate 18 while the upper flange 19 is engaged by a variable tension wavy washer 20. The tension of this washer is regulated by a threaded knob 21 on the upper end of shaft 13 so that the spool 15 may be operated under power or in a free-turning mode with variable friction resistance relative to the fixed plate 18. In effect, the washer 20 comprises a variable friction brake for the spool 15 at all times which may be regulated through a wide range from very light friction to heavy friction.

An electric motor 22, such as a DC motor, is fixedly mounted to a side wall portion 23 of housing 12 below the deck plate with its armature shaft 24 extending at right angles to the shaft 13 and offset laterally therefrom. The armature shaft 24 carries a spur gear 25 in mesh with a reduction spur gear 26 on an offset shaft 27 which is suitably journaled in housing bearings 28. The shaft 27 has a worm 29 mounted thereon and driven thereby and this worm is in mesh with a worm gear 30 mounted for free rotation on the vertical shaft 13 within the housing 12.

The lower hub extension 31 of worm gear 30 constitutes one element of a jaw type clutch, the mating element 32 of which is keyed to the shaft 13 below the worm gear to turn therewith while being axially shiftable thereon. The clutch element 32 is constantly biased toward engagement with the mating element 31 by a compression spring 33 in the housing and normally the jaw clutch is engaged so that the spool 15 will be locked through the worm 29 as long as the electric motor is off.

The shiftable clutch element 32 is moved axially to the disengaged or inactive position shown in FIG. 1 by a pivoted fork or yoke 34 having a conventional lost motion connection with the clutch element 32. One end of the yoke 34 is pivoted at 35 to the housing 12 while its opposite end is pivoted at 36 to the armature of a solenoid 37 attached to the housing 12. Whenever the solenoid 37 is activated to draw its armature downwardly as shown in FIG. 1, the pivoted yoke 34 will be pulled downwardly, compressing spring 33 and shifting clutch element 32 free of engagement with mating clutch element 31 on free-turning worm gear 30. Under such circumstances, the boat anchor 38 attached to cable 16 may drop or free-fall under regulation of the friction washer 20 as the only restraining means. When solenoid 37 is de-energized so that spring 33 forces mating clutch elements 32 and 31 into their normal engaged relationship, the anchor will be positively locked in any given position through the medium of the worm gear which serves as a locking means. With the clutch engaged, the anchor may be positively driven in a descending mode or may be elevated by the operation of the reversible drive motor 22. Whenever this motor is de-activated, the anchor will be locked.

The mechanism further embodies an anchor guide and nesting arm 39 pivoted to the deck for vertical swinging movement at 40. The guide arm carries a plurality of guide rollers 41 for the anchor cable 16. A limit switch 42 mounted in the deck is normally closed as shown in FIG. 3 when the arm 39 is down and engaging a switch actuator 43. When the anchor 38 is fully retrieved so that its shank is nested in the arm 39, the arm will begin to elevate around its pivot 40 and will disengage limit switch actuator 43 and open the motor circuit so that retrieval of the anchor will be safely stopped.

The operation of the mechanism can be best understood by reference to FIG. 3 of the drawings. In this figure, a double pole, double throw center off switch 44

is used for reversing the electric motor 22, as well as for energizing an isolated relay 45 for the purpose of operating the clutch release solenoid 37. A source of direct current is indicated at 46 connected across the switch contacts.

When it is desired to drop the anchor 38 in a free-falling mode retarded only by the action of the friction brake effect provided by the tension of washer 20, the switch 44 is held in the reverse mode and while in this position, the relay 45 will be energized and its associated contact closed whereby solenoid 37 will in turn be energized to disengage the two part clutch. When this occurs, the anchor will free-fall as previously described in connection with FIG. 1. It may be noted that while the solenoid 37 is energized to disengage the clutch, the motor 22 will be running in the reverse mode but this is of no consequence as the worm gear 30 is free-turning with respect to shaft 13 and will have no effect on the free-fall of the anchor.

As soon as the switch 44 is released to a center off position shown in FIG. 3, both the motor and the relay 45 and the associated solenoid will be de-energized and the clutch will be automatically re-engaged by spring 33 locking the anchor at a particular position. The anchor will ordinarily be dropped to the bottom and for this purpose the switch 44 will be held in the reverse mode to energize solenoid 37 for a sufficient time to accomplish this.

When the switch 44 is thrown in the other direction to operate motor 22 in the forward mode, the relay 45 will not be energized and an open circuit will exist through the coil of solenoid 37 and the clutch 31–32 will remain normally engaged so that the motor and associated gearing may positively drive the winch spool 15 to reel in the anchor. While the clutch is normally engaged and the switch 44 is in the center off position, the anchor will always be locked at any given position by the natural locking action of the worm gear 30 with the worm 29. That is to say the gear 30 cannot drive the worm 29.

During raising of the anchor, should the motor cause the anchor to override and lift the pivoted arm 39, such overriding will be stopped due to the fact that the elevation of the arm 39 will cause opening of the normally closed switch 42 and this will interrupt the motor circuit. This is a safety feature of the invention.

In order to achieve a controlled or powered descent of the anchor in the mode of operation utilizing the circuit of FIG. 3, the adjustable brake means embodied in the washer 20 and associated parts may be relied upon.

FIG. 4 shows a modification of the invention wherein the clutch releasing solenoid 37 and relay 45 are eliminated thus simplifying the electrical circuit. The other electrical components remain the same, as indicated. As before, clutch 31–32 will be normally engaged by the action of spring 33. Therefore, the motor 22 may be driven in either direction by use of reversing switch 44 to impart to the anchor a controlled powered descent or raising while the clutch is engaged.

Instead of the previously-described electrical means for releasing the clutch, in FIG. 4 there is shown a mechanical push-pull cable 47 connected to the fork or yoke 34 at 36, FIG. 5, or in any other convenient way. The knob 48 of cable 47 may be positioned on the instrument panel 49 of the boat at a convenient location. To release the clutch 31–32 against the force of spring 33, the operator merely pulls the knob 48 and the cable 47 will shift the fork 34 and disengage the clutch. At this point, the anchor 38 will free-fall regardless of whether the motor 22 is off as shown in FIG. 4, or running. As soon as thee knob 48 is released, the clutch will automatically re-engage and the winch spool and anchor will be locked through the worm gearing while the motor switch 44 is in the center off position shown. As stated, with the clutch engaged, the motor 22 can be driven in either direction to raise or lower the anchor with power. It may thus be seen that the invention mechanism is quite versatile or flexible as to its possible modes of operation. A possible third mode of operation is to simply use the unit as a windlass without the free-fall capability, if desired.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. A boat anchor winch mechanism comprising a housing attachable to the bottom of a boat deck, an upright shaft journaled for rotation on the housing and projecting above the housing and above a deck to which the housing is attached, a winch spool on the shaft to turn therewith, said spool disposed above said deck, an anchor and flexible anchor line attached to said spool, guide means for the anchor line remote from said spool, a motor attached to said housing below said deck, a drive gear on the armature shaft of said motor within said housing, reduction gearing in said housing engaged with said drive gear and driven thereby including a worm, a worm gear in mesh with the worm and freely rotatably mounted upon said upright shaft within said housing, a first jaw clutch element carried by said worm gear in said housing, a mating jaw clutch element in said housing and on said upright shaft below the worm gear and turning with the upright shaft but shiftable axially thereon toward and away from the worm gear and first-named jaw clutch element, a spring connected with the mating shiftable jaw clutch element in said housing and urging it into active engagement with the first-named jaw clutch element, a pivoted shifter member for the mating jaw clutch element within the housing, and a normally inactive solenoid connected with said pivoted shifter member and adapted when energized to move the shifter member in a direction which disengages the mating jaw clutch element from the first-named jaw clutch element to thereby allow a free-fall descent of said anchor.

2. The structure of claim 1, and a friction element below the bottom flange of said winch spool, a variable tension element above the upper flange of said spool, and an adjusting nut means on said upright shaft engaging said variable tension element to regulate the tension thereof, thereby regulating the degree of friction between said friction element and bottom flange.

3. The structure of claim 2, and said variable tension element comprising a wavy spring washer surrounding said upright shaft.

4. The structure of claim 1, and said guide means for said anchor line comprising a pivoted vertically swingable guide arm, and a deck mounted limit switch below said guide arm and normally engaged thereby and

maintained in a closed condition by the guide arm to complete a circuit with said motor.

5. The structure of claim **1**, and said motor comprising an electric motor attached to a side wall of the housing with the armature shaft of the motor at right angles to said upright shaft.

6. The structure of claim **5**, and said reduction gearing including a spur gear on the shaft of said worm in mesh with said drive gear on said armature shaft, said drive gear being a spur gear.

7. The structure of claim **1**, and said pivoted shifter member comprising a yoke which straddles said mating shiftable clutch element and has a lost motion connection therewith, one end of said yoke pivoted to said housing on one side of said upright shaft, and the other end of said yoke pivoted to the armature of said solenoid, the armature of said solenoid having an upright axis.

8. A boat anchor winch mechanism comprising a gear and clutch housing attachable to the bottom of a boat deck and having a driven shaft extending above the deck with a winch spool mounted thereon to turn therewith on an upright axis, gearing within said housing including a free-turning gear on said driven shaft, an electric motor connected with said housing below said deck and having its armature shaft coupled with said gearing, a first clutch element on said free-turning gear, a second clutch element mounted on said driven shaft and turning therewith and shiftable thereon toward and away from the first clutch element, a spring means maintaining said first and second clutch elements normally engaged whereby said motor may posiively drive said driven shaft, a shifter means for the second clutch element opposing said spring means and operable to disengage the first and second clutch elements so that an anchor connected with said winch spool may free-fall, and means coupled with said shifter means to operate the same at desired times.

9. The structure of claim **8**, and said means comprising an electrical means including an initiating switch.

10. The structure of claim **9**, and said electrical means comprising a solenoid having an armature coupled to said shifter means.

11. The structure of claim **10**, and said shifter means comprising a pivoted member on said housing having a lost motion connection with the second clutch element.

12. The structure of claim **10**, and said initiating switch comprising a reversing switch for said electric motor, and an isolated relay to control the energizing of said solenoid to separate the second clutch element from the first clutch element, said reversing switch in one operative position energizing and closing said relay to thereby energize said solenoid.

13. The structure of claim **8**, and said means coupled with said shifter means comprising a manually operated mechanical means.

14. The structure of claim **13**, and said mechanical means consisting of a cable operable from a remote station.

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