Feb. 4, 1930. R. F. SYMONDS 1,746,060

WINCH

Filed Jan. 26, 1928

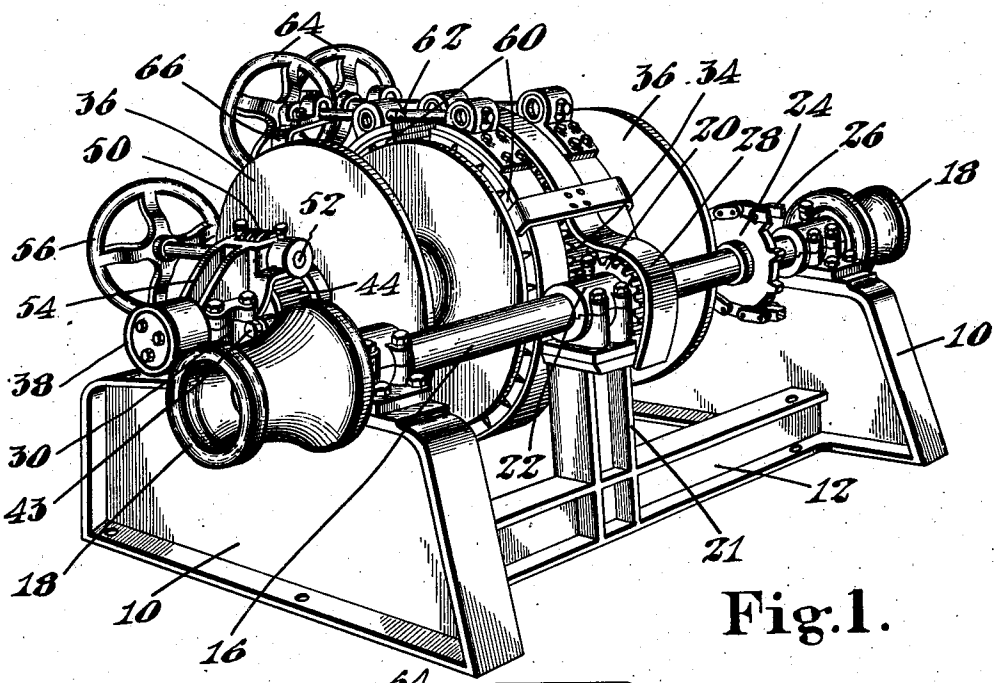
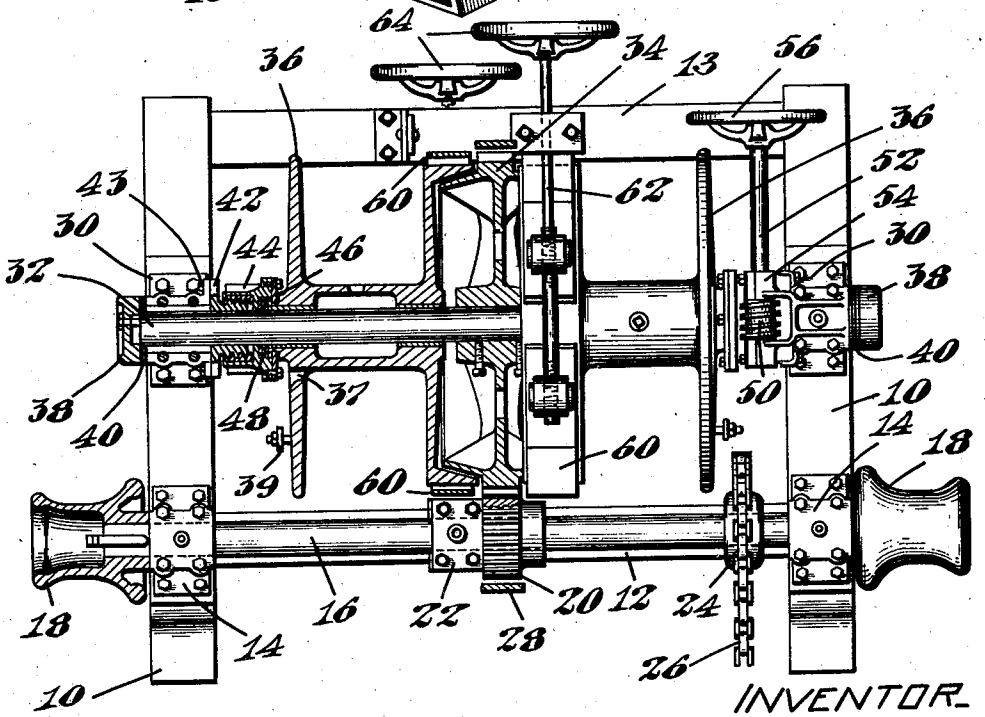


Fig.1.



INVENTOR.

Fig.2.

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UNITED STATES PATENT OFFICE

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WINCH

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This invention relates to winches, and more particularly to winches for use on shipboard in handling trawls, a service where the most exacting requirements are encountered and where the greatest delicacy of control is essential. For example, in bringing the tackle and trawl doors up out of the water, it is necessary to hoist the doors to just the proper height in order to clear the vessel's rail when they are swung inboard, whereas if the hoisting is continued even slightly too long, the tackle will jam in the sheave and the cable will be broken or the gallows frame carried away. Other difficulties to be overcome arise from the fact that on shipboard, in a rough sea, the winch is subject to constant change of position, so that the weight of the moving parts tends to interfere with the driving connections and introduces an element of uncertainty into the performance of the mechanism.

With these considerations in view, it is an object of the present invention to provide a winch of such design that its hoisting drums shall be at all times under the sensitive control of the winchman in respect to starting and stopping, and that the driving of the drums and their operation shall be reliable and uniform regardless of the angle of the deck supporting the winch.

An important feature of the invention consists in a hoisting drum and a clutch member relatively movable into and out of clutching engagement by means of mechanism which includes cooperating threaded members acting at all times in a positive manner for moving one or the other of these elements and maintaining its clutching engagement. The actuation of one of the threaded members is effected, as herein shown, by a worm and worm-wheel under the immediate control of the winchman and such construction presents the further advantage of being non-reversible or self-locking.

Other features of the invention consist in the provision of adjustable means for taking up wear throughout the mechanism and provision for end-thrust occurring in the elements of the winch.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof, selected for purposes of illustration and shown in the accompanying drawings, in which

Fig. 1 is a view in perspective of the winch; and

Fig. 2 is a plan view, partly in section.

The frame of the winch comprises two flanged end pieces 10, connected by a pair of cross girts, comprising a heavy I-beam 13 extending across the rear of the winch and a lighter I-beam 12 extending across the front of the winch, these members being welded at their ends to the end pieces 10 and forming together a rigid frame of great strength. Bolted to the upper flange of the end pieces 10 are journal boxes 14 for a shaft 16. The shaft 16 extends beyond the end pieces 10 at either end and has a pair of small hoisting heads 18 keyed thereto. The cross girt 12 carries an upright post 21, having a journal box 22 at its upper end, which constitutes an intermediate bearing for the shaft 16. The shaft carries a sprocket wheel 24, meshing with a sprocket chain 26, by which the shaft 16 and the winch may be driven from any convenient source of power.

The end pieces 10 carry also upon their upper flanges a pair of journal boxes 30, in which is journaled the transverse hoisting shaft 32. Keyed to the center of the shaft 32 is a large gear wheel 34, meshing with and driven by a pinion 20 fast to the shaft 16. The gear wheel 34 is provided with oppositely disposed tapering clutch surfaces at either side. Hoisting drums 36 are journaled on the shaft 32 at either side of the geared clutch member 34 and are longitudinally movable upon the shaft so that either one may be moved into or out of clutching engagement with the member 34. To this end, the inner flange of each drum 36 is provided with an annular tapering clutch surface which cooperates with the male clutch surface of the member 30.

The hoisting shaft 32 extends entirely through the journal boxes 30 and is provided at each end with a cap 38 of greater diameter than the shaft which engages a series of

thrust washers 40 between its inner face and the outer face of the journal box 30, thus providing for end-thrust in either direction upon the shaft. Each of the journal boxes 30 is flanged at its inner end for connection with a threaded member or sleeve 42, disposed concentrically about the shaft 32 and having a flange by which it is bolted to the flange of the journal box, so that it is held rigidly in place although subject to adjustment, as will be presently explained.

In threaded engagement with the sleeve 42 is a nut 44, carrying a sectional ring 46 which projects into a groove in the hub of the drum 36 so that the nut is connected thereto positively for longitudinal movement, although free for relative rotary movement with respect to the drum. Between the end face of the drum and the inner end face of the nut 44 is located a series of thrust washers 48 which provide for end-thrust between the drum and the nut. The nut 44 is provided upon its periphery with elongated worm teeth with which meshes a worm 50, mounted on a transverse shaft 52 carried by a bearing bracket 54 bolted to each of the journal boxes 30. Each shaft 52 carries at its rear end a hand wheel 56 which the winchman rotates to turn the nut 44 in either direction to move the drum 36 positively toward or from clutching engagement with the clutch member 34.

In order to adjust the longitudinal position of the drum 36 upon the shaft 32, either in assembling the winch or in compensating for wear, the threaded sleeve 42 has provision for rotary adjustment. To this end, the sleeve 42 is provided with a flange having a series of equally spaced bolt holes for bolts 43 which extend through the flange of the journal box 30. By removing the bolts 43, the threaded sleeve 42 may be turned in the required direction and then bolted in place again in any desired position of adjustment.

The outer flange of each hoisting drum 36 is provided with an aperture 37, through which the end of the cable may be drawn, and with a stud 39, over which the cable may be looped before starting a hoisting operation. The hub of the drum is provided with a tapped oil hole, communicating with an oil reservoir located in the body of the hub about the shaft 32.

In order to arrest the movement of the hoisting drum 36 when disengaged from the clutch member 34 and to control its reverse action in paying out the cable, the inner flange of each drum is formed as a brake drum and cooperates with an external band brake, comprising two flexible bands 60 anchored at their lower ends and brought together and connected at their upper ends by a threaded shaft 62 having on its outer end a hand wheel 64. The brake shafts 62 are supported at their outer end by a bearing bracket 66 which is secured to the upper flange of the cross girt 14 at the rear of the winch. A sheet metal guard 28 is located between the brake bands of the hoisting drums and serves to cover the pinion 20 and gear teeth of the clutch member 34.

From the foregoing description, it will be apparent that the longitudinal position of each clutch drum is positively controlled at all times so that there is no danger of variation in the clutching engagement due to the deck angle. For example, if springs or gravity were depended upon to any degree in maintaining the clutching engagement between the drums and the clutch member 34 and the vessel happened to roll so as to tilt the winch down at its left side, the left-hand drum 36 would tend to disengage itself from the central clutch member, so that its driving frictional clutch engagement would be decreased, whereas the drum 36 on the right side of the clutch would tend to settle itself more firmly upon the central clutch member. These variations in action are entirely avoided in the construction herein disclosed.

The operation of the winch described will be apparent from the foregoing description but may be briefly summarized as follows. The trawl cables are usually about three hundred fathoms in length. One end of each cable is secured to one of the drums 36 by being passed through the aperture 37 and looped over the stud 39, and the cable is coiled on the two drums. In setting the trawl, the doors are secured to the free ends of the cable and dropped overboard. The brakes are released and the cable allowed to pay out until the trawl is the desired distance astern of the vessel, whereupon the drums are brought to rest by the brakes.

When it is desired to haul in the trawl, the driving shaft 16 is set in operation and the hand wheels 56 turned to rotate the nut 44 and shift the hoisting drums longitudinally into clutching engagement with the central driven clutch member 34. When the cable has been drawn in to the desired point, the winchman slacks off the hand wheel 56 and simultaneously operates the brake wheel 64, retarding the drum and bringing it to rest in exactly the desired position and when completely disengaged from the clutch member 34. If, after long continued use, an excessive movement of the hand wheel 56 is required to bring the hoisting drum into clutching engagement, the bolts 43 are removed and the threaded stud 42 turned so as to advance the hoisting drum 36 a short distance, for example, one-third of a turn toward the clutch member 34. The threaded stud is then secured in position anew and the winch is in condition to operate as before.

It will be apparent that I have provided

a winch of particularly rugged and durable construction, well adapted to withstand severe usage and unfavorable weather conditions; and, moreover, its mechanical construction may be relied upon for uniform operation and sensitive control.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A winch comprising a frame having a driven shaft, a drum and clutch member carried thereby and movable relatively into clutching engagement, and mechanism for effecting such engagement including a threaded member in fixed position on the shaft, and a nut having a positive rotatable connection with the drum in all positions thereof.

2. A winch comprising a shaft, a drum and clutch member relatively movable thereon, an adjustable threaded member concentric with the shaft, and a nut positively connected to the drum for longitudinal movement therewith in both directions, said drum being freely rotatable with respect thereto.

3. A winch comprising a shaft, a drum and clutch member relatively movable thereon, a threaded member arranged to be held stationary but having provision for rotary adjustment concentrically about the shaft, and a nut upon said threaded member and having end-thrust bearings interposed between itself and the drum.

4. A winch comprising a shaft, a clutch member fast thereto, a drum loose on the shaft, a threaded member concentrically disposed in longitudinally stationary position on the shaft and having provision for angular adjustment about the axis of the shaft, and a nut upon said threaded member having connection with said drum for positively controlling at all times its position with respect to said clutch member.

5. A winch comprising a frame with journal boxes rigidly secured thereto, a shaft journaled therein, caps secured to both ends of the shaft, end-thrust bearings interposed between the caps and said journal boxes, a centrally disposed clutch member, and a hoisting drum located on either side of the clutch member and movable longitudinally on the shaft into clutching engagement therewith.

6. A winch comprising a frame, a driving shaft having a clutch member and a hoisting drum thereon, an adjustable threaded member concentrically disposed with respect to the shaft, a nut on the threaded member and positively connected to the drum, and self locking mechanism for turning the nut.

7. A winch comprising a frame, a shaft journaled therein, a clutch member and hoisting drum on said shaft, an adjustable threaded member concentrically disposed with respect to the shaft, a nut on said threaded member and arranged positively to control the position of the drum with respect to the clutch member, and worm and worm-wheel mechanism for turning said nut.

8. A winch comprising a frame, a shaft journaled in the frame, a hoisting shaft having geared connections therewith including a geared clutch member fast on the hoisting shaft, hoisting drums journaled on said shaft at either side of said clutch member and having each a clutch face cooperating therewith, nuts concentrically disposed on the shaft and connected to each drum, and separate hand wheels with connections for turning either nut to render either drum operative.

9. A winch comprising a rigid frame structure carrying spaced journal boxes, a shaft journaled in said boxes and having an enlarged cap secured to one end, thrust washers interposed between the cap and the outer face of its associated journal box, a driven clutch member secured to the shaft, and hoisting drums movable longitudinally on the shaft into and out of clutching engagement therewith.

10. A winch comprising a frame having a driven shaft, a drum and clutch member carried thereby and movable relatively into clutching engagement, and mechanism for effecting such engagement including a threaded member in fixed position on the shaft, a nut having a positive rotatable connection with the drum in all positions thereof and having gear teeth in its periphery, a worm supported in mesh with said gear teeth, and a hand wheel for turning the worm.

11. A winch comprising a frame having a driven shaft, a drum and clutch member carried thereby and movable relatively into clutching engagement, and mechanism for effecting such engagement including a threaded member in fixed position on the shaft, a nut having a positive rotatable connection with the drum in all positions thereof, and a hand wheel having positive non-reversible connection with the nut for turning the latter in either direction.

RALPH F. SYMONDS.