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R. A. McCLOUD ET AL

3,536,299

WINCH MECHANISM

Filed May 17, 1968

3 Sheets-Sheet 1

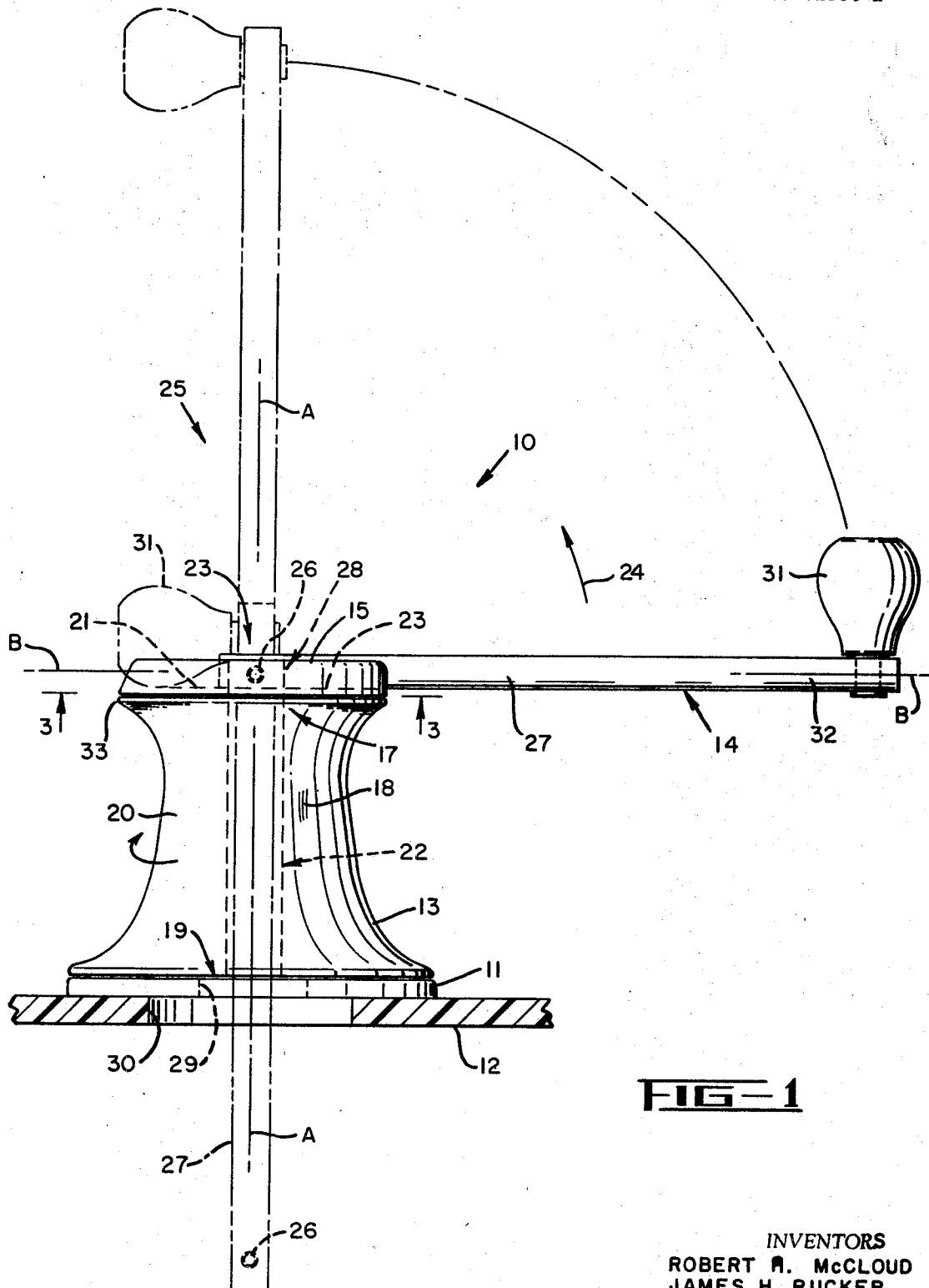


FIG-1

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3 Sheets-Sheet 2

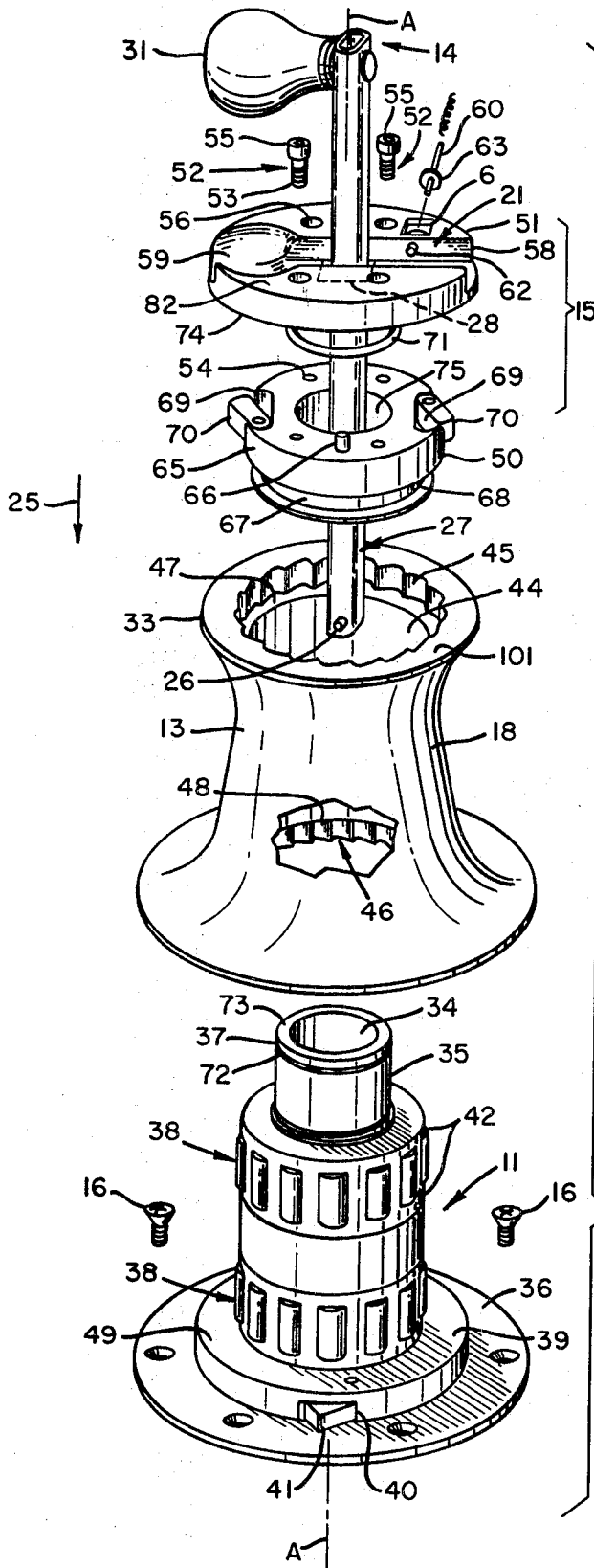
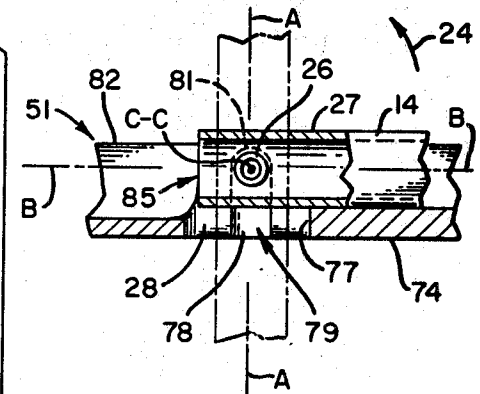


FIG-4

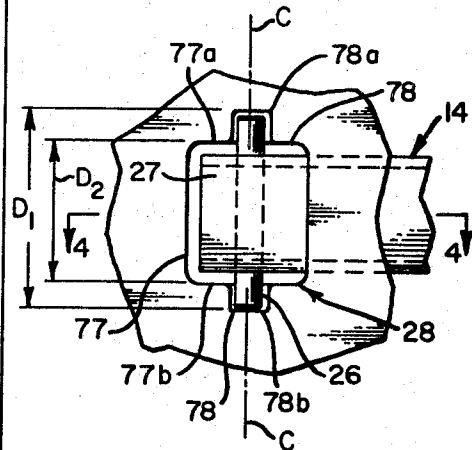


FIG-3

FIG-2

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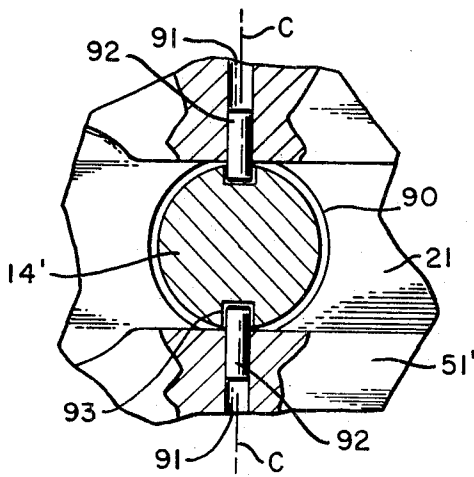
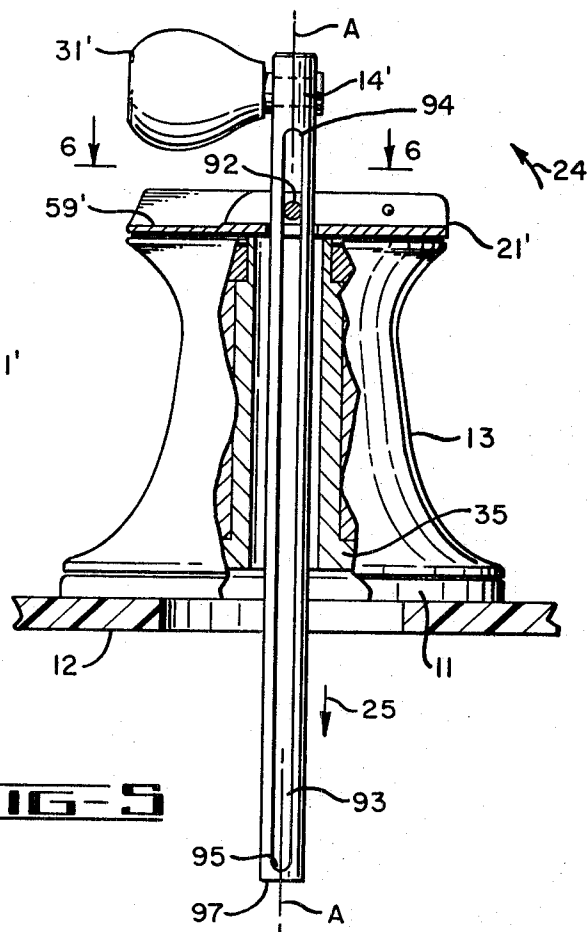
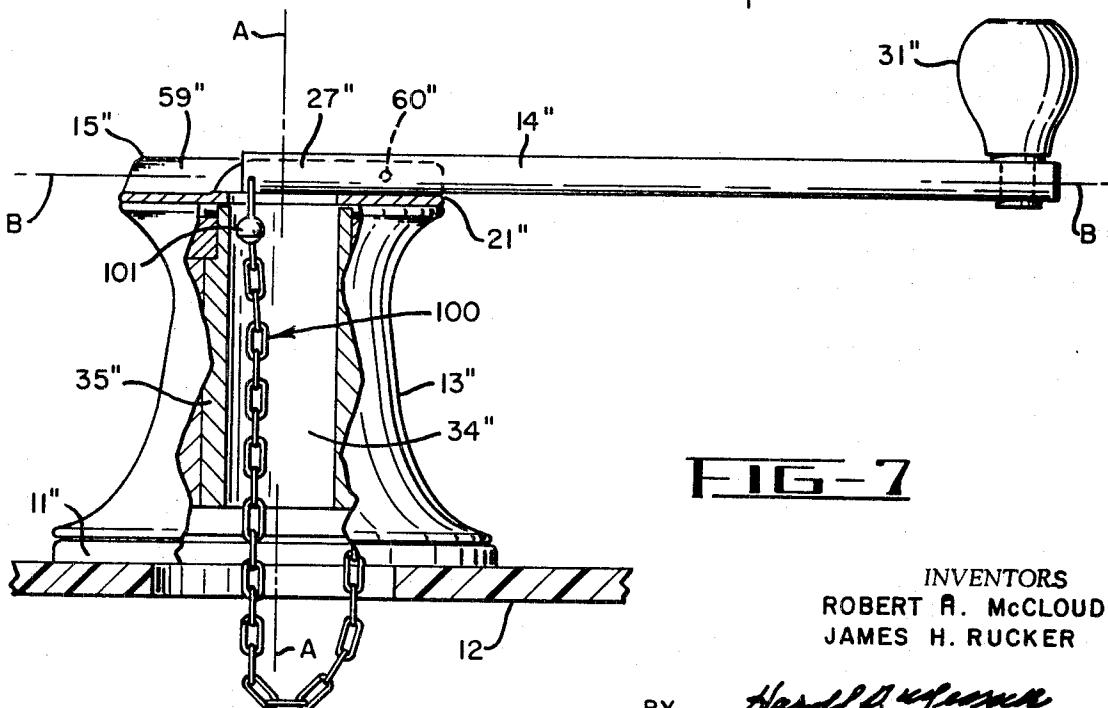
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3 Sheets-Sheet 3



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WINCH MECHANISM

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U.S. Cl. 254—150

7 Claims

ABSTRACT OF THE DISCLOSURE

A top-action winch assembly comprising a hand-powered winch drum adapted to be rotatably mounted by a spindle to a stationary base at a first end of the drum, the winch drum or spindle—singularly or in combination—having wall means therethrough forming a central cavity in communication with at least the second end of the drum opposite the first end for stowably receiving a winch crank or turning bar employed as a lever arm to rotate the drum. A linking assembly connects the turning bar relative to the winch assembly to allow orthogonal reorientation of the bar between a position of repose within the central cavity to a position of leverage atop the drum without severing permanent mechanical connection between the bar and the drum or spindle, said linking assembly adapted to allow limited rectilinear travel of the bar relative to the cavity in at least a direction of movement away from the base, and including means to allow pivoting of the bar at the second end of the drum so as to position the bar in a working plane of rotation transverse to the axis of rotation of the drum.

The present invention relates to winches, windlasses and capstans and more particularly to a hand-powered winch for tensioning running rigging such as sheets, halyards and the like having a centralized recess or cavity, for stowably receiving a winch bar or crank employed to rotate the winch drum about a base attached to a stationary portion of a sailing craft after rotation of the drum and bar has been terminated.

In accordance with the present invention, the turning bar of a top-action winch is stowable within the centralized cavity formed within the winch drum or the mounting spindle, but is capable of being orthogonally reoriented to a position of leverage transverse to the axis of rotation of the drum without severing mechanical connection between the bar and drum, spindle or base, by means of a linkage assembly connected between the bar and the drum, spindle or base. The linkage assembly permits rectilinear movement of the bar relative to the cavity to allow the bar to enter or exit from the cavity but prevents mechanical separation by the construction of enlarged lugs to engage portions of the drum, spindle or base at at least two strategic locations along the rectilinear path of travel of the bar. In this manner, the bar can be limited as to the extent of rectilinear travel in directions both away from and toward the base of the winch assembly.

In accordance with another aspect of the present invention, the drum is driven in rotation by the turning bar through a separately rotatable head cap attached at the top of the winch drum. The head cap includes a clutch adapter which permits rotation of the head cap independent of the drum in a first circumferential direction but couples rotational movement of the head cap to the drum in the opposite circumferential direction of rotation.

In accordance with another aspect of the present invention, the drum is rotatably attached to the base through an elongated spindle or mounting shaft interior of the

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drum attached at one end to the base having a central recess defining at least in part the central cavity forming the repository for the turning bar. A braking adapter is mounted between the spindle and the drum to prevent retrogressive movement of the drum in a direction opposite to its hauling angular movement after the hauling rotation has terminated.

Winches, capstans and windlasses have long been used on sailing ships to provide mechanical leverage for hoisting sails and the like. In its most familiar form, the winch comprises a drum rotatably mounted on a spindle and having a winch bar installed diametrically through the drum serving as a lever arm to turn the drum.

Today's pleasure and racing sailing boats require the need for a capstan-like hand-powered winch for, inter alia, pulling in sheets, hoisting the halyards and controlling the position of the boom. Where it is desired to compete in sailboat races, the speed with which the various rope pulling functions are performed must be maximized.

One of the problems in employing a top-action winch (a winch having a capstan bar attached to the drum at the upper end of the winch opposite to a fixed base) is that the winch bar must be mechanically disconnected from the drum when release of the running rigging from the drum is desired. To couple the running rigging to the drum, it is customary to form several turns or loops of rigging in gripping contact with the drum. As the drum is rotated and the rigging is played over the drum, it is customary to draw off the first formed turns to prevent overwrapping by the later formed turns so that a constant number of turns remain coupled to the drum. The removed turns constitute the standing part of the rigging as opposed to the hauling rigging attached between the drum and the object undergoing movement. When it is desired to release the loops of rigging from the drum, upward force is applied to the turns permitting them to slide from the working surface of the drum in a direction away from the base of the winch. In prior art winches, of which I am aware, prior to release of the loops, the bar must be mechanically disengaged from the winch assembly and stowed at a remote location. Although latching means may be provided for the bar at the stowing location, often in the excitement associated with sailing, the bar may be left unsecured and lost overboard necessitating the carrying of spares for such an emergency. It is therefore an object of the present invention to provide a winch assembly in which the turning bar remains permanently linked to the winch assembly to prevent misplacement of the bar yet such linkage functioning in a manner that does not interfere with the release mode of the operation of the winch, viz, as the loop of rigging are released from the working surface of the winch drum.

Other objects and advantages of the present invention will become more apparent from the following description, in which:

FIG. 1 is an elevational view of the winch assembly of the present invention illustrating the paths of movement of the turning bar of the winch as the bar is orthogonally reoriented from a leverage position to a stowed position interior of the winch;

FIG. 2 is an exploded, perspective view of the drum of FIG. 1 illustrating the winch assembly of the present invention in more detail.

FIG. 3 is a sectional view along 3—3 of FIG. 1, illustrating the linking assembly for the winch of FIG. 2.

FIG. 4 is a sectional view along line 4—4 of FIG. 3;

FIG. 5 is a side elevation of a modified winch assembly of the present invention illustrating a second embodiment of the linking assembly of FIGS. 3 and 4;

FIG. 6 is a sectional view taken along line 6—6; and FIG. 7 is a sectional view of yet another modified winch assembly of the present invention illustrating a third embodiment of the linking assembly of FIGS. 3 and 4.

Reference is now made to the drawings. As shown in FIG. 1, the winch assembly 10 of the present invention includes a base 11 adapted to be fixedly mounted to a structural member of a sailing vessel, say deck 12. A winch drum 13 is rotatably mounted at one of its ends to the base 11 for rotation about a central working axis A—A coincident with the axis of symmetry of the drum. In order to drive the drum 13 in rotation about working axis A—A, an elongated winch bar 14, of rather long extension, is attached at the top of the drum 13 through a separately rotatable head cap 15. When in a leverage position with respect to the drum 13, the bar 14 is seen to extend from the head cap 15 in a transverse direction with respect to the working axis A—A. The bar 14 is rotated while extending from the drum in the leverage position depicted in FIG. 1, the movement of the bar is confined to a plane of rotation B—B intersecting, as shown, working axis A—A. To provide rotation of the drum, the bar 14 may be operated in either of two modes—rotated a full 360° with each revolution of the drum (direct coupling mode), or in incremental, angular steps through a clutch adapter generally indicated at 17 in FIG. 1 (ratchet coupling mode). In either operating mode, the bar 14 provides mechanical leverage to cause rotation of the drum 13 about working axis A—A. The total number of revolutions of the drum determines the total length of running rigging drawn across the drum and hence the incremental distance an object attached to the rigging sails, booms or the like is moved with respect to a reference plane. To couple the running rigging to the drum, it is customary to form several loops of the rigging about the drum and as the drum is rotated and incremental segments of rigging drawn across the drum, to draw off first formed loops so that a constant number remain coupled to the drum. The removed loops constituted the standing part of the rigging as opposed to the hauling part attached between the drum and the object undergoing movement. To prevent premature release of the loops, the drum is enlarged at its ends to provide a concave working surface 18 with respect to the geometric center of the drum.

To prevent retrogressive angular movement of the drum after leverage force is released from the bar 14, the winch is provided with a braking adapter generally shown at 19 between the base 11 and the bottom end of the drum. As explained in more detail below, the adapter 19 permits angular rotation of the drum in only one angular direction, say in the direction of arrow 20 with respect to the working axis A—A.

Release of the loops of rigging from the drum is customarily achieved by applying upward force to the loops permitting them to slide from the working surface 18 as the drum remains stationary. Since release of the loops is usually upward through the plane of rotation B—B, bar 14 must be relocated from its transverse position with respect to the drum. In prior art winches of which I am aware, prior to release of the loops, the bar is mechanically disengaged from the drum and stowed at a remote location. Although mechanical latching may be provided for the bar at the storing location, exigencies associated with operating the vessel may arise which prevent the securing of the bar and thus allow the bar to be lost overboard or otherwise misplaced. It would therefore be desirable to provide a winch assembly in which the bar remains linked permanently to the assembly to prevent misplacement yet such linkage not interfere with the operation of the assembly as the loops of rigging are released from the working surface 18 of the drum.

In accordance with the present invention, the drum 13 and head cap 15 are constructed with a longitudinally extending cavity 22, preferably cylindrical, terminating in open communication with the top of the head cap adja-

cent to transverse slot 21 by which bar 14 is accommodated within plane of rotation B—B. Permanent connection of the bar 14 relative to base 11, drum 13 and head cap 15 is provided by a linkage assembly generally indicated at 23 in FIGS. 1—4; indicated at 23' in FIGS. 5 and 6 and at 23'' in FIG. 7.

Briefly, the linkage assembly of the present invention provides for connection of bar 14 with base 11, drum 13 or head cap 15 as well as permits pivotal movement of the bar at the exterior of the cavity 22 in a plane which intersects both the plane of rotation B—B and the working axis A—A. It will be appreciated that pivoting of the bar 14 exterior of the cavity provides for orthogonal reorientation of the bar with respect to cavity 22 so that the bar can be removed from the plane of rotation B—B, travelling along the direction of arrow 24 to a position atop the head cap 15, as shown in phantom line in FIG. 1. As illustrated, the bar thus assumes an axially aligned position with cavity 22, i.e., its longitudinal axis becomes aligned with that of cavity 22, so that rectilinear movement of the bar toward the base 11, in the direction of arrow 25 places the bar in a position of repose within cavity 22. In this manner, the cavity 22 provides a centralized stowing repository for the bar 14 yet when the bar is so positioned, there is no interference with the release of the loops of rigging from the working surface 18 of the drum.

Rectilinear movement of the bar along working axis AA is limited, however. As shown in FIG. 1, the bar 14 may be provided with enlarged lug section such as transversely extending pin 26 at the shank 27 of the bar. The length of the pin 26 is controlled to be less than the diameter of the side wall forming cavity 22 so as to allow travel of the bar relative to the cavity, but to be greater than that of a wall segment along the cavity, say apertured throat segment 28 of head cap 15 formed of reduced size in the plane of travel of the pin. Accordingly, the limit of travel of the bar in a direction away from base 11 occurs with the engagement of the pin 26 with throat segment 28. Travel of the bar toward the base 11 may be limited in a similar manner. For example, an end wall (not shown) may be formed in base 11 to contact the shank 27 of the bar ("closed end construction"). Alternatively, base 11 may be provided with aperture 29 and deck 12 provided with aperture 30 in alignment with each other and cavity 22 ("open end construction"). In such case, knob 31 mounted to handle 32 of the bar can be used to terminate downward rectilinear travel by its engagement with the exterior surface of the head cap 15. It will be appreciated that the use of apertures 29 and 30 aligned with cavity 22 permits the use of ultra-long turning bars inasmuch as a portion of the shank 27 of each bar can be accommodated below deck, as shown in phantom in FIG. 1.

When knob 31 is placed in contact with the exterior surface of the head cap 15, sufficient clearance must exist to permit the release of the turns of rigging from the working surface 18 of the drum. Accordingly, the length of the knob 22 is controlled in relation to the diameter of the head cap 15 and drum 13 so as to prevent the knob from extending beyond the circumferential edge 33 of the drum when the bar is positioned with the cavity 22. In that manner the turns of rigging released from the drum do not become tangled or otherwise obstructed irrespective of the fact that the bar is positioned centrally of the released turns within cavity 22.

It will be appreciated that coupling of the angular movement of the bar in plane of rotation B—B to the drum can be accomplished in several ways, for example, through the linkage assembly 23 of FIG. 1, or by surface contact between shank 27 of the bar and slot 21 grooved across the upper surface of the head cap 15. Since the leverage force provided by movement of the bar is proportional to the magnitude of the force applied to the rigging, it is desirable that the joint, when power is transferred, has good mechanical strength characteristics. Ac-

cordingly, it is preferred that the joint of power transfer be between the shank 27 of the bar and the slot 21 where surface contact—and hence good mechanical strength—exists.

FIG. 2 illustrates the fabrication of the winch assembly of the present invention in more detail. As shown, the base 11 is preferably provided with a spindle section 35 attached at one end to a transverse annular support plate 36 and having spaced along its exterior side wall 37 a series of roller bearings 38 which contact the interior side wall of drum 13. At the interior of the side wall 37 of the cylindrical spindle section 35 is a central recess 38 forming at least in part the repository for stowing the turning bar 14. As previously mentioned, the central recess 34 is preferably open at both ends so as to permit full penetration by the bar 14 through support plate 36 but can be closed at one or both ends to intercept the shank 27 of the bar 14.

Attachment of the spindle and support plate can be integrally forming these elements or, if individually constructed, they can be joined by welding or similar fastening techniques. Positioned exterior of the joint of the spindle 35 and the support plate 36 is support ring 39 formed with first and second cut-out sections 40 at diametrically opposed locations at the edge of the ring into which are attached spring-loaded pawls 41. As explained in more detail below, the pawls 41 are constructed so as to ride in rack 46 formed at the interior of the drum 13 to provide braking action to the drum so as to prevent retrogressive movement of the drum after hauling angular movement is terminated.

The height of the spindle must be correlated with the widths of the races 42 of the roller bearings 38 and support ring 39 so as to locate these parts in correct relationship with mating parts of the drum 13 and head cap 15. In more detail, the drum 13 is provided with constant diametered wall surface 44 interior of convexed working surface 18 interposed between first and second continuous sawtoothed racks 45 and 46, each of which having a diameter slightly larger than that of the wall surface 44 and separated therefrom by a shoulder 47 and 48, respectively. After the support ring 39 and bearings 38 have been mounted in abutting end-to-end contact on the spindle by sliding first the support ring 39 and then the bearings 38 onto the spindle, the drum is mounted about the spindle by sliding the drum over the bearings. When shoulder 48 of rack 46 contacts the upper surface 49 of the support ring 39, the pawls 41 become positioned within pockets of the rack 46 forming the braking adapter. By pivoting mounting the pawls to the ring 39, as shown, it is apparent that as counterclockwise hauling movement of the drum occurs, the pawls slide from pocket to pocket of the rack 46 without interference. But braking force is applied when the hauling movement is terminated to prevent retrogressive clockwise movement of the drum relative to the spindle.

To provide rotational hauling movement to the drum, the head cap 15 is rotatably mounted about the upper end of the spindle and includes a cylindrical hub section 50 depending from a planar head housing 51 of larger diameter than the hub section 50. Attaching the hub section 50 to the head housing 51 are a plurality of machine screws 52 having threaded shanks 53 which are received by the threaded side walls of openings 54 in the hub section 50 and enlarged heads 55 positioned in countersunk holes 56 in the head housing 51 so as to be positioned flush with the upper exterior surface of the housing and thereby provide a smooth, even exterior free from obstructions.

Extending across the upper surface of housing 51 is transverse groove 21 comprising receiving slot 58 along a major section of its length but one end having its side walls outwardly swaged to form a seating region 59 into which can be seated knob 31 of the bar. As previously mentioned at the end opposite seat region 59, the rec-

tangular cross-sectioned slot 58 is constructed to receive the shank of the bar along a major portion of its length so that leverage forces can be applied through the bar to the head cap at a joint having good mechanical strength characteristics. To provide disconnectable coupling between the bar and head cap when the bar is aligned within receiving slot 58, a latching assembly is provided comprising a spring-loaded pin 60 fitted within elongated opening 61 and in communication with the slot 58 through an aperture 62. The pin 60 is brought into contact with an appropriately located opening in bar 14 when the bar is transversely aligned within the slot 58. The pin is removed from contact with the bar by movement of the pin 60 away from contact with the bar, as provided by manual force being brought into contact with flange 63 of the pin 60.

Hub section 50 of head cap 15 is provided with central section 65 having guide pin 66 at its mating surface with planar housing 51 for keying these parts in correct azimuthal orientation with respect to each other for reasons explained below, and a shank section 67 of smaller diameter defining shoulder 68 which mates with shoulder 47 of rack 45 at the interior wall of the drum. The central section 65 is also provided with diametrically opposed cut-outs 69 at the circumferential edge into which spring-loaded pawls 70 are pivotally mounted for contacting the pockets of saw-toothed rack 45 so as to directly couple hauling angular movement of the head cap to the drum. It will be apparent that the pawls 70 and rack 45 constitute the clutch adapter of the present invention and furthermore, that the slope of the saw teeth of the rack 45 must be oppositely oriented to that of rack 46 to permit the head cap to be operated in a ratcheting mode independent of braking forces applied by the braking adapter.

To prevent disengagement of the head cap from the spindle, yet allow rotation therebetween, a snap-ring 71 is fitted within grooves 72 at the upper end of the spindle 35. Since the depth of the rack 45 is about matched to the width of the central section 65, assembly of the drum about the base places the upper end flange 73 of the spindle in a terminal location adjacent to lower surface 74 to the head housing 51. Accordingly, by careful adjustment in the relative dimensions of the parts, the end face 73 may be terminated in contact with the lower surface 74 to form a watertight joint therebetween and prevent water intrusion into bearings 38. Of course, a separate O-ring assembly can also be provided by forming a retaining groove at the transverse face 73 of the spindle 35 into which can be placed an O-ring (not shown).

Bar 14 need not be rotated a full 360 degrees to provide rotation of the drum. Discontinuous rotation of the drum in a clockwise direction can be maintained by a ratcheting action of the bar 14, provided by the release of pawls 70 from rack 45. In this regard it should be noted that as the bar 14 undergoes recovery motion in a direction counterclockwise with respect of the drum to the axis AA of the assembly, retrogressive movement is prevented by the pawls 40 being placed in engagement with two of the pockets of rack 46.

Hub section 50 of the head cap 15 as well as head housing 51 are apertured to allow rectilinear movement of the bar 14 along the working axis AA of the drum. For example, the central section 65 and the hub section 67 include a central aperture 75 of sufficient diameter to allow passage of both the shank 27 as well as transverse pin 26 of the bar. Similarly, the aperture 28 of the head housing 51 permits passage of the shank 27 but moreover limits its total extent of rectilinear travel along the axis AA of the drum.

In preventing release of the bar from the winch, the mode of operation of the aperture 28 in combination with transverse pin 26 of the turning bar 14 constitutes the linkage assembly 23 of FIG. 1 and is shown in detail in FIGS. 3 and 4.

In FIG. 3, aperture 28 of the head housing 51 is illustrated in detail and, as shown, includes side walls 77 of rectangular cross section symmetrically located about axis AA of the winch assembly, at opposed segments of which, elongated slots 78 parallel to the axis AA are constructed for receiving pin 26 of the bar 14. The dimensions of the aperture 28 are sufficient to permit travel of the shank 27 of the bar 14 relative thereto but to limit travel of pin 26 attached to the bar. As shown in FIG. 3, the transverse length of the pin 26 is slightly less than the transverse distance D_1 between opposite side walls 78a and 78b of the slots 78 but is longer than transverse distance D_2 between opposite side walls 77a and 77b of the aperture 28. Accordingly, movement of the pin 26 and the bar is permitted within the aperture 28 only to the extent that the pin 26 can be moved within the slots 78. As shown in FIG. 4, entrance 79 of slots 78 is located at the lower surface 74 of the head housing 51 while terminal curved wall 81 is located below the upper surface 82 of the housing 51 in the plane of rotation BB. The curvature of the wall 81 is preferably matched to that of the pin 26 so that the bar can easily pivot after mating surface contact has occurred to reorient the bar from a position of axial alignment with the axis AA to an orthogonal position of repose within the groove 21 of the head cap. Accordingly, the pin 26 is preferably of circular cross section, the radius of which is matched to the center of formation of the curved wall 81. To maintain alignment between the path of travel of the pin 26 with the stationary location of slots 78 as the bar undergoes rectilinear movement along the axis AA, the bar is dimensioned so as to prevent its rotation about the axis AA, as by forming at least its shank 27 of rectangular cross section, the outside dimensions of which being slightly undersized with respect to those of aperture 28 to permit rectilinear travel therebetween but preventing relative rotation. Furthermore, in its construction, the bar need not be formed from solid bar stock but can be formed of hollow core bar stock, as shown, to reduce weight without sacrificing strength.

Orthogonal reorientation of the bar is accomplished by pivoting the bar about pivot axis CC of FIG. 3 connecting the centers of formation of the curved walls 81 of the slots 78. As seen in FIGS. 3 and 4, the pivot axis CC is not only normal to the plane of rotation BB and the working axis AA, but also is located at their point of intersection. As the bar is pivoted from a position of repose within the groove 21 in the direction of arrow 24 of FIG. 4, the terminal face 85 of the bar must clear the side walls 77 of the aperture 28. Accordingly the final chosen distance between the face 85 and the pin 26 must take into account the width of the aperture 28 assuming the axis of rotation CC intersects the working axis AA as shown, the length of the slots 78 and the dimensions of the groove 21.

It should be apparent from FIG. 4 that the placement of the pin 26 within the slots 78 prevents mechanical separation of the bar from the central section 65 by forces acting along the longitudinal axis of the bar. With rectilinear travel of the bar along the working axis AA, even though the pin is clear of the slots 78, as depicted in FIG. 2, the central recess 34 of the spindle 35 still prevents separation of the bar from the winch assembly. After continued rectilinear travel in the downward direction, i.e., in the direction of arrow 25 in FIG. 2, separation is prevented by the engagement of the knob 31 of the bar 14 with the seating region 59 of the head cap 15.

FIGS. 5 and 6 illustrate the operation of a second embodiment of the present invention. As shown, the winch drum 13 mounts the base 11 including spindle 35 in the manner previously described. However, the head cap 15 attached to the drum 13 is modified as shown in FIG. 6 so as to define central apertured throat segment 90 of circular cross section within head housing 51 having diametrically opposed recesses 91 from which extend a pair

of transversely extending lugs 92 of circular cross section. The magnitude of extent of the lugs 92 relative to the side wall of the aperture 90 is controlled so as to provide keying engagement with keyways, or slots, 93 in the bar 14'. These slots are diametrically located with respect to the axis of symmetry of the bar and extend longitudinally over nearly its entire length. Lugs 92 remain stationary as the bar 14' undergoes rectilinear movement along the axis AA of the assembly, or pivotal movement about pivot axis CC defined by centers of formation of the lugs 92 but remained coupled to the slots 93 of the bar irrespective of the orientation of the bar with respect to the working axis AA of plane of rotation BB.

At the handle of the bar, the slots 93 terminate at curved end wall 94 having a center of formation equal to the radius of formation of the lugs 92; similarly, at the shank of the bar, the slots terminate at curved end wall 95 similarly fashioned as end wall 94 to provide a good pivoting surface for the bar 14'. Accordingly, it is apparent that on operation the bar can be orthogonally reoriented when curved end walls 95 are engaged by the lugs 92, say from a position elevated above the head cap to a position along plane of rotation BB.

As the bar is pivoted from a position within the groove 21' in the direction of arrow 24, the terminal face 97 of the bar must clear the side wall of the aperture 90. Accordingly, the final chosen dimension of separation between the face 97 and the curved end walls 95 must take into account the diameter of the aperture 90, the height of the lugs above the intersection of the aperture 90 with the groove 21' and the dimensions of the groove 21'.

It should be apparent from FIG. 6 that the placement of the lugs 92 within the slots 93 prevents mechanical separation of the bar from the head cap 15' irrespective of the position of the bar with respect to the plane of rotation BB or its relative position along the working axis AA of the assembly. Termination of the rectilinear travel of the bar along the direction of arrow 25 can be terminated by either the lugs 92 contacting the curved end walls 94 of the slots 93 or by the knob 31' of the bar 14' contacting the seating region 59' of the head cap 15'.

It will be appreciated that manufacture of the drum 13 need not occur where the base 11 is fabricated. Each of these parts can be manufactured at separate locations and then assembled at any convenient location, such as aboard the sailing vessel where use of the winch is intended. For example, with reference to the embodiment depicted in FIG. 2, it can be seen that the base 11 can be first mounted to the deck 12 as by use of screws 16 extending through openings in the support plate 36 of the base. After the support ring 39 and bearings 38 have been mounted about the spindle 35, the drum 13 is disposed about the spindle in contact with both support ring and bearings whereby the pawls 41 are located within two of the pockets of the rack 46 at the interior of the drum to form the braking adapter of the present invention.

The hub 50 of the head cap 15 is next attached to the spindle 35 and locked in place by snap ring 71 whereby pawls 70 attached to hub section 15, as previously mentioned, are placed within two of the pockets of the rack 45 also at the interior of the drum to form the clutch adapter of the present invention. Head housing 51 of the head cap 15 is then attached to the hub section 50 by the machine screws 52. Attachment of the bar 14 to the head cap 15 can be accomplished in several ways, inter alia, (1) prior to attaching the head housing 51 to the hub section 50, the bar 14 (with pin 26 removed from the shank 27) is inserted through the head housing 51. Pin 26 is then attached to the bar. The head housing 51 (with the bar 14 attached thereto) is attached to the hub section 50, (2) after the head housing 51 has been attached to the hub section 50, the bar 14 (with the pin

26 removed from contact with shank 27) is inserted through the spindle 35, support plate 36 and deck 12. The pin 26 is then attached to the bar from a location below the plane of deck 12.

FIG. 7 depicts an alternative method of attaching the bar 14". As shown, chain 100 of predetermined length and formed of a series of connected links is attached to (a) the shank 27" of the bar 14" by means of a ball-in-socket swivel 101 (b) either the head cap 15", drum 13" or the base 11", attachment to the base 11" being depicted in FIG. 7. As seen, the central section of the chain 100 is accommodated within the central cavity 34" of the spindle 35" when the bar is positioned in the plane of rotation BB as shown and includes a swivel. Attachment of the bar 14" to the groove 21" of the head cap in the plane is maintained by a latch assembly including 60" previously described. When the bar 14" (i) is removed from the plane of rotation BB, (ii) pivoted to elevated position atop the drum 13", (iii) undergoes rectilinear movement along the axis AA and (iv) contacts the seating region 59" of the head cap, the central segment of chain 100 will be located below the plane of deck 12.

Formation of a centralized repository for stowing of the turning bar of the present invention need not be limited to use of a spindle 35 extending the full extent of the drum 13, as, for example, depicted in FIGS. 1 and 2. The spindle can be made much shorter. In another embodiment, it is contemplated that after the hub section 50 of head cap 15 has been mounted in contact with shoulder 47 of the rack 46 at the interior of the drum 13, a separate annular plate (not shown) having the outside diameter equal to that defined by circumferential edge 33 of the drum and an inside diameter less than the outside diameter of the hub section 50, is attached to flange 101 of the drum by flush fitting screws or the like. By having the annular plate overlap the plane of location of the hub section 50, movement of the hub section is prevented along the axis AA in either direction. Thus the hub section 50 is fixed in elevation with respect to the base 11 and can serve as a mounting block for the head housing 51 when attachment thereto by machine screws 52 occurs. In this manner, it is apparent that the cavity defined by side wall 44 of the drum functions in combination of the spindle recess 34 to form a repository for the bar. It is also apparent that the drum need not be mounted to a central shaft to be able to rotate relative to a fixed base. For example, the drum 13 can be made to rotate interior of a cup-shaped base in which the drum is rotatably fitted within the recess of the base with the exterior of the drum being rotatably mounted to the elongated side wall through bearings. Accordingly, the repository space provided by the drum alone is correspondingly increased over embodiments previously described.

Although specific embodiments of the present invention have been described, the invention is not to be limited to only such embodiments, rather by the scope of the appended claims.

We claim:

1. In a winch mechanism for providing windup force for the running rigging of a sailing vessel, of the type having a first member having a base means adapted to be fixedly mounted to a deck, mast or the like, and a second member rotatably mounted to said first member, said second member having a working surface for operative engagement with said running rigging, a turning bar having a first end segment attachable to said second member in a leverage position for rotating said second member relative to said first member about a working axis intersecting said first member and a second end segment opposite to said first segment attached to an enlarged knob extending perpendicular to the longitudinal axis of said bar, wall means in at least one of said members adapted to provide a central cavity forming a repository

for stowably receiving said turning bar when said turning bar is disconnected from leverage engagement with said second member, linking means for connecting said turning bar to one of said members to thereby prevent mechanical disconnection between said one member and said bar and possible misplacement of the bar adapted to allow limited rectilinear travel of said bar relative to said one member from said stowed position along said cavity in a direction away from said base means of said first member and including means to allow pivoting of said turning bar relative to said first and second members after travel away from said base means of said first member by said turning bar has terminated and positioning of said bar in a working plane of rotation intersecting the working axis of said second member whereby leverage force applied through said turning bar to said second member causes rotation of said second member about said working axis, the improvement comprising single groove means in said second member for disconnectably connecting said turning bar to said second member in said leverage position of rotation, said groove means including an enlarged, shaped recessed portion adapted to receive said knob of said turning bar when said bar is stowably stored within at least one of said members, and in which said pivot allowing and positioning means includes (i) enlarged lug means attached to one of said turning bar and said second member, (ii) wall means in the other of said turning bar and said second member adapted to engage said lug means to limit rectilinear travel of said bar relative to said central cavity from said base of said first member, (iii) anti-rotational means formed between said turning bar and said second member to prevent rotation about its longitudinal axis at least as said bar travels along said central cavity, (iv) said lug and wall means adapted to engage one to the other at said limiting position of travel of turning bar from said base toward said leverage position, yet permit rotation in unison in said leverage portion, (v) one of said enlarged lug means and said wall means being provided with rectilinear movement while the other of said enlarged lug means and wall means is stationary.

2. The improvement in accordance with claim 1 with the addition of surface actuated clamping means in said groove means for disconnectably connecting said turning bar thereto in said working plane of rotation of said bar.

3. The improvement of claim 1 in which said enlarged lug means is attached to said turning bar at a preselected location therealong and is movable therewith, and said wall means is formed in said second member and is stationary therewith, said wall means including apertured throat means in positional alignment with said central cavity of said one member and adapted to be dimensionally larger than said bar to allow rectilinear travel of said bar therethrough but dimensionally smaller than said enlarged lug means so as to engage said lug means to thereby limit travel of said bar in said direction away from said base means of said first member.

4. The improvement of claim 3 in which said anti-rotational means is formed by having said wall means and said turning bar being of rectangular cross section and suitably dimensioned to prevent relative rotation therebetween about the longitudinal axis of said bar.

5. The improvement of claim 1 in which said second member comprises a hollow drum having a side wall exteriorly terminating in said working surface adapted to engage said running rigging of said vessel, and interiorly terminating in rotatably mounting contact with said first member, and a separately rotatable head cap including clutch adapter means disconnectably connected to said drum so as to permit rotation of said head cap about said working axis independent of said drum, said head cap including said groove means radially extending in a direction transverse to said working axis coextensive of said working plane of rotation and unitary wall means through said head cap forming an apertured throat means in posi-

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tional alignment with said central cavity in said one member but stationary with respect to rectilinear travel of said turning bar therethrough, at least one wall of said wall means of said head cap including a transverse elongated slot therein, said turning bar including lug means attached thereto and movable therewith and adapted to engage said elongated slot of said wall means to terminate rectilinear travel of said bar in a direction away from said base means of said first member and to permit pivoting of said bar about an axis intersecting said slot into positional alignment with said central cavity enabling rectilinear travel of said bar toward said base means of said first member to stowably position said bar within said central cavity.

6. The improvement of claim 1 in which said movable one of said enlarged lug means and said side wall means comprises at least one slot extending along said turning bar in said direction of rectilinear travel thereof, and said stationary other of said enlarged lug means and said wall means comprises (i) apertured throat means extending through said second member in alignment with said single central cavity and (ii) at least one enlarged lug means attached to and extending from said side wall means in keying engagement with said one slot of said turning bar to form said anti-rotational means, said slot terminating in at least one end wall adjacent to one end of said turning bar adapted to terminate rectilinear travel of said bar

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in a direction away from said base means of said first member and to permit pivoting of said bar about an axis intersecting said one wall into said working plane of rotation thereby enabling angular movement of said bar to be transferred to said second member to cause rotation thereof.

7. The improvement of claim 6 in which said apertured throat means and said turning bar are circular in cross section.

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