

[54] **DEVICE FOR SELECTIVELY PREVENTING
ROTATION OF THE UPPER END OF A
REEFED SAIL AND PARTICULARLY A
HEAD SAIL SUCH AS A JIB**

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[51] Int. Cl. **B63h 9/10**

[58] Field of Search **114/102, 104-107;
192/67 R**

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

11,237 1907 Great Britain **114/106**

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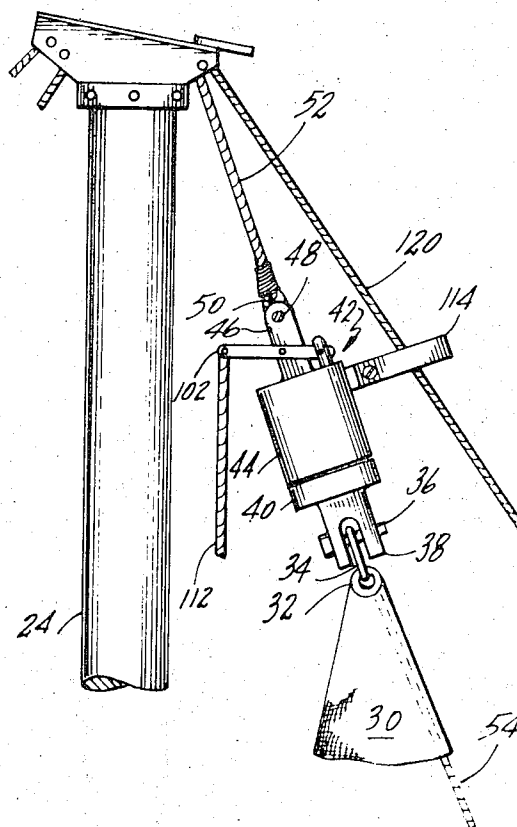
Attorney, Agent, or Firm—Kirschstein, Kirschstein,
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[57] **ABSTRACT**

Heretofore in a sailboat the upper end of a jib luff wire was connected through a swivel to a halyard near the mast head and the lower end to a drum near the

deck. By turning the drum, and therefore the luff wire, a jib would be furled. The jib was unfurled by pulling on a jib sheet connected to a jib clew. The jib was fixed in any selected partially furled conditioned by securing a furling line wound around the drum and by securing the jib sheet. However, the upper end of the luff wire would twist if the force of the wind on the sail was sufficient, causing skewing of the sail with resulting unsightliness, sloppiness, inefficient use of the wind force, and undue stressing of portions of the jib. The present invention provides a device to remedy the aforesaid problem by releasably locking together the two normally relatively rotatably parts of the swivel and by fixing the locked parts to a stationary reference point which preferably is in the vicinity of the swivel and may constitute, for example, the mast or a stay such as the head stay. The two parts of the swivel are biased to interlocked position. They are unlocked from each other by pulling on a clutch control lanyard which may be positioned to run alongside the mast or alongside the head stay. The clutch control lanyard may be prestressed to minimize the effort required to release the clutch and also to keep the clutch control lanyard under tension so it does not flap in the wind. Moreover, a structure may be provided between the clutch control lanyard and a clutch operating lanyard to supply a mechanical advantage so that the pull required on the operating lanyard can be reduced to a value which can be easily handled by a youngster or by a woman.

14 Claims, 10 Drawing Figures



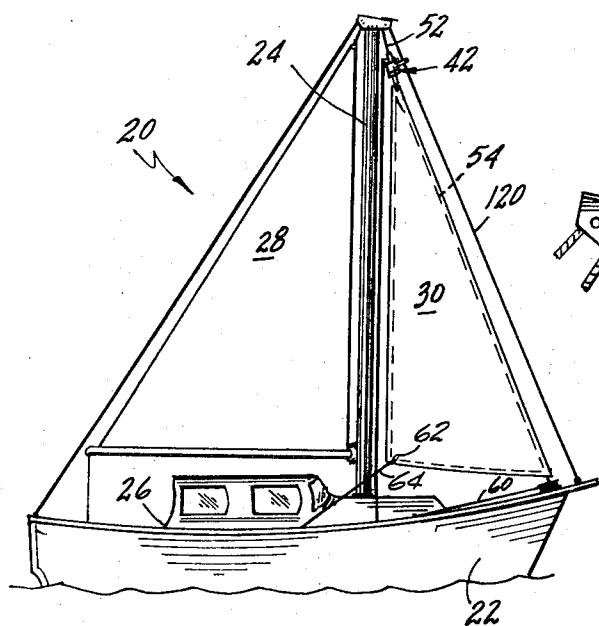


FIG. 1

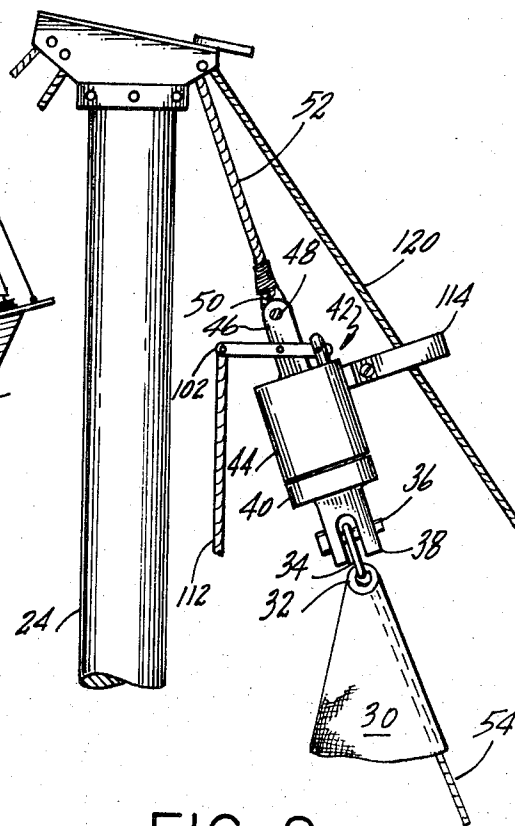


FIG. 2

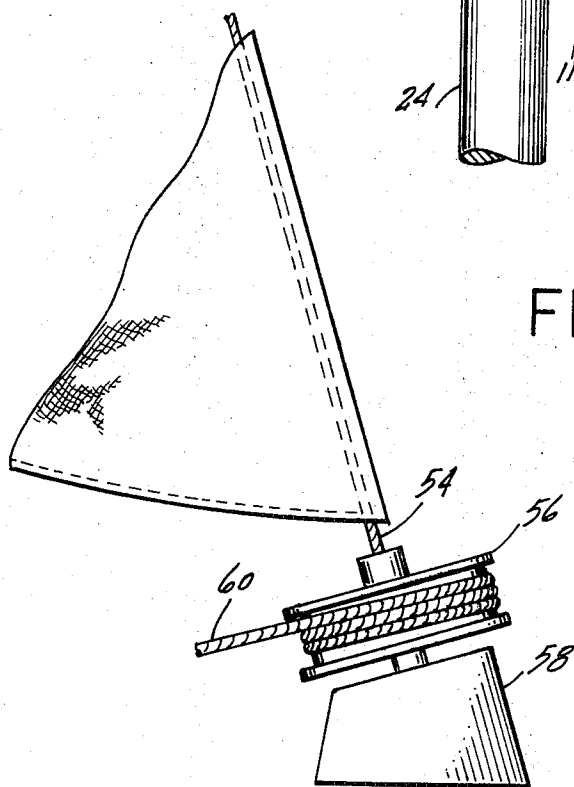


FIG. 3

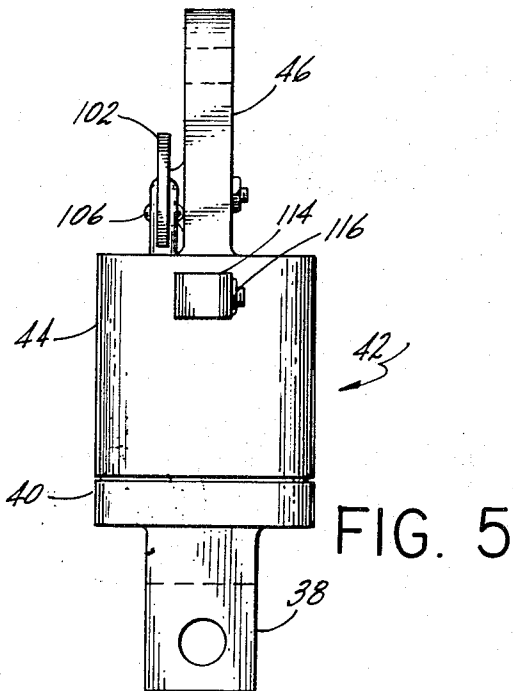
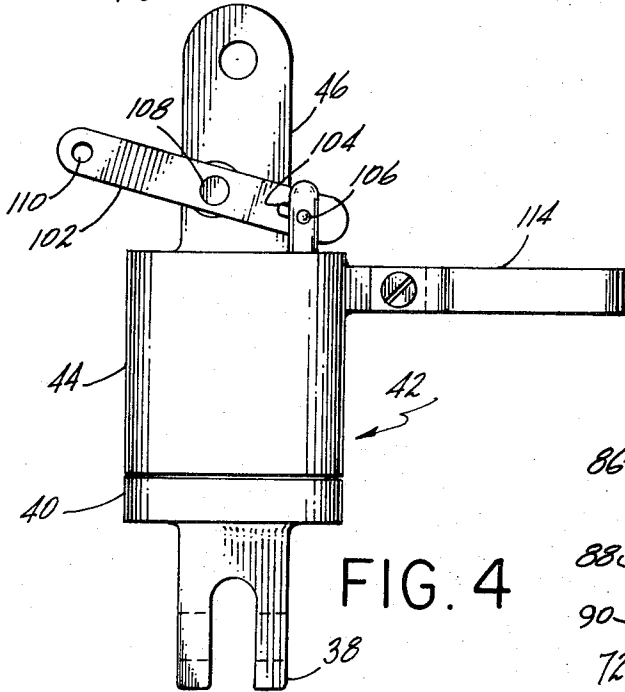
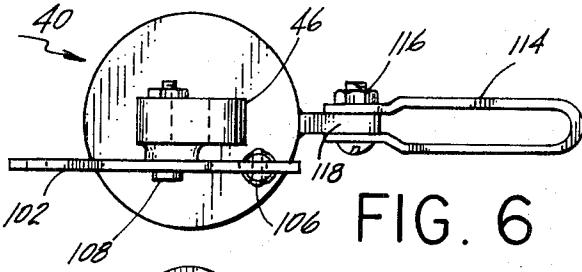
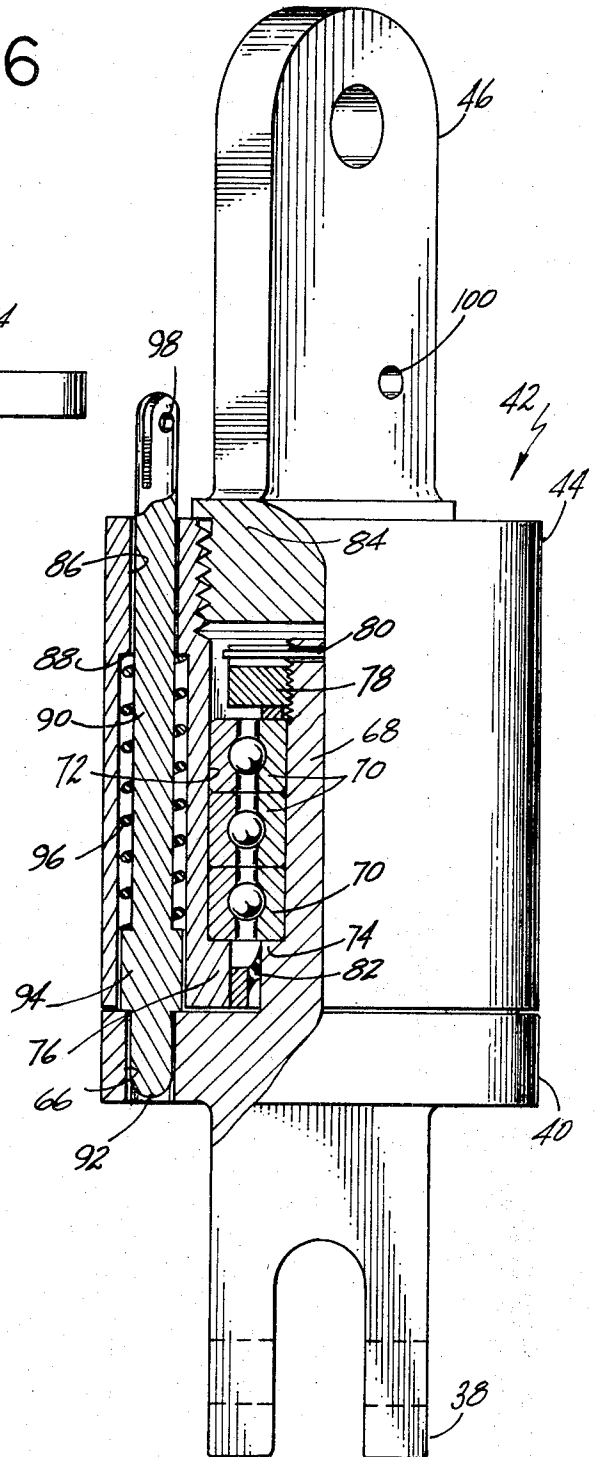


FIG. 7



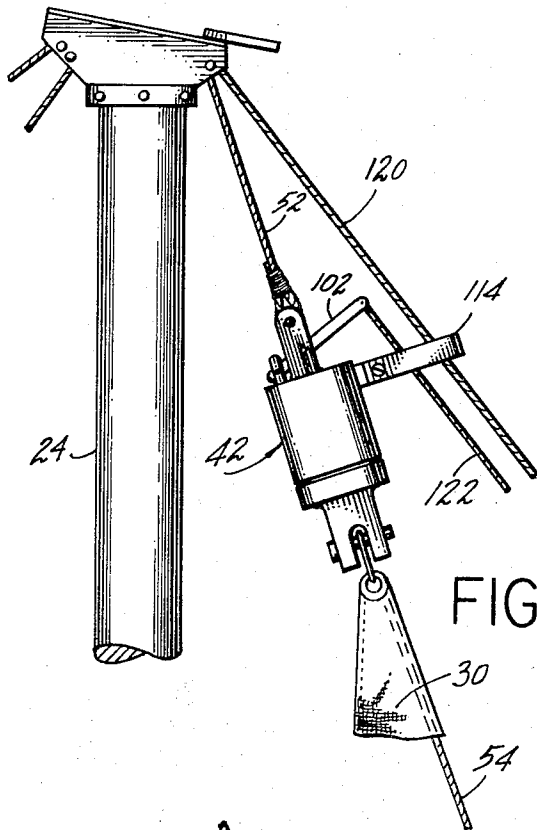


FIG. 8

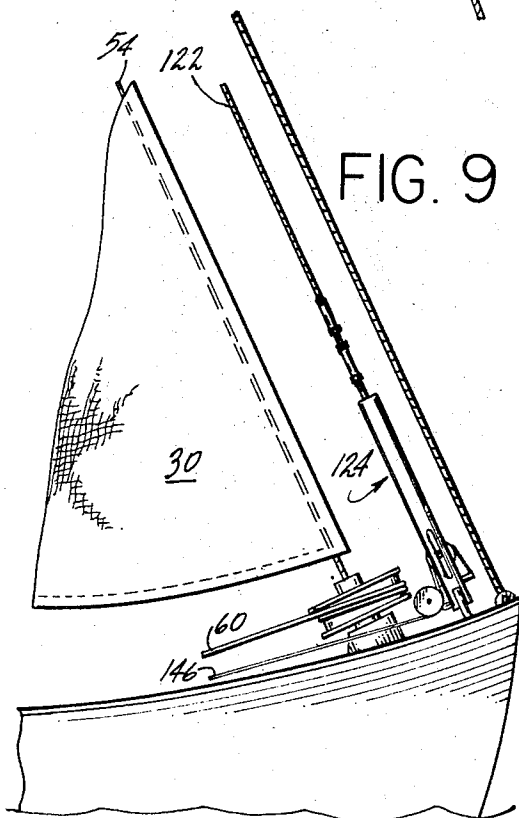
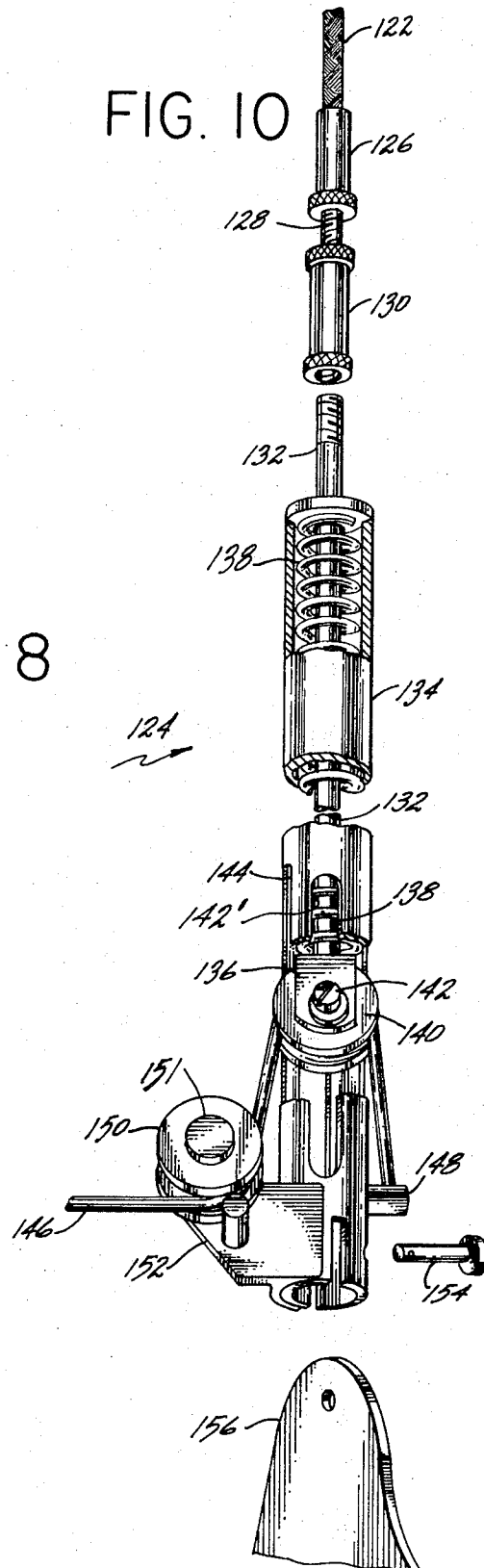


FIG. 9

FIG. 10



DEVICE FOR SELECTIVELY PREVENTING ROTATION OF THE UPPER END OF A REEFED SAIL AND PARTICULARLY A HEAD SAIL SUCH AS A JIB

BACKGROUND OF THE INVENTION

1. Field of the Invention

A mechanism for selectively either fixing the upper end of the luff wire of a furled or a reefed sail such as a jib to a stationary reference point in its vicinity, or allowing the luff wire to turn freely when furling or reefing the sail.

2. Description of the Prior Art

During the operation of a sailboat, it frequently is desirable to enable a sail, for instance a head sail such as a jib, to be used in a reefed or a furled condition. Reefing lessens the area of the sail available to catch the wind but does not furl the sail. The term "reefed" as used herein indicates that the sail is between furled, i.e., closed, and unfurled, i.e., fully extended, positions. In a typical roller furling rigging of the prior art, the jib had its forward edge connected as by clamping to a jib luff wire. The lower end of the jib luff wire was attached to the axle of a furling drum, the bearing of which was mounted on the deck or a support connected to the deck. Wound about the drum was a jib furling line that was connected by suitable guides such as eyes or pulleys to a point e.g., the cockpit, where the reefing was to be controlled.

The upper end of the jib luff wire was connected to the lower half (the jib luff wire half) of a swivel. This half of the swivel rotatably engaged the upper half (the jib halyard half) of the swivel. The said upper half of the swivel was connected to a jib halyard. The jib halyard was trained about a block, i.e., a pulley, which was supported by the mast head. The jib halyard ran down the mast to the deck of the boat where it was guided to a location occupied by the operator of the boat, e.g., the cockpit. When the operator pulled on the jib halyard, he tautened the jib luff wire. The swivel permitted the jib luff wire to turn about its longitudinal axis as the jib furling line was pulled. The jib was unfurled by rotating the drum in a direction opposite to that in which it was rotated by pulling on the jib furling line. For this purpose, the jib had attached to it a line known as a jib sheet, the attachment being at the clew, i.e., the aft lower corner of the jib. Pulling on the jib sheet unfurled the jib. While the jib was unfurling the jib luff wire turned about its longitudinal axis. Its upper end was free to turn because of the swivel. Its lower end turned with the drum which was permitted to rotate by slackening and paying out the jib furling line. By jointly working the jib furling line and the jib sheet, the jib could be furled or unfurled. If it was desired to operate the jib in reefed condition the jib sheet and the jib furling line were manipulated to secure the desired degree of reefing and then both were belayed to stationary reference points on the deck of the boat by devices such as cleats or snubbers.

A very undesirable condition prevailed when a jib having a conventional roller furling rigging such as described above was reefed. The jib luff wire, even when pulled very taut by the jib halyard, tended to twist when torque was applied by the force of the wind acting on the reefed jib. As the wind filled out the jib and the tensed the same, the reefed jib applied torque to the jib luff wire. This tended to unfurl the jib. The lower end

of the jib luff wire was not free to turn in response to this torque, since the furling drum was held against rotation by the anchoring of the jib furling line to a cleat or snubber. However, the same condition did not prevail at the upper end of the jib luff wire where the conventional swivel allowed the jib luff wire to turn so that the jib in response to pressure exerted thereon by the wind unfurled unevenly from its preset reefed condition. Thus, the lower end of the jib luff wire and the jib remained fixed but the upper end of the jib luff wire was allowed to turn by the swivel whereby the upper end of the jib luff wire untwisted to some extent and permitted undesired unfurling of the upper end of the jib luff wire. As a consequence, although the jib was supposedly fixed in selected reefed condition, as a matter of practice only the lower end remained fixed while the upper end unfurled further, imparting a sloppy appearance to the jib, unduly straining the jib and making inefficient use of the available wind force.

SUMMARY OF THE INVENTION

1. Purpose of the Invention

It is an object of the invention to provide for use in a sailboat a reefing clutch which avoids the aforesaid drawback.

It is another object of the invention to provide a reefing clutch which essentially constitutes a bi-directional swivel the relatively rotatable elements of which can be releasably locked to one another and, further, to provide an arrangement for cageing the locked reefing clutch, that is to say, for securing the same to a stationary nearby reference point so that when the clutch is in engaged, i.e., position the upper end of the jib luff wire cannot turn as it did previously.

More particularly, it is an object of the invention to provide a reefing clutch as described just above wherein the cageing arrangement secures the swivel element that is remote from the jib luff wire, that is to say, the distal swivel element, to a stationary reference point whereby when the clutch is engaged i.e., the proximal and distal elements are locked to one another, the proximal element will not be able to turn and thereby will prevent the upper end of the jib luff wire from turning.

It is another object of the invention to provide a reefing clutch of the character described which is biased to engaged position and which is provided with a clutch control lanyard that is tensioned against the biasing means both for the purpose of holding the said control lanyard under sufficient stress to prevent it from flapping freely and to reduce the amount of force required to shift the clutch to its disengaged position.

It is another object of the invention to provide a reefing clutch of the character described wherein the clutch control lanyard is pulled by an operating lanyard through a means providing a mechanical force advantage whereby to enable the clutch to be shifted from engaged to disengaged position by a person not endowed with substantial physical strength.

It is another object of the invention to provide a reefing clutch of the character described which constitutes relatively few and simple parts, is inexpensive to make and can be operated with ease by sailors.

Other objects of the invention in part will be obvious and in part will be pointed out hereinafter.

2. Brief Description of the Invention

The instant invention includes a reefing clutch-and-swivel in a special location, to wit, between the upper end of a jib luff wire and a jib halyard or the like wherein the jib luff wire has its lower end connected to a rotatable means such as a drum. The reefing clutch-and-swivel includes two relatively rotatable elements one proximal to the upper end of the jib luff wire and the other distal from the upper end of the jib luff wire. Preferably, the axis about which the two elements are rotatable is substantially coincident with the longitudinal axis of the jib luff wire. A cageing arrangement is employed to hold the distal element against rotation. For example, the cageing means may include a guide non-rotatably secured to the mast or to the head stay, both of which occupy fixed positions. This cageing arrangement does not prevent rotation of the proximal element of the reefing and-swivel-clutch. The reefing clutch-and-swivel includes a mechanisms which when properly manipulated will releasably interengage the distal and proximal elements to render them functionally unitary at such time. When this occurs the upper end of the jib luff wire no longer can twist and, if the lower end of the jib luff wire likewise is fixed against rotations as by cleating the jib furling line and the jib sheet, the jib luff wire will not noticeably twist regardless of how much torque is applied thereto by the wind blowing on the jib. The arrangement for releasably interengaging the proximal and distal elements and the reefing clutch-and-swivel may be operable in any manner. For example, it may constitute a clutch control lanyard which runs down alongside the mast and around a block to a convenient site for a sailor's operation, or it may be operated electromechanically as by a solenoid and armature. Preferably, the locking arrangement is biased toward locking position and only is released when it is desired to reef, furl or unfurl the jib.

Alternatively, the clutch control lanyard may run parallel to the head stay.

Moreover, the clutch control lanyard may be maintained under tension so as to partially offset the tension of the means biasing the two elements of the clutch-and-swivel into locking position and to somewhat rigidify this lanyard so that it will not flap in the wind.

Still further, the clutch control lanyard may be pulled toward clutch disengaging position by manipulating an operating lanyard which is connected to the clutch control lanyard through an arrangement which provides a mechanical force advantage in favor of the operating lanyard whereby the clutch-and-swivel may be shifted from locked to unlocked position by a person not having substantial strength. In this connection a typical force required to operate a lever for the aforesaid clutch control is 120 lbs. This can be partially offset by preloading, i.e. pre-tensioning, the clutch control lanyard to a 60 lbs. tension so that it is only necessary to supply an additional 60 lbs. of force to shift the clutch to disengaged position. If the device which provides mechanical advantage supplies a two-to-one force advantage, it only is necessary to apply a 30 lbs. force to the clutch operating lanyard, in order to disengage the clutch elements, this being well within the strength of anyone who is likely to be required to control the jib.

The invention consists in the features of construction, combinations of elements, and arrangements of parts which will be exemplified in the devices hereinaf-

ter described and of which the scope of application will be indicated in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which are shown various possible embodiments of the invention:

FIG. 1 is a thumbnail sketch of a sailboat showing the principal components thereof including those which cooperate with a reefing clutch-and-swivel to complete a system embodying the present invention;

FIG. 2 is an enlarged view of a portion of FIG. 1, specifically the mast head and details of the associated components such, for example, as the reefing clutch-and swivel and the elements to which it is secured, this view being included to better illustrate the cooperation of said clutch with certain elements of the sailboat to effect the instant invention;

FIG. 3 is an enlarged view of the lower end of the luff wire and the jib and the associated furling drum;

FIG. 4 is an enlarged front view of the reefing clutch-and-swivel detached from the components of the sailboat to which it normally is connected;

FIG. 5 is an enlarged right side view of the reefing clutch-and-swivel.

FIG. 6 is an enlarged top view of the reefing clutch-and-swivel.

FIG. 7 is a further enlarged and partially fragmentary view of the reefing clutch-and-swivel the distal element of said clutch being shown partially turned in comparison to the position in which it is illustrated in FIGS. 4, 5, and 6;

FIG. 8 is an elevational view of mast head details of a modified system of the present invention;

FIG. 9 is a boat deck detail of the system shown in FIG. 8; and

FIG. 10 is partially exploded, partially fragmentary perspective view of certain elements of the modified system, the same constituting a clutch control tension adjuster, a lanyard tension control device and a multiple pulley mechanical force advantage unit.

PREFERRED EMBODIMENTS OF THE INVENTION

Referring now in detail to the drawings, and more specifically to FIGS. 1-7, the reference numeral 20 denotes a sailboat. The particular configuration of the boat has no bearing on the present invention. It will, as usual, include a hull 22 of appropriate configuration and a mast 24 stepped on the hull and extending upwardly therefrom at an appropriate location for the particular boat design. The reference numeral 26 denotes the location where the person who is in charge of sailing the boat will be situated. This may, for example, be a cockpit or it simply may be at the steering wheel aft of the cabin. It is at this site that the various lanyards, halyards and sheets which control the sundry sails will be located. The lanyards, halyards, and sheets usually will be free-ended here and secured in any desired positions of the sails as by cleats or snubbing devices, or certain of the lanyards, halyards and sheets may be connected here to toggle arms. The particular type of securing device used will depend upon the amount of movement required of any given lanyard, halyard and sheet; that is to say, if substantial movement is needed a cleat or snubbing device will be employed whereas if only a short distance of travel is

called for, as in the case of the clutch operating lanyard, a toggle arm may be utilized.

The boat has suitable complement of sails. Conventionally, with a single-masted sailboat a sail 28 is supported by the mast in an aft location. This sail conventionally is not furled or reefed. It has been illustrated only as a matter of completeness. Its manipulation is not affected by the present invention.

On a sailboat employing the present system there also is a sail 30 forward of the mast. This is commonly referred to as a jib. The furling, unfurling and reefing of such a sail is the subject of the present invention.

At its upper end the jib is connected, as by a grommet 32 (see FIG. 2) at the upper tip of the sail and a ring 34 threaded through the grommet, to a crosspin 36 encircled by the ring and supported between a pair of trunnions 38 which are functionally unitary with a lower element 40 of a cageable reefing clutch-and-swivel 42. The reefing clutch-and-swivel further includes an upper element 44. For convenience, the lower element 40, being the closest to the jib, is sometimes herein referred to as the proximal element, and the upper element 44, accordingly, is sometimes referred to herein as the distal element.

The distal element 44 has an upwardly extending arm 46 which is connected by a nut and bolt 48 to an eye 50 permanently secured to the adjacent end of a jib halyard 52. The jib halyard is trained about a sheave (not shown) at the head of the mast and then is guided down to the location 26. At this point the free end of the jib halyard is releasably secured to the hull of a boat thereby permitting the jib to be raised or lowered. It should be mentioned at this point that when the boat is sailed the jib often will be in an unfurled position, and if the person is command of the boat wishes to render the jib wholly or partially inoperative he does not lower the jib but will furl it or reef it in a manner well known in the boating field, improvement of the furling, unfurling and reefing operation (the latter in particular) being the feature to which the instant invention is directed.

The cageable reefing clutch-and-swivel 42 is novel in the art, that is to say the provision of a cageing means and a clutch in combination with the swivel, not the particular details of the cageing means or the clutch. This element previously has included a swivel function and not a clutch and a cageing function. The reason for the clutch and cageing functions has been pointed out previously in the Brief Description of the Invention and, therefore, will not be repeated here. It should be observed however before going into the detailed construction of the reefing cageable clutch-and-swivel 42 that the two aforesaid elements thereof are so constructed and are so mutually interengageable that they are relatively rotatable about an axis which is essentially a continuation of the longitudinal axis of that portion of the jib halyard 52 that extends downwardly and forwardly from the head of the mast. The forward edge of the jib contains a luff wire 54 secured to said edge and also secured to the grommet 32. The securement is such that the jib will be wrapped around the luff wire (furled) if the luff wire is rotated about its own axis and will be unfurled if the luff wire is counter-rotated after furling. The longitudinal axis of the luff wire is an extension of the aforesaid portion of the halyard and is coincident with the axis of the relative rotation of the

proximal and distal elements of the cageable clutch-and-swivel 42.

The lower end of the jib luff wire is secured to the center of a reefing and furling drum 56 (FIG. 3) which is mounted for rotation relative to the hull on a support 58 secured to the boat deck. A jib furling line 60 has an end portion wrapped about the drum 56. The line 60 is guided, as by sheaves, to the location 26. The axis of rotation of the drum is coincident with the longitudinal axis of the jib luff wire.

The jib 30 has a clew 62 to which a jib sheet 64 is secured. This sheet is guided, as by sheaves, to the location 26. The ends of the line 60 and the sheet 64 are held as by cleats or snubbing devices at the location 26 inasmuch as they will experience considerable movement during furling, unfurling and reefing of the jib.

For the moment disregarding the clutch function of the reefing cageable clutch-and-swivel 42 and considering the same only as to its swivel function, and assuming that the jib has been fully unfurled, it will have the general appearance illustrated in FIG. 1. If it now is desired to furl, the jib, the jib sheet 64 is paid out and the jib furling line 60 is drawn in, unwinding from the drum 56 which is turned. This turns the jib luff wire 54 and causes the jib to be wound about said wire. The jib thus can be furled or reefed to the degree desired. A reverse operation is practiced to unfurl the jib. It will be observed that the luff wire is maintained taut by pulling on the halyard 52.

The difficulty with the aforesaid operation insofar as it involved the swivel of the prior art between the upper end of the jib luff wire and the jib halyard 52 was that, regardless of how much one tautened the jib furling line and the jib sheet, there was a tendency, when the jib sheet was caught in the wind, for the jib luff wire to turn and the torque engendered was sufficient to cause the upper end of the jib luff wire to twist. The swivel permitted such twisting and this resulted in a sloppy appearance of the jib, undue stress to the fabric of the jib and inefficient use of the wind.

The cageable clutch-and-swivel 42 is shown in detail in FIG. 7. The proximal element 40 constitutes a disc with the integral spaced trunnions 38 extending downwardly therefrom. The disc has a series of holes 66, e.g., six holes, adjacent the periphery thereof. The holes are 60° apart and are at a common radius. A shaft 68 extends perpendicularly upwardly from the center of the disc, terminating at a male threaded tip. The inner races of a stack of thrust ball bearings 70 are fitted on the shaft 68, the outer races thereof being fitted in a large-diameter central bore 72 in the cylindrical distal element 44. The lowermost ball bearing 70 is seated on an annular radially outwardly extending flange 74 at the base of the shaft 68 and on an annular radially inwardly extending flange 76 adjacent the bottom of the bore 72. The stack of inner ball bearing races are compressed between the flange 74 and a nut 78 screwed on the tip of the shaft 68. The nut is secured in assembled condition of the stack by a cotter pin 80 extending radially through registered openings in the nut and shaft. The bearings are grease packed, downward leakage being inhibited by a lip seal 82. The upper end of the bore 72 is tapped to receive a plug 84 with which the arm 46 is integral. As thus far described, the clutch-and-swivel is capable of functioning solely as a swivel; no clutching and cageing structure has been described, although the holes 66, in cooperation with an

element about to be mentioned, do supply a clutching function.

To enable the clutch-and-swivel also to act as a clutch the distal element 44 is formed near its periphery with a longitudinal bore 86 at the same radius as the radius at which the holes 66 are located with respect to central longitudinal axis of the clutch-and-swivel. The lower portion of the bore 66 is of uniform diameter; however a step, i.e., shoulder 88, is provided near the top of the bore so that the upper portion of the bore is smaller diameter. Slideable within the larger diameter portion of the bore is a lock control rod 90 having a lower tip 92 the diameter of which is slightly less than the diameter of the holes 66. The end of the tip 92 is rounded for easy camming entrance into any selected hole 66. Near the tip of the control rod there is formed a circular enlargement 94 of the same diameter as that of the circular bore 86 in order to guide the rod. A helical compression spring 96 encircles the rod 90 between the enlargement 94 and the flange 88, thereby biasing the rod toward the proximal element 40 whereby if the tip 92 at any given time is in alignment with any one of the holes 66 the tip will shoot into the hole until the enlargement 94 strikes the upper surface of said element thereby locking the proximal and distal element to one another so that they act as a unit. Thereby if, as soon will be seen, the distal element 44 is caged to a nearby stationary reference the proximal element 40 will not be able to rotate about the longitudinal axis of the jib luff wire.

The upper end of the lock control rod 90 projects above the top surface of the distal element 44 where it is provided with a transverse opening 98 that in association with a nearby transverse opening 100 in the arm 46 serve as points for pivotal connection to a control lever 102 (see FIGS. 4, 5, 6). One end of the control lever 102 is formed with a longitudinal slot 104 which accepts a pin 106 secured in the opening 98 of the lock control rod. An intermediate opening in the control lever accepts a pin 108 received in the opening 100 of the arm 46, the pin being rotatable in either or both of these openings. This latter pin 108 serves as a fulcrum about which the control lever 102 pivots. The control lever is provided with an opening 110 to which a clutch control lanyard 112 (see FIG. 2) is fastened.

It will be apparent that the spring normally maintains the two elements 40, 44 in mutually interlocked relationship. To disengage the said elements, a sufficiently strong pull on the lanyard 112 will lower the control lever so as to raise the lock control rod 90, lifting the tip 92 thereof above the upper surface of the element 40 whereupon the two elements are free to rotate relative to one another about the longitudinal axis of the jib luff wire 54 by suitable manipulation of the jib furling line 60 and the jib sheet 64.

Nevertheless, locking of the elements 40, 44 to each other will not suffice to inhibit turning of the upper end of the jib luff wire with respect to the lower end thereof assuming the furling drum to be held against rotation by fixing of the free ends of the jib furling line and the jib sheet. It further is necessary in the locked position of the two elements 40, 44 for said elements to be caged, that is to say, held against rotation, as by securement to a nearby reference member. To expedite caging of the elements, it is simpler to continually cage the distal element 44 than to actuate a mechanism for caging both elements or only the proximal element

when the elements are locked to each other; hence pursuant to the instant invention, means is included to continually cage the distal element so that when the elements are interengaged to effectively act as one the proximal element will be held against rotation along with the distal element.

The caging means in the form of the invention being described is a bail 114 the opposed ends of which are secured as by a nut and bolt 116 to a lateral lug 118 on the distal element 44. The bail is a free sliding fit on a nearby substantially stationary part of the boat, for example a head stay 120, although any other stationary reference point, e.g. the mast 24, will serve as well. Movement of the bail lengthwise of the head stay that is permitted by the single axis connection constituting the nut and bolt 116 does not affect the ability of the bail to prevent rotation of the distal element 44 about the longitudinal axis of the jib luff wire to a degree so negligible as not to influence the effective caging of the distal element. Likewise transverse movement of the head stay is too slight to prevent effective caging.

The clutch control lanyard in the instant form of the invention runs down alongside the mast 24 as can be seen in FIG. 2 and is guided at the boat deck, as by pulleys, to the position 26 where it is secured to a toggle. When the toggle is idle, i.e., in contracted position, the clutch control lanyard is sufficiently slack to allow the compression spring 96 to shift the tip of the lock control rod into a hole 66 (under the play of the wind the proximal element 40 will usually be turning enough to bring a hole 66 into registry with the axis of the rod 90). When the toggle is actuated, i.e., shifted to extended position, it will pull the lanyard 112 far enough to lift the tip 92 above the proximal element, disabling the clutch and permitting the elements to turn freely with respect to each other so that a desired furling, unfurling or reefing rotation can be imparted to the jib luff wire.

Another embodiment of the invention is shown in FIGS. 8-10. This embodiment differs from that described with respect to FIGS. 1-7 in the location of the clutch control lanyard and in the actuations of this lanyard. The clutch-and-swivel 42, the jib 30, the jib luff wire 54, the jib halyard 52, the clutch control lanyard 112, the furling drum 56, the furling line 60 and the jib sheet 64 (not shown) in the second embodiment are the same as in the first and are denoted by the same reference numerals; they will not be described further. In this second embodiment an arrangement is provided whereby the clutch control lanyard is kept under tension and may be operated with a lesser manual effort.

The clutch control lanyard 122 is fastened at one end to the opening 110 of the control lever 102. Said lanyard runs down toward the deck of the boat alongside the head stay 120 as shown in FIGS. 8 and 9. The other end of the lanyard 122 is fastened to the upper end of a tension adjuster 124 which is, essentially, a turn-buckle.

Said adjuster includes a sleeve 126 in which said other end of the lanyard 122 is rotatably secured. The adjuster has a male threaded rod 128 protruding therefrom in line with the clutch control lanyard 122. Said rod is screwed into a tapped bore at one end of a barrel 130. The opposite end of the barrel has an aligned tapped bore into which a male threaded end of a sec-

ond rod 132 is screwed. The threads on the rods 128 and 132 are opposite handed whereby when the barrel is turned in one direction the overall length of the adjuster is lengthened and in the other direction shortened.

The rod 132 extends freely through a restricted opening at an end of a circular tube 134 and terminates at a plate 136 that lies in a diametral plane of the tube. A helical spring 138 encircling the rod 132 is held under compression in the tube between the upper end and the plate 136. The force exerted on the clutch control lanyard by this spring opposes the force exerted by the spring 96. This accomplishes two purposes. Firstly, it keeps the clutch control lanyard under tension so that, situated as it is alongside substantially the full length of the head stay, it will not flap unsightly when the elements 40 and 44 are interlocked as it will in the first embodiment of the invention. Secondly, it reduces the amount of pull that must be exerted on the plate 136 to pull the lock control rod 90 to clutch disengaging position. The extent of the reduction is selectively varied by altering the overall length of the tension adjuster 124. In a typical installation the spring 96 is selected to exert a force of about 120 pounds and the spring 138 is selected and the adjuster is set to create a tension of about 60 pounds in the lanyard 122 so that application of a force of about 60 pounds on the plate will disengage the clutch.

To further reduce the pulling force manually necessary to disengage the clutch a mechanical force advantage means is provided. This includes a pulley 140 rotatably mounted on the plate 136 by a stub shaft 142 that is positioned at right angles to said plate and protrudes from both sides thereof for sliding movements in diametrically opposed registered longitudinal slots 142' in the tube 134. Preferably the design of the mechanical force advantage means is such that when the adjuster is set to apply the requisite idle opposing force on the clutch control lanyard the ends of the shaft 142 are about midway of the lengths of the slots 142'. The slots prevent the rod 132 from turning and, furthermore, restrict the longitudinal motion of said rod to a few, e.g., 2, inches to either side of the idle position, thus allowing the slight amount of motion required to take up for motion of the mast and rigging that is normal in a sailboat. Another pair of diametrically opposed registered longitudinal slots in quadrature to the slots 142' are formed in the tube 134 to provide access to the pulley 140 from the outside of the tube. A clutch operating lanyard 146 has one end anchored to an ear 148; it is trained about the pulley 140 and then about a pulley 150 rotatable about an axle 151 fixed to a support plate 152. The lanyard is guided by suitable sheaves to the position 26 where it is under the control of the boat's operator. Conveniently it is attached to a toggle. It will be apparent that a two-to-one force advantage is obtained so that in the foregoing example an operating control force of only about 30 pounds pull on the lanyard 146 is needed to disengage the clutch. The lower end of the tube is fastened to the boat's hull to provide a reaction point for the spring 138. The necessary freedom of action is obtained for the tube by rotatably anchoring the same by a pivot pin 154 to a bracket 156 fastened on the deck of the boat near the bow adjacent the lower end of the head stay.

It thus will be seen that there are provided devices which achieve the various objections of the invention

and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth it is to be understood that all matter described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described the inventions, there is claimed as new and is desired to be secured by Letters Patent:

1. In combination in a sailboat having a mast and a hull

- a. a headsail;
- b. a luff wire running from the mast forwardly and downwardly to the hull and secured to the forward edge of the headsail;
- c. means rotatably connecting the lower end of the luff wire to the hull;
- d. means for rotating the lower end of the luff wire so as to furl, unfurl or reef the headsail;
- e. a halyard running forwardly and downwardly from the mast; and
- f. a clutch-and-swivel, said clutch having
 - i. a proximal element connected to the upper end of the luff wire,
 - ii. a distal element connected to the lower end of the halyard,
 - iii. means attaching the elements to each other for rotation about an axis substantially coincident with the luff wire and the halyard,
 - iv. means releasably locking the elements to each other,
 - v. means biasing the locking means into a locked mode
 - vi. selectively operable means for nullifying the biasing means so as to permit relative rotation of said elements in an unlocked mode, and
 - vii. cageing means for fixing said elements to a nearby stationary reference point when the elements are in a locked mode.

2. A combination as set forth in claim 1 wherein the stationary reference point is the head stay.

3. A combination as set forth in claim 1 wherein the stationary reference point is the mast.

4. A combination as set forth in claim 1 wherein the cageing means fixes the distal element to a nearby stationary reference point in both locked and unlocked modes of the elements.

5. A combination as set forth in claim 4 wherein the biasing means is a spring.

6. A combination as set forth in claim 5 wherein the nullifying means is a clutch control lanyard.

7. A combination as set forth in claim 6 wherein the clutch control lanyard runs alongside the head stay.

8. A combination as set forth in claim 6 wherein the clutch control lanyard runs alongside the mast.

9. A combination as set forth in claim 6 wherein a clutch operating lanyard is provided and wherein a tension means is interposed between the clutch control lanyard and the clutch operating lanyard for tensing the clutch control lanyard.

10. A combination as set forth in claim 6 wherein a clutch operating lanyard is provided and wherein a mechanical force advantage means is interposed between the clutch control lanyard and the clutch operating lanyard for reducing the force to be applied to the clutch

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operating lanyard for shifting said elements from the locked mode into which they are biased to the unlocked mode.

11. A combination as set forth in claim 10 wherein the mechanical force advantage means is a pulley system.

12. A combination as set forth in claim 10 wherein a tension means is interposed between the clutch control lanyard and the mechanical force advantage means.

13. A combination as set forth in claim 12 wherein the tension means is a rod attached to the clutch operating lanyard, a spring biasing the rod away from the

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clutch operating lanyard and a pulley system having one pulley carried by the rod, the clutch operating lanyard being trained about said pulley.

14. A combination as set forth in claim 13 wherein a tube is provided in which the rod is slideable, the spring being contained in the tube, the one pulley being shiftable in the tube, one end of the clutch operating lanyard being anchored to the tube and the clutch operating lanyard being trained about a second pulley to form reaches that extend in the same direction from opposite segments of the one pulley to supply a two-to-one mechanical force advantage.

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