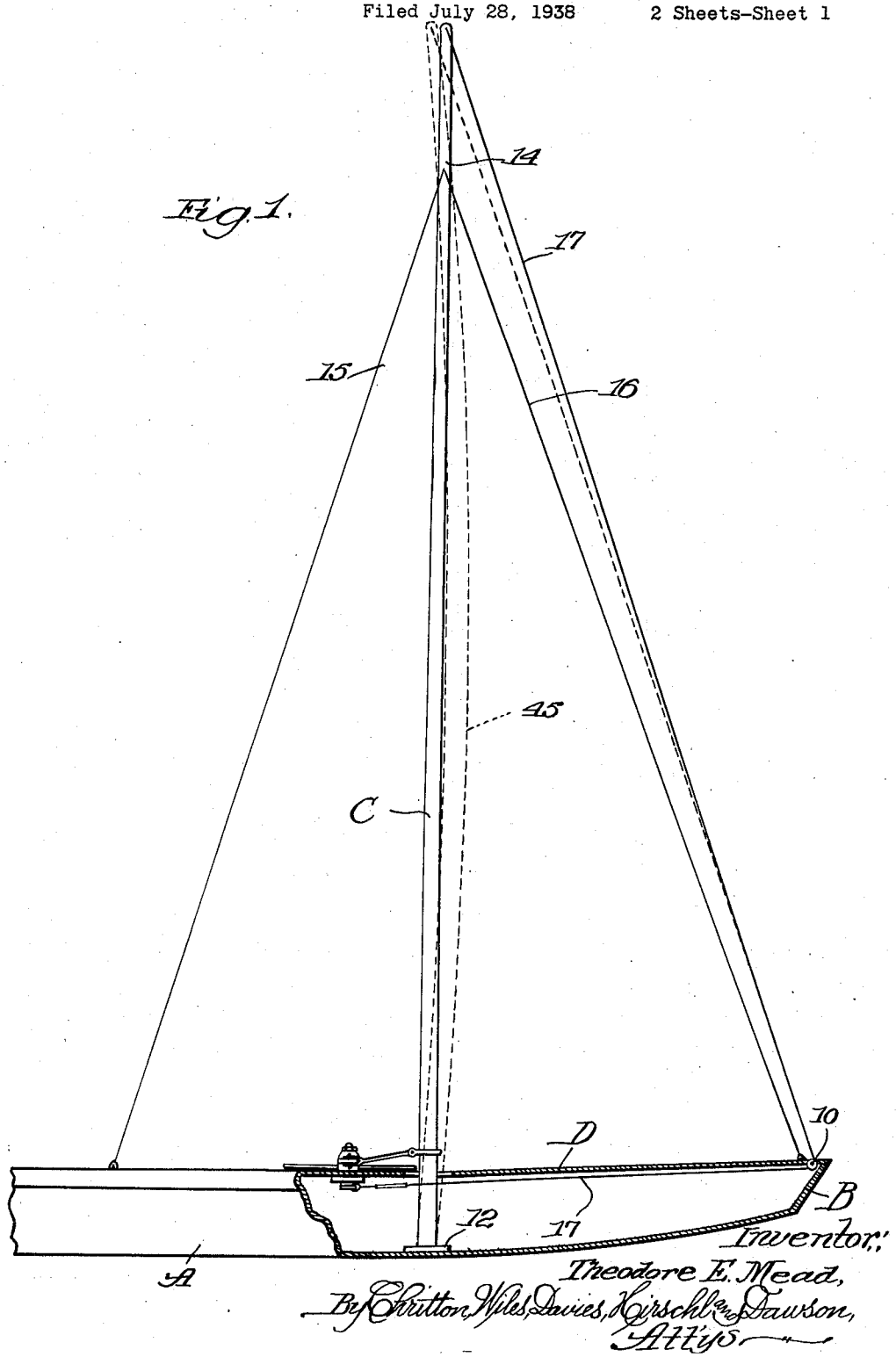
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SAILBOAT MAST BENDING

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Fig. 1.

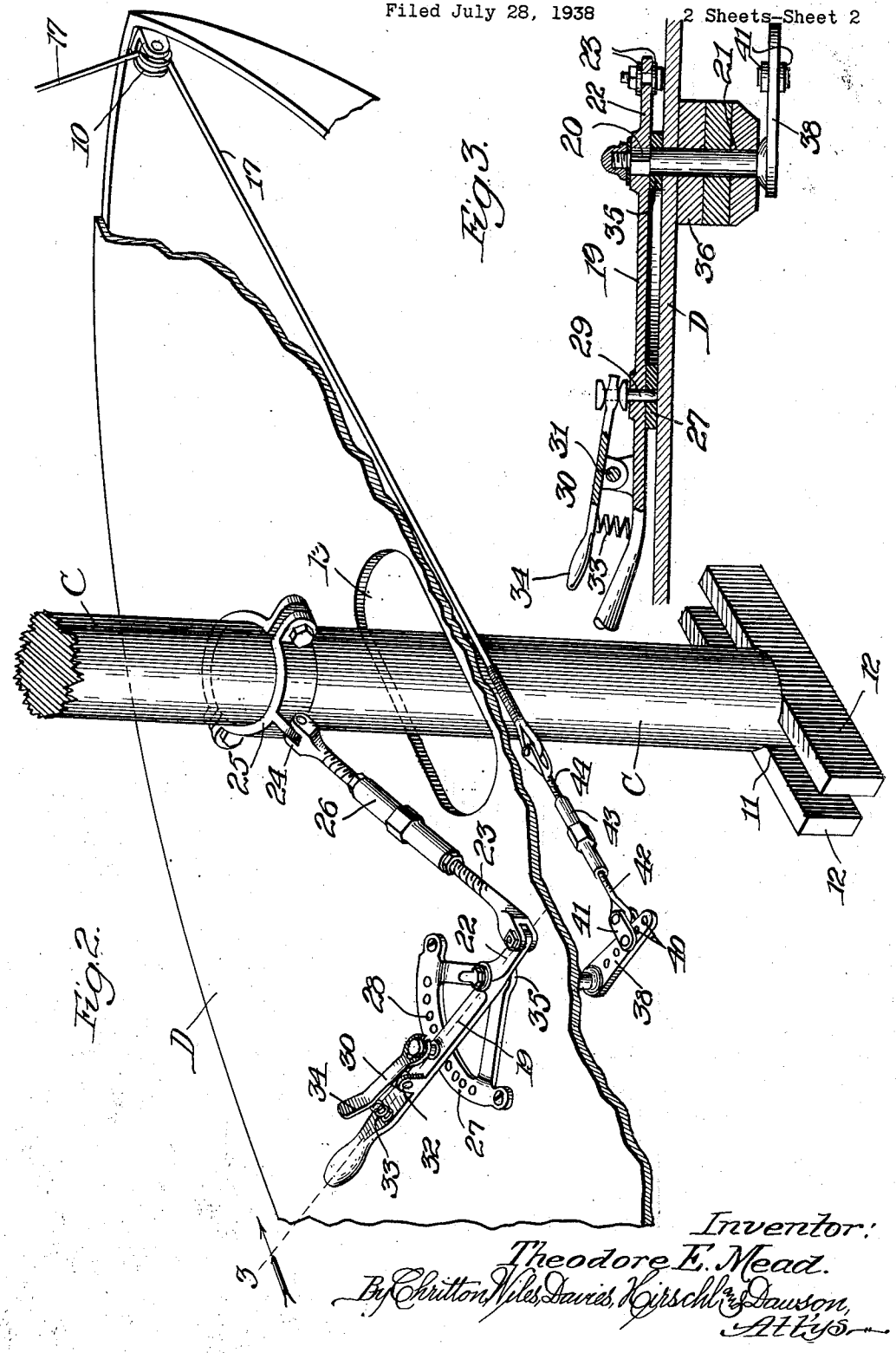


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SAILBOAT MAST BENDING

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SAILBOAT MAST BENDING

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12 Claims. (Cl. 114—39)

This invention relates to sail boat mast bending, and more particularly to mechanism for flattening the sail of a sail boat, together with means for adjustably maintaining it in any desired degree of tautness or looseness.

The advantage of a flat sail when sailing into the wind is well known among yachtsmen. A flat sail enables the boat to point higher into the wind and sail faster than would be possible with a full sail, that is, a sail with a lot of draft or belly. Obviously, a yacht cannot change sails during a race so as to have a flat sail when on the wind and a full sail when off the wind. It is desired, therefore, to provide means whereby the sail can be converted into a flat sail or into a full sail very quickly.

A flat sail can be produced by bending the mast so that the after side is concave. This bend pulls out some of the fullness of the sail and produces the flat sail. Two methods have been employed recently, but both are crude and laborious and consume considerable time and energy while racing. The first method consists of having the mast rigidly mounted at the step and held secure at the deck. By letting out the jibstay and the headstay, and taking up the backstay, the upper portion of the mast was pulled aft, causing it to bend and thus flattening the sail. This method involved a great deal of work with turnbuckles and cranks controlling the cables. Furthermore, this moved the center of effort of the sail toward the stern of the boat tending to throw it out of balance, which is a very undesirable feature.

The second method consisted of having the mast held securely at the deckline and moving the foot of the mast aft by means of a threaded rod and crank. Moving the foot of the mast aft caused the portion of the mast between the deck and the jibstay attachment to move forward in a curve, thus throwing the head of the mast toward the stern of the boat. Since the head of the mast moved toward the stern of the boat, it was necessary to pay out the headstay before the mast head would move. The jibstay and backstay were not moved. The moving of the foot of the mast and the letting out of the headstay were both accomplished by means of threaded cranks or turnbuckles, and these operations consumed considerable time.

The tremendous friction in the mast step, due to the powerful downward pressure of the mast, made it difficult to move the foot of the mast. Here again, valuable time and energy were consumed to the detriment of the boat's position in the race.

The purpose of the present invention is to eliminate the drawbacks of the above methods. It is instantaneous and easy in action as well as automatically accurate in the amount of bend given the mast as related to the amount the headstay is paid out.

Another object of the invention is to provide simple and effective means whereby the mast may be bent readily in the desired direction and maintained in the desired position by releasable locking means. A further object is to provide mechanism by which the mast is bent at the desired portion and at the same time the headstay is paid out or pulled in according to the direction of movement of the top portion of the mast. Other specific objects and advantages will appear as the specification proceeds.

The invention is illustrated, in a preferred embodiment, by the accompanying drawings, in which—

Figure 1 is a broken side elevational view (partly in section) of a sail boat equipped with apparatus embodying my invention; Fig. 2, a broken enlarged perspective view; and Fig. 3, an enlarged detail sectional view, the section being taken as indicated at line 3 of Fig. 2.

In the illustration given, the hull of the boat is indicated by the letter A, the bow B being shown provided with a pulley 10. The mast C has its lower portion reduced so as to provide a depending integral block 11 secured within the step 12.

The deck D of the boat is provided with an elongated slot or aperture 13 through which the mast C extends, the aperture permitting bending of the mast in either direction.

The upper portion of the mast is secured or held stationary at the point 14 by the backstay 15 and by the jibstay 16. A headstay 17 connects the top of the mast and extends downwardly about the pulley 10 and rearwardly below the deck D.

Mounted upon the deck D is the mast bending mechanism. This comprises a lever 19 which is provided at an intermediate point with a squared opening receiving the squared end 20 of the vertically mounted shaft 21. The end 22 of lever 19 is pivotally connected to the rod 23. A similar rod 24 is pivotally connected to a collar 25 which extends about the mast C, as shown more clearly in Fig. 2. The adjacent threaded ends of rods 23 and 24 are connected by a turnbuckle 26.

In order to lock the actuating lever 19 in any

desired position, I provide a quadrant **27** which is fixedly secured to the deck and which is provided with perforations **28** adapted to receive the pin **29** of the latch **30**. The latch **30** is pivotally supported upon the shaft **31** supported by the upright ears **32** of the lever **19**. A spring **33** normally urges the locking pin **29** toward locking position. The handle **34** of the latch is adjacent the rear handle portion of the bar **19** so that the latch may be raised by pressing down thereon with the thumb while the bar **19** is being swung in either direction.

The shaft **21** extends through the collar **35**, formed integrally with the quadrant **27**, the deck D, and through the reinforcing block **36** secured to the deck D. At its lower side, the shaft **21** is provided with an integral lever **38**. The lever **38** is provided with a plurality of adjustment openings **40** to one of which is pivotally secured by a pin a pair of links **41**. The outer perforated ends of the pair of links are secured by a pin to the eye of screw rod **42**. The threaded end of rod **42** is connected by turnbuckle **43** to the threaded end of rod **44**. Rod **44** is provided with a fork to which is secured the end of the headstay **17**.

Operation

The normal position of the mast is indicated by the solid lines shown in Fig. 1. A forward bend position of the mast is indicated by the dotted lines **45**, which latter position takes out the fullness of the sail and converts it into a flat sail. To shift the mast from the position shown in solid lines to the position shown in dotted lines, the handle of the lever **19** is pulled aft, thus causing the opposite end **22** of the lever to push forward on the turnbuckle and collar. This forces the mast forward and causes it to bend as illustrated, the upper portion of the mast being held at the point **14** by the jibstay and backstay and the bottom of the mast being held at the step **12**. Simultaneously, the lower lever **38** moves toward the mast so as to pay out the headstay to the desired degree, thus taking care of the travel of the head of the mast toward the stern of the boat. When the desired position has been reached, the lever **34** of the latch which had been depressed is released and the pin **29** immediately enters the adjacent perforation **28** of the quadrant **27** and locks the lever in that position. To bring the mast back to neutral, the latch handle **34** is depressed to release the pin **29** and the handle is allowed to swing to the central position shown in Fig. 2.

Conversely, if it is desired to bend the mast in the opposite direction, it is necessary only to push the hand lever forward which automatically pulls the mast back at the collar and takes up the headstay, giving the mast a natural bend in the opposite direction. This increases the fullness of the sail.

The distance that the headstay is paid out or taken up can be regulated by attaching it to any one of the perforations **40** in the lower lever **38**. The nearer it is to the axis of the lever, the smaller the amount of travel, and conversely the farther out it is attached, the greater the amount of travel. The proper tension of the headstay is secured by means of the turnbuckle **43**.

Practically all racing yachts are provided with an adjustable mast step so that the mast can be moved forward or aft in order to properly balance the boat. This structure being old and well known, it is not illustrated herein. Different suits of sails will sometimes change the balance of the boat so that it becomes necessary to shift the position of the mast. In the mechanism described herein, the shifting of the mast may be accommodated by the long turnbuckle **26** connecting the rods **23** and **24** between the lever extension **22** and the collar **25**. If the balance of the yacht requires that the mast be moved aft, this turnbuckle can be shortened to suit the new location of the mast in the step.

Conversely, if it is desired to move the mast forward, the turnbuckle can be lengthened a corresponding amount. The moving of the mast also makes it necessary to lengthen or shorten the headstay and this is permitted by the turnbuckle **43** which is attached to the lower lever **38**.

The apparatus can be quickly installed on any yacht with a minimum of labor and expense. It can be adapted in principle to yachts of any size, although the invention is described herein in connection with Star class sloops.

In the invention illustrated, it will be noted that it is not necessary to change the jibstay or the backstay or the mast step. It will be noted that the mast is supported by two points; namely, the step and the junction **14** of the backstay and jibstay. Hence, pressure exerted anywhere between these points will cause the mast to bend. By a simple change in the position of the lever, the mast is easily bent in either direction desired and the headstay automatically follows a proportionate amount. By a single movement with one hand, requiring less than one second, the mast can be bent to the desired degree and the headstay paid off to the corresponding position for the mast when bent.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

I claim:

1. In combination with a sail boat provided with a deck and a mast, said deck being provided with an elongated opening through which the mast freely extends, means for anchoring the bottom of the mast to the bottom portion of the boat, stays secured to the boat and engaging an intermediate portion of the mast to retain said intermediate portion against movement, and means carried by the deck of said boat and engaging an adjacent portion of said mast for bending said mast within the elongated opening of said deck.

2. In combination with a sail boat equipped with a deck and a mast, said deck being provided with an elongated opening through which said mast freely extends, means for anchoring the foot of said mast to the bottom portion of said boat, stay means for securing said mast and portion at an intermediate point, a headstay connecting the head of said mast to the bow of said boat, and means supported by the deck of said boat and engaging said mast adjacent said opening for bending said mast in one direction and simultaneously adjusting the length of said headstay for the travel of said headstay caused by said bending of the mast.

3. In combination with a sail boat provided with a deck and a mast, said deck being provided with an opening through which said mast freely extends, means for anchoring the foot of said mast to the bottom portion of said boat, stay means engaging said boat at an intermediate portion of said mast for rendering said intermediate portion of the mast substantially stationary, a

pivoted lever supported upon said deck adjacent said mast, means connecting one end of said lever to said mast, and releasable locking means for securing said lever in one of a number of positions.

4. In combination with a sail boat provided with a deck and a mast, said deck being provided with an opening through which said mast freely extends, means for anchoring the foot of said mast to the bottom of said boat, stay means joining said boat and an intermediate portion of said mast for holding the same substantially stationary, a headstay connected to the head of said mast, a connection engaging said mast above said deck, and lever means operated by a single handle for operating said mast engaging means and said headstay simultaneously whereby the mast is bent in one direction and that portion of the mast above said intermediate point is moved in the opposite direction, the headstay being adjusted by said lever mechanism to the travel of said mast head above said intermediate portion.

5. In combination with a sail boat provided with a deck and a mast, said deck having an opening therein freely receiving said mast, means for anchoring the foot of said mast to the bottom of said boat, a backstay and jibstay supporting said mast at an intermediate point, a headstay engaging the head of said mast, a pulley mounted in the bow of said boat receiving said headstay, lever mechanism upon said deck fixedly connected to a lever below said deck, said headstay being connected to said lever below said deck, and means connecting the lever above said deck to said mast.

6. In combination with a boat having a deck and a mast, said deck having an opening therein freely receiving said mast and permitting the same to be bent therein, means for anchoring the foot of said mast in the bottom of said boat, a pulley mounted in the bow of said boat, a headstay secured to the head of said mast and extending about said pulley and to the rear of said mast, a collar engaging said mast and having an extension rearwardly thereof, a lever member equipped with a pivot bar fixed thereto extending through said deck and equipped with a lever below said deck, means for connecting the end of said headstay to said lever below said deck, and means for connecting said collar extension to the lever above said deck.

7. In combination with a boat equipped with a deck and a mast, said deck being provided with an opening freely receiving said mast and through which said mast may be bent, means for anchoring the foot of said mast in the bottom of said boat, stay means for supporting an upper portion of said mast against movement when said mast is bent, a perforated adjustment plate secured to said deck, a lever pivotally mounted upon said deck, a latch member carried by said lever and adapted to engage the holes of said adjustment plate, said lever being equipped with an extension beyond said pivot point, and means connecting said extension to said mast.

8. In combination with a boat equipped with a deck and a mast, said deck being provided with an opening freely receiving said mast and through which said mast may be bent, means for anchoring the foot of said mast in the bottom of said boat, stay means for supporting an upper portion of said mast against movement when said mast is bent, a perforated adjustment plate secured to said deck, a lever pivotally mounted upon said deck, a latch member carried by said lever and adapted to engage the holes of said adjustment plate, said lever being equipped with an extension beyond said pivot point, and means connecting said extension to said mast, said means comprising a collar engaging said mast and a turnbuckle connecting said collar and said extension.

9. In combination with a boat provided with a deck and a mast, said deck having an opening therein through which said mast may be moved, means for anchoring the foot of said mast in the bottom of said boat, stay means for anchoring a portion of said mast near the upper portion thereof against movement, means for moving that portion of the mast between said foot and said stay supported portion to bend the mast, a headstay connecting the top portion of said mast and the bow of said boat, and means operable simultaneously with said mast moving and bending means for adjusting said headstay to the movement of the head of said mast.

10. In combination with a boat provided with a deck and a mast, said deck having an opening therein through which said mast may be moved, means for anchoring the foot of said mast in the bottom of said boat, stay means for anchoring a portion of said mast near the upper portion thereof against movement, means for moving that portion of the mast between said foot and said stay supported portion to bend the mast, a headstay connecting the top portion of said mast and the bow of said boat, and means operable simultaneously with said mast moving and bending means for adjusting said headstay to the movement of the head of said mast, said mast bending means and said headstay operating means comprising a quadrant equipped with openings secured to said deck, a lever equipped with a pivot extension, a pivot bar for said lever fixed thereto, a lever fixed to the lower end of said bar, and means connecting the extension of said lever to said mast and said lever below the deck to said headstay.

11. In combination with a boat provided with a deck and a mast, said deck having an opening therein through which said mast may be moved, means for anchoring the foot of said mast in the bottom of said boat, stay means for anchoring a portion of said mast near the upper portion thereof against movement, means for moving that portion of the mast between said foot and said stay supported portion to bend the mast, a headstay connecting the top portion of said mast and the bow of said boat, and means operable simultaneously with said mast moving and bending means for adjusting said headstay to the movement of the head of said mast, said mast bending means and said headstay operating means comprising a quadrant equipped with openings secured to said deck, a lever equipped with a pivot extension, a pivot bar for said lever fixed thereto, a lever fixed to the lower end of said bar, and means connecting the extension of said lever to said mast and said lever below the deck to said headstay, said means connecting the lever extension to said mast and means connecting said lever below the deck to said headstay including turnbuckles.

12. In combination with a sail boat and a mast, means for anchoring the foot of the mast in the boat, stay means engaging an intermediate portion of the mast and holding the same substantially stationary, and adjustable means engaging said mast between the foot thereof and said stay supported portion for bending the same.

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