Sept. 8, 1964 H. H. BARNARD 3,147,729

SAIL

Filed March 21, 1962 2 Sheets-Sheet 1

FIG. 1

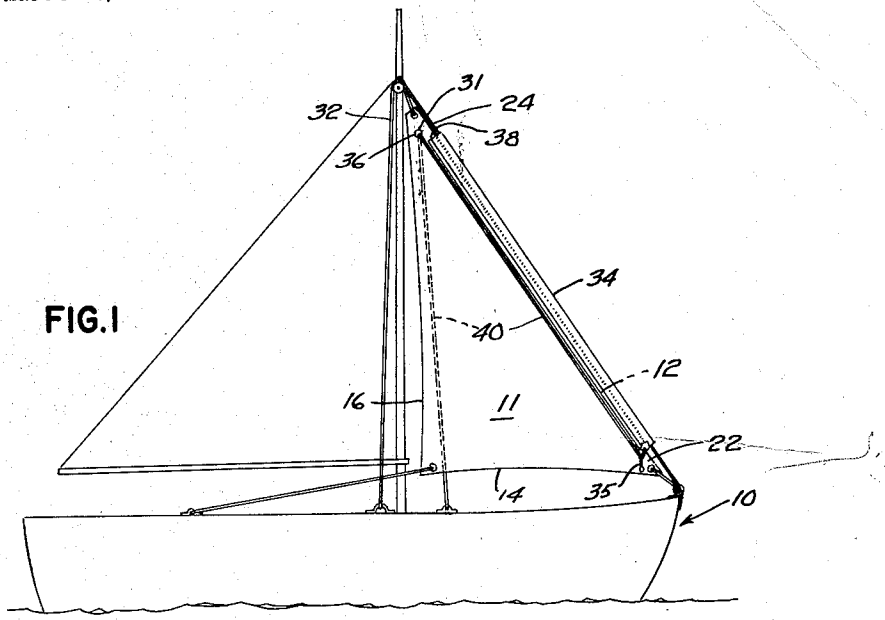


FIG. 2

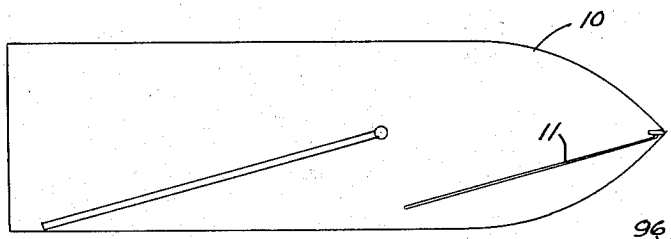


FIG. 2A

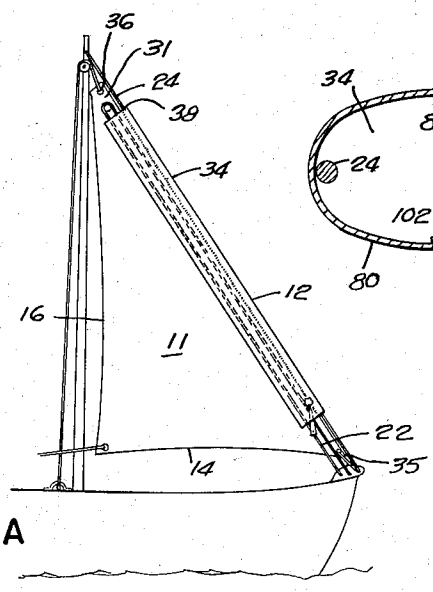
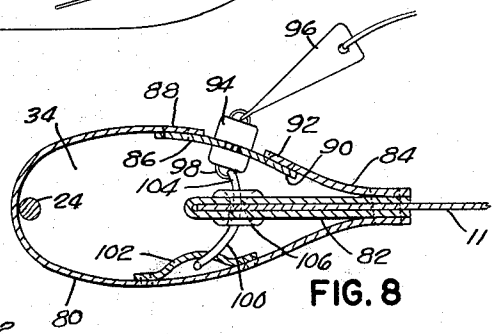


FIG. 8



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Sept. 8, 1964 H. H. BARNARD 3,147,729

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FIG. 3

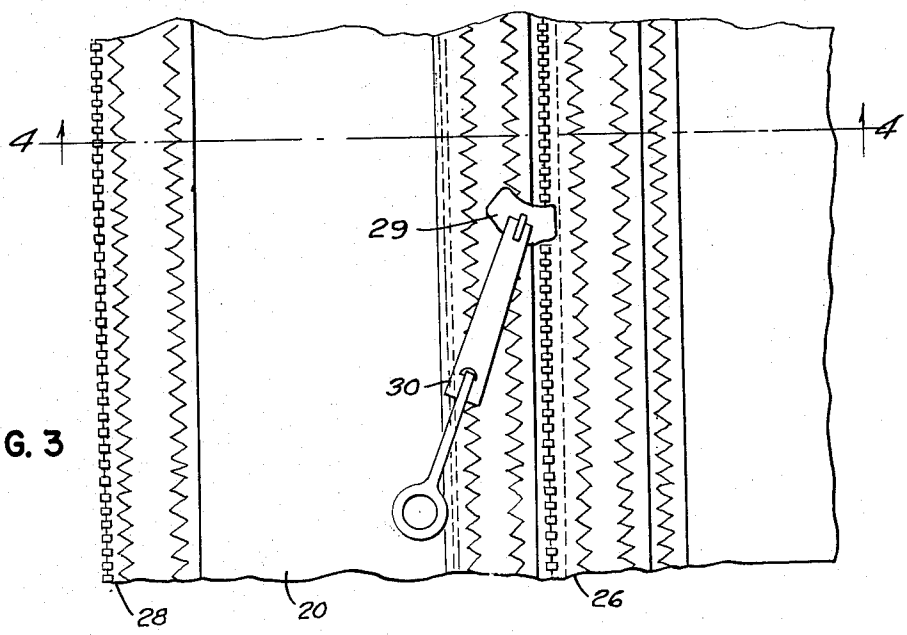


FIG. 4

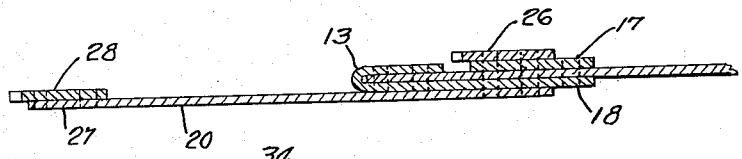


FIG. 5

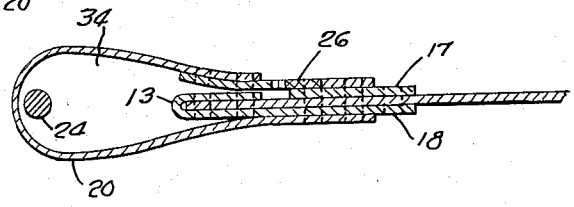
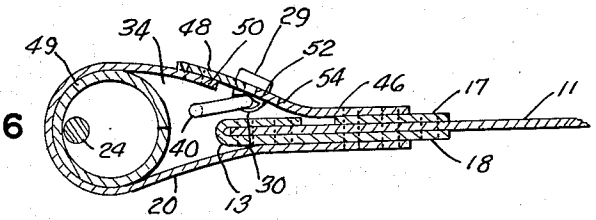


FIG. 6



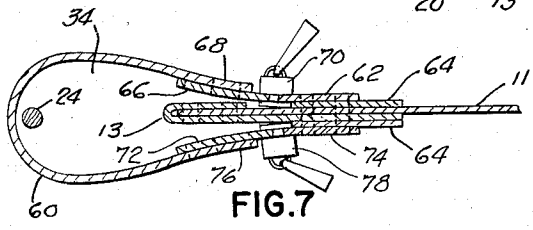


FIG. 7

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United States Patent Office 3,147,729 Patented Sept. 8, 1964

3,147,729

SAIL

Henry H. Barnard, Falmouth, Mass.; Boston Safe Deposit and Trust Company and Bruce E. Barnard, co-executors of said Henry H. Barnard, deceased

Filed Mar. 21, 1962, Ser. No. 181,404
15 Claims. (Cl. 114—103)

This invention relates to a sail.

The invention has for a principal object to provide a novel and improved sail which is characterized by novel means for improving the air flow over the sail whereby to increase its efficiency.

Another object of the invention is to provide a sail embodying novel means for securing the same to the headstay of a sailboat and for facilitating its removal therefrom in a rapid and efficient manner.

A further object of the invention is to provide a sail having a novel luff edge which provides an efficient and continuous uninterrupted air foil along its length.

A still further object of the invention is to provide a sail having novel means for rapidly automatically freeing the same from the stay of the boat whereby to enable sails to be quickly and efficiently changed whenever necessary.

Another object of the invention is to provide a sail having novel means for readily detachably securing the luff edge thereof to a stay of a boat whereby the entire length of the luff edge is supported on the stay with the strain distributed over its entire length, and the usual gap between the leading edge of the luff and the stay and the harmful effect of sagging of the luff edge are eliminated.

A still further object is to provide a sail having a luff edge which is characterized by providing a continuous, free and uninterrupted air foil along its length and in which the necessity of providing relatively heavy fasteners for securing the sail to the stay is eliminated and the weight of the sail reduced.

With these general objects in view and such others as may hereinafter appear, the invention consists in the sail hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the present invention:

FIG. 1 is a side view of a sailboat rigged with the present sail;

FIG. 2 is a plan view of a sailboard illustrating the relative positions of the sails of a sailboat;

FIG. 2A is a side view of the present sail showing the lanyard for unfastening the fastening means;

FIG. 3 is an enlarged plan view of a portion of a sail embodying the present invention;

FIG. 4 is a cross section taken on the line 4—4 of FIG. 3;

FIG. 5 is a view similar to FIG. 4 illustrating the sail secured to the stay with the fastening means engaged;

FIG. 6 is a view similar to FIG. 5 of a modified form of the invention showing the fastening means enclosed within the folded portion of the sail;

FIG. 7 is a view similar to FIG. 6 illustrating a further modified form of the invention; and

FIG. 8 is a view similar to FIG. 6 of another form of the invention wherein a separate compartment is provided for the lanyard for unfastening the fastening means.

The present novel sail structure includes novel fastening means for securing the sail to the stay whereby the usual gap between the leading edge of the luff and stay and the conventional metal hanks for securing the sail to the stay are eliminated. The elimination of the hanks substantially reduces the weight of the sail and also reduces with disturbance and "drag" caused by such hanks to a minimum whereby the efficiency of the sail during windward work is increased. Novel means is also provided

for manually freeing the sail from the stay rapidly, and in a modified form of the invention means is provided for automatically freeing the sail from the stay substantially instantaneously.

In general the present invention contemplates a novel and improved sail for a sailboat and particularly a jib or other headsail which is characterized by novel means for readily detachably securing the sail to a stay of the boat wherein the leading edge of the luff of the sail is smooth, continuous and uninterrupted, and a highly efficient air sail is formed along the edge of the luff, thereby substantially increasing the efficiency of the sail during windward sailing. Another feature of the invention resides in the ease and speed with which the sail may be freed and removed from the stay when it becomes necessary or desirable to change sails.

The present invention also provides a sail which in its hoisted position is fully supported on the stay for substantially its entire length whereby the strain is evenly distributed along the leading edge of the luff, and wrinkling and the formation of gaps caused by sagging of the leading edge of the luff during use are substantially eliminated, and an efficient air foil is maintained.

A further advantage of the present invention resides in the fact that the continuous uninterrupted air foil along the leading edge of the luff of the sail may be attained without hoisting the sail too tightly. Thus, undue strain on the mast, stays and downward thrust on the mast of the boat is reduced to a minimum.

The present invention also eliminates possible fouling of other sails, such as a spinnaker, on the hanks or snap hooks used to secure conventional jibs to the stay of the boat.

In a modified form of the invention provision is made for shaping the luff edge around the stay to provide an efficient uninterrupted pear-shaped air foil along substantially the entire edge.

Referring now to the drawings, and to FIG. 1 in particular, **10** represents a sailboat rigged with a jib embodying the preferred form of the present invention and a main sail. The jib **11** is cut from a suitable sailcloth fabric, such as cotton, nylon or dacron, or like material, and has a luff **12**, a foot **14** and a leech **16**. Fabric reinforcing strips **17**, **18** are sewn to the luff edge of the jib as best shown in FIGS. 4, 5 and 6.

In accordance with the preferred form of the invention an elongated, substantially rectangular flap **20** of fabric, which may or may not be of the same type as that from which the sail is made, is sewn along the reinforced luff edge **13** of the sail **11** on one side thereof commencing adjacent the tack **22** and extending substantially the length of the luff edge **13**. The flap **20** is preferably of a width sufficient to enable it to extend beyond the marginal edge of the luff to permit it to be folded around the foremost stay **24** of the boat and be detachably secured to the opposite side of the luff edge **13** of the sail. In accordance with the present invention it is preferred to provide a flap having enough width so that in its folded position it forms, in cooperation with the stay of a boat, a hollow tube or sleeve loosely around the stay as indicated in FIG. 6.

In order to detachably secure the flap **20** in its folded position around the stay, one portion **26** of a zipper is secured along the luff edge **13** of the sail along the side opposite that to which the flap **20** is sewn. The zipper portion **26** is spaced inwardly from the marginal edge of the flap a short distance. The cooperating portion **28** of the zipper is sewn or otherwise secured along the free edge **27** of the flap **20**. The cooperating zipper portions **26**, **28** are secured to the sail such that the cooperating zipper teeth engage and close as the zipper slide **29** is pulled

from the head 31 of the sail downwardly toward the tack 22 of the sail. Suitable fastening means, such as a snap hook 35, may be secured to a zipper handle 30 attached to the slide and arranged to be detachably secured to an eye fastened to the boat, or to the tack of the sail below the bottom edge of the zipper.

In operation, in order to bend on the jib, the tack 22 is secured to the bow portion of the boat in any convenient manner, and with the jib on the deck of the boat the upper portion of the flap 20 is folded around the headstay, and the cooperating portions 26, 28 of the zipper are engaged by the zipper slide 29. The jib halyard 32 may be attached in any conventional manner to the head 31 of the jib, and while the zipper slide 29 is held by hand or secured to the bow of the boat or tack portion 22 of the jib 11, the jib is hoisted by pulling on the halyard. It will be apparent that the upward movement of the head 31 of the jib 11 while the slide 29 is held stationary causes the cooperating portions 26, 28 of the zipper to be progressively engaged and fully engaged when the jib is hoisted as shown in FIG. 1.

Thus, it may be seen from the foregoing description that the folded flap 20 provides a continuous, uninterrupted tubular air foil 34 around the stay and a continuous, uninterrupted surface from the tubular portion rearwardly across the sail. It will be apparent that the hoisted sail 11 may freely rotate on the stay 24 when the boat changes from one tack to another, and is supported along substantially its entire luff edge 13 whereby any tendency of the sail to bind on the stay when swinging from one side of the boat to the other is substantially eliminated. The continuous support provided by the tubular air foil portion 34 also reduces the effects produced by sagging of the luff edge to a minimum even when the tension on the hoist is slackened due to stretching of the luff edge during use or when the halyard 32 is slackened, if desired, during reaching or running before the wind.

The present invention is particularly advantageous in that it provides a jib or headsail which may be rapidly removed from the stay 24 whenever it is desirable or necessary to change from one sail to another due to changing wind conditions, or when changing the course of the boat from a windward course to a leeward course and vice versa.

In one form of the invention a suitable lanyard 40 may be secured to the zipper slide handle 30, the other end being passed through a pulley or grommet 36 at the head 31 of the sail 11 above the upper end 38 of the zipper and downwardly to be detachably secured to the tack 22 of the sail or if desired, to the deck of the boat adjacent the bow or adjacent the cockpit where it may be easily accessible to the crew.

In order to detach the jib 11 from the stay 24 the zipper slide 29 is unfastened and hoisted by means of the lanyard 40 which raises the slide 29 toward the head 31 of the sail, thereby disengaging the cooperating portions 26, 28 of the zipper. The tack 22 of the jib may then be unfastened, the jib halyard 32 freed and the jib hauled down either into the cokpit or onto the deck of the boat. It will be apparent that as soon as the zipper is unzipped, and the tack 22 unfastened, the flap 20 is free of the stay 24, and the crew may immediately bend another sail on the stay. It will be understood that, if desired, the sail may be hauled down toward the deck of the boat and the zipper unzipped by hand.

In another form of the invention the lanyard 40 may be replaced by a length of elastic material commonly referred to as "shock cord." The use of shock cord provides an automatic and very rapid method of freeing the sail from the stay after the sail 11 is secured to the stay 24 in the manner hereintofore described. The shock cord 40, which is secured to the zipper slide 29 and passed upwardly through the grommet or pulley 36 at the head 31 of the sail and then downwardly secured adjacent the tack 22 of the sail 11 in the manner described in connection with the lanyard 40, is placed under an amount of tension sufficient to cause the slide 29 to be rapidly hoisted toward the head 31 of the sail to free the cooperating zipper portions 26, 28. It will be apparent that the amount of tension applied to the shock cord in order to cause it to fully hoist the slide 29 and disengage the cooperating portions of the zipper will depend upon the length of the luff and also upon the size and amount of friction inherent in the zipper and, consequently, may be varied whenever necessary.

One of the important advantages obtained by the present invention resides in the fact that the headsails may be changed rapidly, and this is particularly important in sailing races wherein a matter of seconds may be the difference between winning and losing a race. The use of shock cord or other elastic material substantially increases the speed with which the sail may be freed of a stay. In fact, the sail may be removed from the stay substantially instantaneously upon release of the zipper slide.

In a form of the invention illustrated in FIG. 6, provision is made for enclosing the rope or shock cord lanyard 40 within the tubular air foil 34. As shown, flap 20 is sewn along the reinforced luff edge 13 of the sail 11, and a short flap 46 is sewn to the opposite side of edge 13. One gripping portion 48 of an elongated zipper is secured along the free edge 50 of the flap 20, the other gripping portion 52 being secured along the free edge 54 of flap 46. The zipper slide 29 is slidably mounted on the gripping portion 48 such that its handle 30 is located on the inside of the flap. One end of the lanyard 40 is fastened to the zipper slide handle in any preferred manner, the other end of the lanyard 40 being passed upwardly through grommet 36 adjacent the head 31 of the sail 11 and downwardly toward the tack 22 of the sail.

In practice with the sail lying on the deck of the boat the free end of the flap 20 is folded around the stay 24, and the cooperating zipper portions 48, 52 are engaged by the slide 29. The free end of the lanyard 40 may be secured to the sail below the zipper or may be secured in any preferred manner adjacent the bow portion of the boat and the sail hoisted. As previously described, when the sail is fully hoisted the cooperating portions of the zipper are fully engaged, and it will be seen that the lanyard 40 is enclosed within the tubular air foil 34 formed by the engaged flaps 20, 46. The amount of tension applied to the shock cord lanyard may be varied by shortening or lengthening the cord, depending upon the amount of force require to release the zipper after the sail is fully hoisted.

Provision is also made for preshaping the air foil 34 by providing an elongated hollow split tube 49 of plastic or other lightweight material having a round or pear shaped cross sectional shape which may be slipped onto the stay 24 prior to securing the flap 20 around the stay 24. In this manner the forward portion of air foil 34 is shaped to conform to the cross sectional shape of the tube 49. It will be understood that tube 49 may be of any desired size and cross sectional shape.

FIG. 7 illustrates still another modified form of the invention wherein the means for detachably securing the sail to the stay of the boat comprises a relatively wide fabric flap 60 which is detachably fastened to the luff edge of the sail and may be completely removed from the sail if desired. As shown, one gripping portion 62 of a conventional zipper is sewn along the reinforced edge 64 of a sail 11, and the other cooperating zipper portion 66 is sewn along the marginal edge 68 of flap 60. A suitable zipper slide 70 is preferably slidably mounted on gripping portion 62 and is arranged to cooperate with gripping portion 66 to detachably secure the flap 60 to the sail. As shown, similar cooperating zipper gripping portions 72, 74 are sewn to the free edge 76 of flap 60 and the other side of edge 64 of sail 11, respectively, and a zipper slide 78 is slidably mounted on, preferably, portion 74. Thus, when it is desired to secure the sail to the stay 24

of the boat, flap 60 may be detachably secured to the leading edge 64 of the sail 11 by engaging the leading portions of gripping portions 62, 66 by means of slide 70 and zipping the gripping portions together. The free edge 76 of flap 60 may be folded around the stay 24 and detachably fastened thereto by zipping gripping portions 72, 74 together as the sail is hoisted in the usual manner. The sail 11 may be freed from stay 24 manually or by means of a rope or shock cord lanyard as hereintofore described in connection with other forms of the invention. In the event that the flap 60 becomes worn it may be easily unzipped from the sail and replaced by a new flap.

FIG. 8 illustrates a modified form of the invention wherein a relatively wide flap 80 is sewn along one side of the reinforced edge 82 of the sail 11, and a short flap 84 is sewn along the other side of the edge 82. One gripping portion 86 of a zipper is sewn to the free edge 88 of flap 80, as shown, and the other gripping portion 90 of the zipper is secured along the free edge 92 of flap 84. A zipper slide 94 is slidably mounted on portion 90 and is provided with a handle 96 on one side and an eye 98 on its other side to which a rope or shock cord lanyard 100 may be secured. In order to confine the rope or shock cord lanyard 100, a fabric sleeve 102 is preferably sewn to the inside of flap 80 as shown. One end 104 of the lanyard 100 is secured to zipper slide eye 98, and the free end of the lanyard is passed upwardly through a grommet or pulley 106 adjacent the head 31 of the sail and downwardly within sleeve 102, and is preferably secured to the sail below the bottom of the zipper or to the deck of the boat adjacent the bow thereof. In this manner the lanyard 100 is confined within the sleeve 102 such that it will not become snarled when the sail is lying on the deck of the boat prior to hoisting or when the sail is freed from the stay 24 after the zipper has been disengaged. The sail 11 may be detachably secured to stay 24 by folding flap 80 around stay 24. The cooperating zipper portions 86, 90 are engaged and the sail hoisted by means of halyard 32 while the zipper slide 94 is secured to the tack of the sail or deck of the boat in the manner hereintofore described. The sail 11 may be freed from the stay 24 by merely releasing zipper slide 94 in the event the lanyard comprises a shock cord lanyard, or by hoisting the slide when a rope lanyard is used.

From the foregoing description it may be seen that the present invention provides a sail particularly adapted for use on a foremost stay of a sailboat which embodies novel means for detachably securing the sail to the stay whereby its efficiency is substantially increased by providing along its luff edge an effcient air foil and a smooth, uninterrupted surface from the leading edge of the sail across the sail over which the air may flow. The present invention also embodies novel means for readily detachably removing the sail from the stay whereby the time required for changing sails while sailing is substantially reduced. The present invention also provides a sail which may be raised or lowered on the stay while drawing to compensate for different wind conditions without loss of efficiency.

It will be understood that while the present means for detachably securing the sail to the stay of the boat has been herein described as a conventional zipper, other types of zippers, such as a two-way zipper, and other forms of continuous, separable and interengageable readily detachable fastening means forming a continuous closure may be used, and also while the invention has been described as embodied in a sail, the invention may be embodied in other forms, such as a false sail or spinnaker net or other device carried on a stay of a sailing vessel.

Having thus described the invention, what is claimed is:

1. A sail having three marginal edges including a luff edge, flap means extending along substantially the full length of said luff edge foldable around the foremost stay of a sailboat, and continuous, separable and interengageable fastening means readily detachably securing said flap means folded upon itself to form a continuous closure around the stay to secure the sail and to said stay to enable the sail to be hoisted and swing freely on said stay and to be easily removed therefrom after use and to provide an uninterrupted surface extending from the leading edge of the folded flap across the surface of the sail.

2. A sail having a foldable luff edge comprising a foldable flap, said flap being foldable upon itself around the stay of a sailboat, and fastening means detachably securing the flap in its folded position around the stay, said fastening means comprising continuous, separable and interengageable cooperating portions, one portion secured to the free edge of said flap and the other portion secured in spaced relation inwardly of said free edge providing a flap portion between said cooperating portions loosely engageable with the stay, and means for engaging and disengaging said cooperating portions when the sail is hoisted and lowered respectively.

3. A sail having a luff edge, said luff edge comprising a flap portion extending outwardly from and along said luff edge, said flap portion being foldable around a stay of a boat, and continuous, separable and interengageable readily detachable fastening means for securing said flap portion around said stay and forming a continuous closure, said foldable flap portion providing a continuous, uninterrupted air foil along the fold of the flap of the sail when the sail is hoisted on the stay, and means for disengaging the fastening means to free the flap portion from the stay.

4. A sail as defined in claim 3 wherein the disengaging means is within the folded flap portion.

5. A sail having a luff edge, said luff edge comprising a flap portion along the luff edge, said flap portion being foldable around a stay of a boat, and continuous readily detachable fastening means securing said flap portion around the stay, said foldable flap portion providing a continuous uninterrupted air foil along the luff edge of the sail, said fastening means comprising a zipper having cooperating portions and a slide for engaging and disengaging said portions, means for securing the slide with the zipper in its fully engaged position, and means for disengaging the zipper comprising guide means above the top of the zipper and a lanyard carried by the guide means and secured at one end to the zipper slide whereby the zipper portions are disengaged when the slide is hoisted by the lanyard.

6. A sail as defined in claim 5 wherein the lanyard comprises a length of elastic cord under sufficient tension to automatically unzip the zipper upon release of the zipper slide to rapidly free the sail from the stay.

7. A sail having a luff edge, said luff edge comprising a flap member foldable around the stay of a sailboat, and readily detachable fastening means securing said flap around the stay, said foldable flap member having a hollow sleeve, means for disengaging said fastening means having a portion thereof disposed within said sleeve and a portion disposed within said foldable flap.

8. A sail having a luff edge, a leech edge and a foot edge, said luff edge comprising a flap foldable around the stay of a sailboat, continuous, separable and interengageable fastening means forming a continuous closure and securing said flap in its folded position around the stay when the sail is hoisted on the stay, and means cooperating with said stay and disposed within the folded flap to cause an air foil of predetermined shape to be formed along the leading edge of said sail.

9. A sail having a luff portion foldable into tubular form around a stay of a boat, and continuous, separable and interengageable fastening means for securing said sail to said stay and forming an elongated and continuous closure around said stay, said fastening means comprising a first fastening element connected with said luff position and a second fastening element connected with said sail inwardly of and spaced from said first fastening element and engageable with and disengageable from said first

fastening element at will, whereby said sail can be quickly set or removed from said stay.

10. A sail having a luff edge foldable into tubular form around a stay of a boat; and continuous, separable and interengageable fastening means for securing said luff edge around said stay, said fastening means comprising a first means connected with said luff edge; and a second means connected with said sail inwardly of and spaced from said first means and manually interengageable at will with said first means forming a continuous closure around the stay.

11. A sail having a luff portion foldable into tubular form around a stay, and readily engageable and disengageable fastening means for detachably securing said sail to said stay, said means comprising a zipper having a first means connected with said luff portion; and a second means connected with said sail inwardly of and spaced from said first means and manually interengageable at will with said first means, for detachably securing said luff portion in tubular form around said stay.

12. A sail adapted to be hoisted on a stay of a sailboat, said sail having a plurality of marginal edges including a two-part luff edge, said luff edge having a plurality of flaps, one of which is substantially wider than the other and continuous, separable and interengageable fastening means detachably securing the edges of said two-part luff edge together forming a continuous closure around the stay.

13. A sail having a luff edge, means for detachably securing the sail to a stay of a sailboat, comprising a detachable flap foldable around the stay of a sailboat, continuous, separable and interengageable fastening means securing said flap to one side of the sail, and continuous, separable and interengageable fastening means continuously securing said flap in folded position to the other side of the sail.

14. A sail having a luff edge, means for detachably securing the sail to a stay of a sailboat, comprising a detachable flap foldable around the stay of a sailboat, a zipper securing said flap to one side of the sail, and a second zipper securing said flap in folded position to the other side of the sail.

15. A sail having a luff edge, a leech edge and a foot edge, said luff edge comprising a flap foldable around the stay of a sailboat, continuous, separable and interengageable fastening means forming a continuous closure and securing in its folded position around the stay when the sail is hoisted on the stay, and an elongated hollow tube disposed within the folded flap and surrounding the stay to cause an air foil of a predetermined shape to be formed along the leading edge of said sail.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,147,729 September 8, 1964

Henry H. Barnard

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 70, for "with" read -- wind --; column 2, line 61, for "FIG. 6" read -- FIG. 5 --; column 6, line 72, for "position" read -- portion --.

Signed and sealed this 11th day of May 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents