Description

This invention relates to a flex wing apparatus and also to a coupling unit for use in the apparatus.

A flex wing apparatus is any apparatus which derives its support or motive power, in whole or in part, from a flexible wing. Example of flex wing apparati include sailboats, windsurfers, hang gliders and land sailing apparati. The flex wing itself can, for example, be a sail for a boat together with the associated mast.

The performance of a flex wing apparatus is dependent upon the efficiency of its flex wing. In order to tailor a flex wing for particular wind conditions, it is often necessary or desirable to adjust the camber of the wing.

For example, a sailboat or windsurfer typically comprises a sail which is stiffened by resilient battens carried by batten pockets in the sail. The sail can be variably tensioned by an outhaul, and this can be used to provide some degree of camber adjustment in the sail. Unfortunately, however, when it is desired to increase the camber of the sail, the compressive forces on the battens push them forward around the sides of the mast thereby providing discontinuities in the wing and materially distorting the airfoil shape of the sail. This in turn reduces the efficiency of the sail and degrades performance.

In an effort to overcome this problem, it has been proposed to utilize a large, expensive mast of airfoil configuration and to couple the leading edges of the battens to the trailing edge of the mast. The mast is pivotable generally about its longitudinal axis, and with this arrangement, camber can be induced in the sail. However, in order to reduce the weight of this mast to an acceptable limit, it must be constructed in exotic expensive materials which make the cost of this construction very high and despite this the junction between the trailing edge of the mast and the sail will still be a significant discontinuity.

A number of proposals have been made for improving the efficiency of sail assemblies, and one of these is disclosed in European Patent publication No. 0,083,432. This shows a mechanism for pivotally coupling the battens of a flexible sail to a mast in which the forward end of each batten is held close to the mast by a collar rotatably mounted on the mast. The collars are themselves constrained to rotate together about the mast by a series of sleeves extending between them. Other proposals for controlling the leading edge shape of a sail structure are disclosed in U.S. Patent No. 4,064,821 and German Patent No. 384,075.

The present invention is concerned with flex wing apparatus of the type comprising a mast and a sail of flexible material formed with a luff sleeve at its leading edge, the sail carrying a plurality of battens extending towards the leading edge, and the luff sleeve enveloping the mast; and a plurality of couplings between the battens and the mast, and within the luff sleeve, which couplings resist forward movement of the battens but allow pivotal movement of the battens and sail about the mast. According to the invention each coupling has a collar at least partially surrounding and rotatable about the mast, and a pair of resilient legs extending rearwardly from the collar on either side of a respective batten, each leg being adapted to align itself with a respective batten when said batten is deflected thereagainst. Means are also provided for resiliently deforming the apparatus and defining the limits of such deflection of the battens.

In the use of apparatus according to the invention the battens are held under compression by the sail to cause camber in the sail, each coupling being pressed by the respective batten against the mast and being pivotable about the mast, (i.e. the mast itself and not just a point on the periphery of the mast). The coupling thus allows the luff sleeve at the leading edge of the sail to take up a smoothly tapering width from the rear of the mast in a rearward direction. This is accomplished inexpensively using conventional inexpensive materials for the mast and without the need to construct the mast in an airfoil configuration. Neither is it necessary to construct an airfoil-shaped envelope for the mast.

With this invention, the couplings couple the battens to the mast for pivotable movement of the battens and sail about the mast. The battens can be resiliently deformed varying magnitudes to induce the desired camber into the battens and the sail. Because the leading edges of the battens are pivotally coupled to the mast, their leading edges do not project around the mast to disrupt the airfoil configuration of the sail. Moreover, because the leading edges of the battens can pivot generally about the longitudinal axis of the sail, they enable the battens and sail to assume the desired airfoil configuration. The legs of the coupling can be resiliently deflected transversely as camber is induced in the sail. As such, the couplings provide a more aerodynamic configuration for the leading edge of the sail to improve the sail's efficiency. The mast can be of a simple, easily constructed cross section, such as a circular cross section.

The battens can be compressively deformed in various ways. For example, in one known form of windsurfer and sailboat, the mast is resilient, and the resilience of the mast can be used to deflect the battens. Alternatively, the tension in the sail, whether or not the mast is resilient, can be used to provide the force for deflecting the battens. The resilient deforming force can be controlled in the usual manner by an outhaul.

With this invention, the battens support and tension the sail to a significant degree irrespective of wind conditions. This enables a sailboat or windsurfer to sail closer into the wind and reduces or eliminates the tendency of the sail to luff.

Preferably the battens are of decreased rigidity or stiffness at their leading ends. For example, they may taper towards the leading ends. This

ensures the largest camber near the mast enhancing the aerofoil section of the mast.

The couplings can be attached to the sail by means of pockets on the sail adjacent associated battens for receiving the legs of the coupling. The battens are normally carried in batten pockets on the sail and the batten pockets may have forward or leading ends which are closed sufficiently to retain the leading end of the battens in the associated batten pocket against forward movement. With this construction, when tension is induced in the battens, the couplings are loaded against the mast, and the battens are linked to the couplings without the need for separate fasteners. Preferably, the forward ends of the batten pockets hold the leading ends of the associated battens spaced from the collar of the associated coupling.

The two resilient legs of each coupling preferably extend away from essentially the widest part of the collar. The legs may include inclined sections which are inclined toward each other as they extend away from the collar and generally parallel sections which extend away from the inclined sections and which are adapted to receive an end portion of a batten.

The features of this invention are applicable to any flex wing apparatus as defined above. However, the features of this invention are particularly applicable to sailboats and windsurfers, and for this reason, the specific embodiment described hereinbelow is of a windsurfer.

The invention, will now be illustrated with reference to the following description taken in connection with the accompanying illustrative drawings, in which:

Figure 1 is an isometric view of a windsurfer constructed in accordance with the teachings of this invention;

Figure 2 is a sectional view taken generally along line 2—2 of Figure 1;

Figure 3 is an enlarged sectional view taken generally along line 2—2 of Figure 1 and illustrating the mast, the sail, a coupling and a batten with the sail essentially flat;

Figure 4 is a fragmentary isometric view of a section of the sail, one of the battens, and a portion of one of the couplings;

Figure 5 is an isometric view of a preferred form of coupling; and

Figure 6 is a somewhat schematic, isometric view of a sail illustrating one way that the camber of the sail can be changed.

Figure 1 shows a windsurfer 11 which generally comprises a buoyant support 13 in the form of a surfboard 13, a mast 15 coupled to the support and projecting generally upwardly therefrom, a sail 17 and a boom 19 coupled to the mast. In the embodiment illustrated, the boom 19 is a wishbone boom having two arms 20 on opposite sides of the sail 17. The sail 17 is stiffened, and its shape is controlled, at least in part, by battens 21 carried by the sail.

The sail 17 has a leading edge or luff 22, a trailing edge or leach 23 and a luff sleeve 25 along its leading edge, and as shown in Figure 3, the ends of the sleeve 25 are sewed onto a main portion of the sail. The sleeve is in general somewhat wider than conventional luff sleeves. The mast 15 is received within the sleeve 25 as shown in Figure 3. The sail 17 may be rigged in accordance with conventional practice, and except for the construction adjacent and within the sleeve 25, the windsurfer 11 may be of conventional construction.

The mast 15 is cylindrical and resilient and may be constructed of fibreglass or aluminium. As shown in Figure 1, the mast 15 curves rearwardly as it extends upwardly. Masts of this type are known, and such curvature is induced by tensioning the sail 17 using a conventional outhaul 27 (Figures 2 and 6) which couples the sail to the boom 19. Thus, the outhaul 27 controls the tension in the sail 17 and so the deflection of the mast 15. The more the mast deflects, the flatter the sail becomes, e.g. the camber is reduced.

Each of the battens 21 is suitably carried by the sail 17, and this is accomplished by a sail pocket 29 on the sail 17 which extends from the trailing edge 23 to a location within the sleeve 25 and adjacent the leading edge 22 of the sail. One batten 21 is provided in each of the batten pockets 29 in the usual manner, and the trailing end of each batten is suitably affixed to the sail as by a tensioning device 31 (Figure 4) which extends over the trailing end of the batten. The battens taper towards their leading ends so as to promote the maximum curvature in the sail in that region.

The leading end portion of the batten 21 and the pocket 29 project into the sleeve 25. The forward end of each of the batten pockets 29 is closed sufficiently to retain the leading end of the associated batten 21 therein against forward movement. In the embodiment illustrated, this is accomplished by a flap 37 (Figures 3 and 4) which is sewed over the forward end of the batten pocket 29. The sail 17 also has coupling pockets 39 (Figures 3 and 4) sewed to the sail 17 on opposite sides each of the batten pockets 29. Each of the coupling pockets 39 has a rearward or trailing end 41 which is closed as by sewing it shut. Preferably, the vertical dimension of each of the coupling pockets 39 is approximately equal to the vertical dimension of the associated batten pocket 29.

The leading ends of the battens 21 are coupled to the mast 15 by coupling means which includes the batten pockets 29, the coupling pockets 39, the luff sleeve 25 and identical couplings 43 located within the sleeve 25. The coupling 43, which may be moulded from a suitable plastic material, comprises a collar 45 and resilient legs 47 coupled to the collar and extending away from the collar. The collar 45, which is generally channel shaped, includes spaced arms 49 integrally joined by a web 51 at the juncture between the arms 49 and the legs 47. The legs 47 include inclined sections 53 which are inclined toward each other as they extend away from the collar 45 and generally parallel sections 55 which

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extend away from the inclined sections at the distal ends of the inclined sections. The inclined sections 53 extend away from the widest part of the collar 45.

The arms 49 are spaced apart sufficiently to slidably receive and partially surround the mast 15 and the web 51 is also engageable with the mast 15 as shown in Figure 3. The parallel sections 55 are spaced apart sufficiently to receive the leading end portion of the associated batten 21 and its batten pocket 29. The parallel sections 55 are receivable in the coupling pockets 39, respectively, on opposite sides of an associated batten 21. With this construction, the legs 55 are approximately centred in a vertical direction on the associated batten 21.

Although the collar 45 could completely surround the mast 15, for ease of assembly, it is preferred to have the collar only partially surround the mast so that it can be assembled onto the mast by moving the collar radially toward the mast. Although various configurations are possible, the sections 53 and 55 are preferably straight, flat, elongated strips which extend in the same direction.

In the assembled condition, the couplings 43 are within the sleeve 25 and the sleeve retains the sail 17 on the mast 15. The collar 45 of each of the couplings is rotatably mounted on the mast 15 as shown in Figure 3. The parallel sections 55 of the legs 47 are received within and bear against the closed trailing ends 41 of their associated coupling pockets 39. With this construction, forces tending to push the battens 21 toward the mast are transmitted via the flaps 37, the coupling pockets 39 and the couplings 43 to the mast. The battens 21 and the leading edge of the sail 17 can pivot about the longitudinal axis of the mast 15 by virtue of the pivoting action of the couplings 43 about the mast 15. This is in contrast with many existing sales where the sail and batten pivot about the rear periphery of the mast.

The camber of the sail 17 can be induced and varied as shown in Figures 2 and 6 using the outhaul 27. The outhaul 27, which is conventional, comprises a double pulley 67 carried by the trailing end of the boom 19, cleats 69 and 71 mounted on the arms 20, respectively of the boom 19, and a line 73 extending from the cleat 69 around one roller of the pulley 67, through an eyelet 75 at the trailing edge 23 of the sail 17, back around a second roller of the pulley 67 to the cleat 71. When the line 73 is tensioned, it draws the trailing edge 23 of the sail 17 closer to the pulley 67 at the trailing end of the boom 19, and this tightly tensions the sail between the mast 15 and the trailing end of the boom 19 with the result that the mast 15 is resiliently deflected rearwardly.

The camber of the sail 17 can be increased by loosening the outhaul 27 to allow the mast 15 to straighten somewhat and to move the eyelet 75 forwardly so that the mast and sail are in the dashed-line position of Figure 6. This forward motion of the trailing edge 23 of the sail 17 pushes the trailing end of the battens 21 forwardly toward the mast. However, because the flap 37 prevents forward motion of the battens 21, they deflect to increase their curvature and increase the camber of the airfoil formed by the sail 17. The couplings 43 slidably pivot clockwise as viewed in Figure 4 about the mast 15 to allow the battens 21 to increase the camber of the sail 17. If this pivoting motion of the couplings 43 about the mast 15 were not allowed, the battens 21 would tend to buckle. The increased resilience of the leading end portions of the battens 21 enables them to impart the desired airfoil shape to the sail 17.

Conversely, to flatten the sail 17, the line 73 is further tensioned to pull the eyelet 75 rearwardly and to deflect the mast 15 rearwardly toward the full-line position of Figure 6. This reduces the compressive forces on the battens 21. Accordingly, the couplings 43 pivot in the opposite direction about the mast 15 to permit a relative flattening of the airfoil shape of the sail. This pivoting movement of the couplings 43 about the mast 15 enables the camber of the sail 17 to be properly decreased.

In coming about, the battens 21 can deflect as shown in dashed lines in Figure 2, and the coupling 43 pivots on the mast 15 in the direction of the arrow "A."

An important function of the couplings 43 is to aerodynamically shape the sail 17 adjacent and along its leading edge 22. In this regard, the legs 47 allow the leading ends of the associated batten 21 to move transversely as the camber of the sail 17 is changed. Because the legs 47 are resilient, they smoothly bend as shown in Figure 2 to efficiently shape the sail 17 adjacent and along its leading edge 22. In addition, the wide portion of the coupling 43 adjacent the opposite ends of the web 51 maintains an aerodynamic configuration for the sail at the locations along the sail which contact this portion of the coupling. Aft of these locations, the resilient legs 47 serve to shape the sail regardless of the amount of camber which is induced into the sail.

Another feature of this invention is that the couplings 43 are appropriately coupled to the sail 17 without using separate fasteners. This simplifies the construction and facilitates assembly.

Claims for the Contracting States: DE FR GB IT NL

1. Flex wing apparatus comprising a mast (15) and a sail (17) of flexible material formed with a luff sleeve (25) at its leading edge, the sail carrying a plurality of battens (21) extending towards the leading edge (22), and the luff sleeve (25) enveloping the mast; and a plurality of couplings (43) between the battens (21) and the mast (15), and within the luff sleeve (25), which couplings (43) resist forward movement of the battens (21) but allow pivotal movement of the battens (21) and sail (17) about the mast (15), characterised in that each coupling (43) has a collar (45) partially surrounding and rotatable about the mast (15),

extend away from the inclined sections at the distal ends of the inclined sections. The inclined sections 53 extend away from the widest part of the collar 45.

The arms 49 are spaced apart sufficiently to slidably receive and partially surround the mast 15 and the web 51 is also engageable with the mast 15 as shown in Figure 3. The parallel sections 55 are spaced apart sufficiently to receive the leading end portion of the associated batten 21 and its batten pocket 29. The parallel sections 55 are receivable in the coupling pockets 39, respectively, on opposite sides of an associated batten 21. With this construction, the legs 55 are approximately centred in a vertical direction on the associated batten 21.

Although the collar 45 could completely surround the mast 15, for ease of assembly, it is preferred to have the collar only partially surround the mast so that it can be assembled onto the mast by moving the collar radially ›ward the mast. Although various configurations are possible, the sections 53 and 55 are preferably straight, flat, elongated strips which extend in the same direction.

In the assembled condition, the couplings 43 are within the sleeve 25 and the sleeve retains the sail 17 on the mast 15. The collar 45 of each of the couplings is rotatably mounted on the mast 15 as shown in Figure 3. The parallel sections 55 of the legs 47 are received within and bear against the closed trailing ends 41 of their associated coupling pockets 39. With this construction, forces tending to push the battens 21 toward the mast are transmitted via the flaps 37, the coupling pockets 39 and the couplings 43 to the mast. The battens 21 and the leading edge of the sail 17 can pivot about the longitudinal axis of the mast 15 by virtue of the pivoting action of the couplings 43 about the mast 15. This is in contrast with many existing sales where the sail and batten pivot about the rear periphery of the mast.

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Another feature of this invention is that the couplings 43 are appropriately coupled to the sail 17 without using separate fasteners. This simplifies the construction and facilitates assembly.

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1. Flex wing apparatus comprising a mast (15) and a sail (17) of flexible material formed with a luff sleeve (25) at its leading edge, the sail carrying a plurality of battens (21) extending towards the leading edge (22), and the luff sleeve (25) enveloping the mast; and a plurality of couplings (43) between the battens (21) and the mast (15), and within the luff sleeve (25), which couplings (43) resist forward movement of the battens (21) but allow pivotal movement of the battens (21) and sail (17) about the mast (15), characterised in that each coupling (43) has a collar (45) partially surrounding and rotatable about the mast (15),

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and a pair of resilient legs (47) extending rearwardly from the collar (45) on either side of a respective batten (21), each leg being adapted to align itself with a respective batten (21) when said batten is deflected thereagainst, and by means for resiliently deforming the apparatus and defining the limits of such deflection of the battens (21); no protection is sought for apparatus as aforesaid in which a leading edge member is provided within the luff sleeve for defining an aerodynamic shape forward of the mast.

2. Apparatus according to Claim 1 characterised in that the sail (17) has batten pockets (29) for carrying the battens (21), at least one of said batten pockets (29) having a forward end which is closed sufficiently to retain the leading end of the respective batten (21) therein against forward movement.

3. Apparatus according to Claim 1 or Claim 2 characterised in that the legs (47) of the couplings (43) are received in coupling pockets (39) on the sail (17) adjacent associated battens (21).

4. Apparatus according to any preceding Claim characterised in that the leading end of each batten (21) is held spaced from the collar (45) of the associated coupling (43).

5. Apparatus according to any preceding Claim characterised in that the collar (45) and legs (47) of each coupling (43) define a pair of smooth continuous surfaces from the mast (15) to the respective batten (21).

6. Apparatus according to Claim 5 characterised in that said smooth surfaces are curved.

7. Apparatus according to Claim 5 or Claim 6 characterised in that the legs (47) of each coupling (43) have sections (53) which converge as they extend away from the collar (45).

8. Apparatus according to Claim 7 characterised in that the legs (47) of each coupling (43) include generally parallel sections (55) which extend away from the convergent sections (53) on either side of the respective batten (21).

9. Apparatus according to any preceding Claim characterised in that each coupling (43) is integrally moulded in a synthetic plastics material.

10. A coupling unit for use in apparatus according to any preceding Claim, having a collar (45) for mounting against the mast (15), characterised in that a pair of resilient legs (47) extending rearwardly from the collar (45) for receipt of the end of a sail batten (21) therebetween, each leg being adapted to align itself with a respective batten (21) when said batten is deflected thereagainst.

11. A coupling according to Claim 10 characterised in that the distal ends of the legs (47) are adapted to support said end of the batten (21) and maintain it spaced from the collar (45).

12. A coupling according to Claim 10 or Claim 11 characterised in that the legs (47) converge in a direction away from the collar (45).

Claims for the Contracting States: AT BE CH LI LU SE

1. Flex wing apparatus comprising a mast (15) and a sail (17) of flexible material formed with a luff sleeve (25) at its leading edge, the sail carrying a plurality of battens (21) extending towards the leading edge (22), and the luff sleeve (25) enveloping the mast; and a plurality of couplings (43) between the battens (21) and the mast (15), and within the luff sleeve (25), which couplings (43) resist forward movement of the battens (21) but allow pivotal movement of the battens (21) and sail (17) about the mast (15), characterised in that each coupling (13) has a collar (45) partially surrounding and rotatable about the mast (15), and a pair of resilient legs (47) extending rearwardly from the collar (45) on either side of a respective batten (21), each leg being adapted to align itself with a respective batten (21) when said batten is deflected thereagainst, and by means for resiliently deforming the apparatus and defining the limits of such deflection of the battens (21).

2. Apparatus according to Claim 1 characterised in that the sail (17) has batten pockets (29) for carrying the battens (21), at least one of said batten pockets (29) having a forward end which is closed sufficiently to retain the leading end of the respective batten (21) therein against forward movement.

3. Apparatus according to Claim 1 or Claim 2 characterised in that the legs (47) of the couplings (43) are received in coupling pockets (39) on the sail (17) adjacent associated battens (21).

4. Apparatus according to any preceding Claim characterised in that the leading end of each batten (21) is held spaced from the collar (45) of the associated coupling (43).

5. Apparatus according to any preceding Claim characterised in that the collar (45) and legs (47) of each coupling (43) define a pair of smooth continuous surfaces from the mast (15) to the respective batten (21).

6. Apparatus according to Claim 5 characterised in that said smooth surfaces are curved.

7. Apparatus according to Claim 5 or Claim 6 characterised in that the legs (47) of each coupling (43) have sections (53) which converge as they extend away from the collar (45).

8. Apparatus according to Claim 7 characterised in that the legs (47) of each coupling (43) include generally parallel sections (55) which extend away from the convergent sections (53) on either side of the respective batten (21).

9. Apparatus according to any preceding Claim characterised in that each coupling (43) is integrally moulded in a synthetic plastics material.

10. A coupling unit for use in apparatus according to any preceding Claim, having a collar (45) for mounting against the mast (15), characterised in that a pair of resilient legs (47) extending rearwardly from the collar (45) for receipt of the end of a sail batten (21) therebetween, each leg being adapted to align itself with a respective

batten (21) when said batten is deflected thereagainst.

11. A coupling according to Claim 10 characterised in that the distal ends of the legs (47) are adapted to support said end of the batten (21) and maintain it spaced from the collar (45).

12. A coupling according to Claim 10 or Claim 11 characterised in that the legs (47) converge in a direction away from the collar (45).

Patentansprüche fü die Vertragsstaaten: DE FR GB IT NL

1. Flexible Flügelvorrichtung mit einem Mast (15) und einem Segel (17) aus flexiblem Material, das an seinem führenden Rand mit einer Luvhülse (25) ausgebildet ist, wobei das Segel eine Mehrzahl von Leisten (21) trägt, die sich in Richtung des führenden Randes (22) erstrecken und die Luvhülse (25) den Mast umhüllt; und einer Mehrzahl von Kupplungen (43) zwischen den Leisten (21) und dem Mast (15) und innerhalb der Luvhülse (25), welche Kupplungen (43) einer Vorwärtsbewegung der Leisten (21) widerstehen, jedoch eine Schwenkbewegung der Leisten (21) und des Segels (17) um den Mast (15) erlauben, dadurch gekennzeichnet daß jede Kupplung (43) eine den Mast (15) teilweise umgebende und um denselben drehbare Manschette (45) und ein Paar elastischer, an jeder Seite einer jeweiligen Leiste (21) von der Manschette (45) aus nach rückwärts verlaufender Schenkel (47) aufweist, wobei jeder Schenkel ausgebildet ist, sich selbst auf eine jeweilige Leiste (21) auszurichten, wenn die genannte Leiste dagegen verformt wird, und durch eine Einrichtung zum elastischen Verformen der Vorrichtung und Festlegen der Grenzen einer solchen Verformung der Leisten (21); wobei kein Schutz für eine Vorrichtung wie die vorgenannte begehrt wird, in der ein führendes Randelement innerhalb der Luvhülse zur Festlegung einer aerodynamischen Form vor dem Mast vorgesehen ist.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Segel (17) Leistentaschen (29) zum Halten der Leisten (21) aufweist, wobei wenigstens eine der genannten Leistentaschen (29) ein vorderes Ende aufweist, das ausreichend geschlossen ist, um darin das führende Ende der jeweiligen Leiste (21) gegenüber Vorwärtsbewegungen zu halten.

3. Vorrichtung nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die Schenkel (47) der Kupplungen (43) in Kupplungstaschen (39) am Segel (17) angrenzend an zugeordnete Leisten (21) aufgenommen sind.

4. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß das führende Ende jeder Leiste (21) in Abstand von der Manschette (45) der zugeordneten Kupplung (43) gehalten ist.

5. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß die Manschette (45) und die Schenkel (47) jeder Kupplung (43) ein Paar glatter ununterbrochener Flächen vom Mast (15) bis zur jeweiligen Leiste (21) definieren.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die genannten glatten Flächen gekrümmt sind.

7. Vorrichtung nach Anspruch 5 oder Anspruch 6, dadurch gekennzeichnet, daß die Schenkel (47) jeder Kupplung (43) Abschnitte (53) aufweisen, die zusammenlaufen, während sie sich von der Manschette (45) weg erstrecken.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Schenkel (47) jeder Kupplung (43) allgemein parallele Abschnitte (55) enthalten, die sich an jeder Seite der jeweiligen Leiste (21) von den zusammenlaufenden Abschnitten (53) weg erstrecken.

9. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß jede Kupplung (43) aus einem synthetischen Kunststoffmaterial einteilig geformt ist.

10. Eine Kupplungseinheit zur Verwendung in der Vorrichtung nach wenigstens einem vorhergehenden Anspruch, mit einer Manschette (45) zum Befestigen am Mast (15), dadurch gekennzeichnet, daß ein Paar elastischer Schenkel (47) sich von der Manschette (45) aus nach rückwärts erstreckt, um dazwischen das Ende einer Segelleiste (21) aufzunehmen, wobei jeder Schenkel ausgebildet ist, sich selbst auf eine jeweilige Leiste (21) auszurichten, wenn die genannte Leiste dagegen verformt wird.

11. Eine Kupplung nach Anspruch 10, dadurch gekennzeichnet, daß die entfernten Enden der Schenkel (47) ausgebildet sind, das genannte Ende der Leiste (21) zu stützen und es im Abstand von der Manschette (45) zu halten.

12. Eine Kupplung nach Anspruch 10 oder Anspruch 11, dadurch gekennzeichnet, daß die Schenkel (47) in einer sich von der Manschette (45) entfernenden Richtung zusammenlaufen.

Patentansprüche für die Vertragsstaaten: AT BE CH LI LU SE

1. Flexible Flügelvorrichtung mit einem Mast (15) und einem Segel (17) aus flexiblem Material, das an seinem führenden Rand mit einer Luvhülse (25) ausgebildet ist, wobei das Segel eine Mehrzahl von Leisten (21) trägt, die sich in Richtung des führenden Randes (22) erstrecken und die Luvhülse (25) den Mast umhüllt; und einer Mehrzahl von Kupplungen (43) zwischen den Leisten (21) und dem Mast (15) und innerhalb der Luvhülse (25), welche Kupplungen (43) einer Vorwärtsbewegung der Leisten (21) widerstehen, jedoch eine Schwenkbewegung der Leisten (21) und des Segels (17) um den Mast (15) erlauben, dadurch gekennzeichnet daß jede Kupplung (43) einen den Mast (15) teilweise umgebende und um denselben drehbare Manschette (45) und ein Paar elastischer, an jeder Seite einer jeweiligen Leiste (21) von der Manschette (45) aus nach rückwärts verlaufender Schenkel (47) aufweist, wobei jeder Schenkel ausgebildet ist, sich selbst auf eine jeweilige Leiste (21) auszurichten, wenn die

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genannte Leiste dagegen verformt wird, und durch eine Einrichtung zum elastischen Verformen der Vorrichtung und Festlegen der Grenzen einer solchen Verformung der Leisten (21).

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Segel (17) Leistentaschen (29) zum Halten der Leisten (21) aufweist, wobei wenigstens eine der genannten Leistentaschen (29) ein vorderes Ende aufweist, das ausreichend geschlossen ist, um darin das führende Ende der jeweiligen Leiste (21) gegenüber Vorwärtsbewegungen zu halten.

3. Vorrichtung nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die Schenkel (47) der Kupplungen (43) in Kupplungstaschen (39) am Segel (17) angrenzend an zugeordnete Leisten (21) aufgenommen sind.

4. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß das führende Ende jeder Leiste (21) im Abstand von der Manschette (45) der zugeordneten Kupplung (43) gehalten ist.

5. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß die Manschette (45) und die Schenkel (47) jeder Kupplung (43) ein Paar glatter ununterbrochener Flächen vom Mast (15) bis zur jeweiligen Leiste (21) definieren.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die genannten glatten Flächen gekrümmt sind.

7. Vorrichtung nach Anspruch 5 oder Anspruch 6, dadurch gekennzeichnet, daß die Schenkel (47) jeder Kupplung (43) Abschnitte (53) aufweisen, die zusammenlaufen, während sie sich von der Manschette (45) weg erstrekken.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Schenkel (47) jeder Kupplung (43) allgemein parallele Abschnitte (55) enthalten, die sich an jeder Seite der jeweiligen Leiste (21) von den zusammenlaufenden Abschnitten (53) weg erstrecken.

9. Vorrichtung nach wenigstens einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß jede Kupplung (43) aus einem synthetischen Kunststoffmaterial einteilig geformt ist.

10. Eine Kupplungseinheit zur Verwendung in der Vorrichtung nach wenigstens einem vorhergehenden Anspruch, mit einer Manschette (45) zum Befestigen am Mast (15), dadurch gekennzeichnet, daß ein Paar elastischer Schenkel (47) sich von der Manschette (45) aus nach rückwärts erstreckt, um dazwischen das Ende einer Segelleiste (21) aufzunehmen, wobei jeder Schenkel ausgebildet ist, sich selbst auf eine jeweilige Leiste (21) auszurichten, wenn die genannte Leiste dagegen verformt wird.

11. Eine Kupplung nach Anspruch 10, dadurch gekennzeichnet, daß die entfernten Enden der Schenkel (47) ausgebildet sind, das genannte Ende der Leiste (21) zu stützen und es im Abstand von der Manschette (45) zu halten.

12. Eine Kupplung nach Anspruch 10 oder Anspruch 11, dadurch gekennzeichnet, daß die Schenkel (47) in einer sich von der Manschette (45) entfernenden Richtung zusammenlaufen.

Revendications pour les Etats contractants: DE FR GB IT NL

1. Dispositif à aile flexible comprenant un mât (15) et une voile (17) en matériau flexible comportant un manchon (25) de lof à son bord avant, la voile supportant une multitude de lattes (21) s'étendant vers le bord avant (22) et le manchon (25) de lof enveloppant le mât, et une multitude de coupleurs (43) entre les lattes (21) et le mât (15), et à l'intérieur du manchon (25) de lof, coupleurs (43) qui s'opposent au mouvement des lattes (21) vers l'avant mais permettent le mouvement de pivotement des lattes (21) et de la voile (17) autour du mât (15), caractérisé en ce que chaque coupleur (43) comporte un collier (45) entourant partiellement le mât (15) et pouvant tourner autour de lui, et une paire de pattes élastiques (47) s'étendant vers l'arrière à partir du collier (45) de chaque côté d'une latte respective (21), chaque patte étant destinée à s'aligner d'elle-même avec une latte respective (21) lorsque ladite latte est déviée contre elle, et par un moyen pour déformer élastiquement le dispositif et définir les limites d'une telle déviation des lattes (21); aucune protection n'est recherchée pour le dispositif tel qu'indiqué ci-dessus dans lequel un élément du bord avant est prévu dans le manchon de lof pour définir une forme aérodynamique à l'avant du mât.

2. Dispositif selon la revendication 1, caractérisé en ce que la voile (17) comporte des poches (29) pour lattes afin de supporter les lattes (21), au moins l'une des poches (29) pour latte ayant une extrémité avant qui est suffisamment fermée pour empêcher que le bord avant de la latte respective (21) ne se déplace vers l'avant.

3. Dispositif selon la revendication 1 ou la revendication 2, caractérisé en ce que les pattes (47) des coupleurs (43) sont reçues dans des poches (39) pour coupleur sur la voile (17) à un endroit contigu aux lattes associées (21).

4. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le bord avant de chaque latte (21) est maintenu espacé du collier (45) du coupleur associé (43).

5. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le collier (45) et les pattes (47) de chaque coupleur (43) définissent une paire de surfaces régulières continues entre le mât (15) et la latte respective (21).

6. Dispositif selon la revendication 5, caractérisé en ce que les surfaces régulières sont incurvées.

7. Dispositif selon la revendication 5 ou la revendication 6, caractérisé en ce que les pattes (47) de chaque coupleur (43) comportent des

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sections (53) qui convergent dans le sens opposé au collier (45).

8. Dispositif selon la revendication 7, caractérisé en ce que les pattes (47) de chaque coupleur (43) comportent des sections généralement parallèles (55) de sens opposé aux sections convergentes (53) de chaque côté de la latte respective (21).

9. Dispositif selon l'une quelconque des revendications precédentes, caractérisé en ce que chaque coupleur (43) est moulé en une pièce dans un matériau plastique synthétique.

10. Ensemble de couplage pour utilisation dans le dispositif selon l'une quelconque des revendications précédentes, comprenant un collier (45) pour montage contre le mât (15), caractérisé en ce qu'une paire de pattes élastiques (47) s'étendent vers l'arrière à partir du collier (45) pour recevoir entre elles l'extrémité d'une latte (21) de voile, chaque patte étant destinée à s'aligner d'elle-même avec une latte respective (21) lorsque la latte est déviée contre elle.

11. Coupleur selon la revendication 10, caractérisé en ce que les extrémités distales des pattes (47) sont destinées à supporter ladite extrémité de la latte (21) et à la maintenir espacée du collier (45).

12. Coupleur selon la revendication 10 ou la revendication 11, caractérisé en ce que les pattes (47) convergent dans la direction opposée au collier (45).

Revendications pour les Etats Contractants: AT BE CH LI LU SE

1. Dispositif à aile flexible comprenant un mât (15) et une voile (17) en matériau flexible comportant un manchon (25) de lof à son bord avant, la voile supportant une multitude de lattes (21) s'étendant vers le bord avant (22) et le manchon (25) de lof enveloppant le mât, et une multitude de coupleurs (43) entre les lattes (21) et le mât (15), et à l'intérieur du manchon (25) de lof, coupleurs (43) qui s'opposent au mouvement des lattes (21) vers l'avant mais permettent le mouvement de pivotement des lattes (21) et de la voile (17) autour du mât (15), caractérisé en ce que chaque coupleur (43) comporte un collier (45) entourant partiellement le mât (15) et pouvant tourner autour de lui, et une paire de pattes élastiques (47) s'étendant vers l'arrière à partir du collier (45) de chaque côté d'une latte respective (21), chaque patte étant destinée à s'aligner d'elle-même avec une latte respective (21) lorsque ladite latte est déviée contre elle, et par un moyen pour déformer élastiquement le dispositif et définir les limites d'une telle déviation des lattes (21).

2. Dispositif selon la revendication 1, caractérisé en ce que la voile (17) comporte des poches (29) pour lattes afin de supporter les lattes (21), au moins l'une des poches (29) pour latte ayant une extrémité avant qui est suffisamment fermée pour empêcher que le bord avant de la latte respective (21) ne se déplace vers l'avant.

3. Dispositif selon la revendication 1 ou la revendication 2, caractérisé en ce que les pattes (47) des coupleurs (43) sont reçues dans des poches (39) pour coupleur sur la voile (17) à un endroit contigu aux lattes associées (21).

4. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le bord avant de chaque latte (21) est maintenu espacé du collier (45) du coupleur associé (43).

5. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que le collier (45) et les pattes (47) de chaque coupleur (43) définissent une paire de surfaces régulières continues entre le mât (15) et la latte respective (21).

6. Dispositif selon la revendication 5, caractérisé en ce que les surfaces régulières sont incurvées.

7. Dispositif selon la revendication 5 ou la revendication 6, caractérisé en ce que les pattes (47) de chaque coupleur (43) comportent des sections (53) qui convergent dans le sens opposé au collier (45).

8. Dispositif selon la revendication 7, caractérisé en ce que les pattes (47) de chaque coupleur (43) comportent des sections généralement parallèles (55) de sens opposé aux sections convergentes (53) de chaque côté de la latte respective (21).

9. Dispositif selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque coupleur (43) est moulé en une pièce dans un matériau plastique synthétique.

10. Ensemble de couplage pour utilisation dans le dispositif selon l'une quelconque des revendications précédentes, comprenant un collier (45) pour montage contre le mât (15), caractérisé en ce qu'une paire de pattes élastiques (47) s'étendent vers l'arrière à partir du collier (45) pour recevoir entre elles l'extrémité d'une latte (21) de voile, chaque patte étant destinée à s'aligner d'elle-même avec une latte respective (21) lorsque la latte est déviée contre elle.

11. Coupleur selon la revendication 10, caractérisé en ce que les extrémités distales des pattes (47) sont destinées à supporter ladite extrémité de la latte (21) et à la maintenir espacée du collier (45).

12. Coupleur selon la revendication 10 ou la revendication 11, caractérisé en ce que les pattes (47) convergent dans la direction opposée au collier (45).

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