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54 **A device for removably connecting hollow cylindrical elements in masts for sailing transport means.**

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Description

The present invention relates to a device for removably connecting two coaxial hollow cylindrical male and female elements, respectively, which can be telescoped into each other for a predetermined length and belong to two mast sections or to a mast top and to a mast heel or to a mast cap in masts for transport means, particularly light sailing boats, such as boarders, wind-surfs and the like.

The light boats and transport means of the above-defined kind, particularly the so called wind-surfs, are provided with a mast generally formed of an aluminium tube having a length of 4,40 4,60 meters, which is intended to be removably secured to the hull by means of an articulated joint and to be closed at the upper end by a "cap" which retains the sail in position. These so long masts present problems of transport either on vehicle roofs or in airplanes, as well as storage problems and it would be therefore advisable for them to be severed in at least two coaxial elements.

However, this severing involves the need of providing a connecting device which can be quickly and readily locked and unlocked and assures at the same time a perfect retention of the strength characteristics of an integral mast, and this under the operative and environmental conditions in which the transport means of concern are. This device, under the above-mentioned conditions, could be applied also in the case of the removable fastening of the mast heel to the articulated joint as well as the cap to be mast head. Particularly in the case of multiple use it is advisable that the above-mentioned connecting devices are in a position to impart to the mast a good hermetic seal not only with respect to the solid matters which can penetrate it but also, in the case of boats, with respect to the water which would unduly make heavy the mast when it is hoisted from the liquid surface to the operative position on the wind-surf.

FR—A—2 446 401 discloses a removably connecting device according to the preamble of claim 1, particularly for mast heels of a wind-surf, comprising a female cylindrical housing forming an anchoring bush, a male ferrule intended to be introduced into said housing of the anchoring bush and a ring of a relatively flexible material, which is designed to assure a connection between the male ferrule and the female bush. The ferrule is provided with first and second grooves being separated from each other without a transition region by an intermediate cylindrical portion. This removably connecting device has the female housing provided with a cup for receiving the end of the male ferrule in order to fasten these elements to each other.

In accordance with the invention there is provided a removably connecting device, of the type comprising at least a packing means movable on the surface of one of the two substantially hollow cylindrical elements facing the other of the two

substantially hollow cylindrical elements from an unlocked position in which it lies in a seat, to a locked position in which it lies in another seat, characterized in that the two seats are connected therebetween by a shaped section which causes the squeezing of the packing element during the axial insertion and extraction movements of the two portions, said shaped section between the seats including a substantially cylindrical top wall as well as side walls inclined towards said seats.

In particular said packing means is a so called O-ring having a toroidal shape circular in cross-section and of elastic material assuring a substantial water seal to the joint, although this joint is made by hand in a very simple manner by axial forced insertion movement of the two elements.

This insertion movement causes a rolling movement of the packing means on itself, with displacement from the first to the second positions both defined by circumferential seats provided on one of the facing surfaces of the substantially hollow cylindrical elements to be coupled. In the second position the O-ring is elastically deformed and locks thereby the two hollow cylindrical elements, by exerting the necessary sealing action and imparting the desired strength characteristic to the connection.

These and other features of the invention will be now described in connection with an embodiment thereof, illustrated in the accompanying drawings.

Figs. 1 and 2 show in a different scale a front view partially broken away of a mast for light sailing transport means, formed according to the invention;

Figs. 3 and 4 show a side view of the connecting device in an unlocked and locked condition of its components, respectively.

As already said, this invention finds a particular even if not exclusive application in light sailing transport means which are movable on sand, land, ice, water or the like. In particular, the application that at present is considered of most interest is in masts of the light boats such as boarders, wind-surfs and the like, which masts have often a not excessive length in order to permit an easy transport and storage thereof and which, for example in the case of wind-surfs, are removably connected at one end to an articulated joint secured to the body and at the opposite end are provided with a closure element, called "cap", which cooperates in retaining in position the sail threaded on the mast. Both to avoid the penetration of foreign matters which can damage the mast and to prevent the penetration of water which would make the lifting operation of the mast during sailing very hard, it is advisable to provide hermetically sealed connections. In particular, the mast 10, for example made of aluminium, is formed of two coaxial hollow slightly frusto-conical cylindrical elements 10a, 10b or of any other geometrical shape, which are locked to each other by an intermediate connecting device 12. Such a connecting device 12a is provided at the mast heel, between the lower end

thereof and a male support 14 pivotally connected through a buffer 16 to the wind-surf body, indicated at 18. Also the upper portion 10a of mast terminates with a so called "cap" 20 inserted into the free upper end of the mast and locked thereto by means of a connecting device 12b according to the invention.

The above-mentioned connecting device 12 will be now described in more detail in the Figs. 3 and 4, wherein such device is shown applied to the removable connection between two elements 10a and 10b of the mast 10. The connection device comprises two male and female coaxial hollow cylindrical portions 22 and 24 which are so dimensioned that the male portion 22 can penetrate the female portion 24 for a sufficient length to assure a desired strength of the assembly, the penetration degree being determined by an abutment 26 provided on the mast element carrying the male portion, against which the free end of the female portion 24 abuts.

The end zone of the male hollow cylindrical portion 22 is shaped as shown in the Figures, for example by a local deformation operation of the surface, such as rolling or the like, so as to form two circumferential seats 28 and 30 being axially spaced from each other and having a different depth. More particularly, the seat 28 is formed by a groove the bottom of which is closer to the axis 32 of the hollow cylindrical portions than the bottom of the groove forming the seat 30. Furthermore, both seats 28, 30 are connected to each other by a shaped section outwardly projecting from the bottom of the seats with respect to the axis 32.

More particularly, this shaped section as a substantially cylindrical top wall 34 and two side wall 36, 38 inclined towards the seats 28 and 30, respectively. The wall 36 inclined towards the seat 28 has a lower slope than that of the wall 38 inclined towards the seat 30.

In these seats and therebetween a movable packing means is placed, which is formed of a toroidal elastic element 40, circular in cross-section (O-ring) and which in the unlocked condition of the two hollow cylindrical portions 22, 24, lies within the seat 28 facing the female portion 24. By pushing this female portion 24, starting from the position of Fig. 3 in the direction of the arrows X indicated in this Figure, relative to the male portion 22 a rolling movement of the O-ring 40 above the shaped section 34—38 occurs until the O-ring enters the seat 30, which movement occurs together with that of insertion of the two portions 22, 24, until the position indicated in Fig. 4 is reached, wherein the portion 24 is against the abutment 26. In this condition, the connection is operative and the two portions 22, 24 are locked to each other and axially retained, in a sufficient manner for the application of the invention, by the friction exerted by the O-ring 40 within the seat 30, where it is squeezed, and by the ramp formed by the wall 38.

To unlock the connection it will be sufficient to exert an axial force in the direction of the arrows Y

in Fig. 4 on the portions 22, 24 to cause a rolling movement of the O-ring 40 until it will be against into the seat 28, thereby unlocking the two mast elements.

It is to be noted that; while the seats 28, 30 and the shaped section 34—38 have been illustrated as formed on the male portion 22, the device can operate as well if the shaped section and the seats are provided on the female portion 24, while the male portion is provided with a smooth surface.

Claims

1. A device for removably connecting two coaxial male and female substantially hollow cylindrical elements (22, 24) which can be telescoped into each other for a predetermined length and belong to two mast sections or to a mast head and to a mast heel or to a mast cap in masts for transport means, particularly light sailing boats, such as boarders, wind-surfs and the like, of the type comprising a packing means (40) movable on the surface of one (22) of the two substantially hollow cylindrical elements (22, 24) facing the other (24) of the two substantially hollow cylindrical elements (22, 24) from a unlocked position in which it lies in a seat (28, 30) to a locked position in which it lies in another seat, (30, 28) characterized in that said seats are connected to each other by a shaped section causing the squeezing of the packing means during the axial insertion and extraction movement of the substantially hollow cylindrical elements (22, 24), said shaped section comprising a substantially cylindrical top wall (34) as well as side walls (36, 38) inclined towards said seats.

2. A device according to claim 1, characterized in that said packing means (40) is made of an elastic material and has a toroidal configuration, preferably circular in cross-section (O-ring).

3. A device according to claim 1, characterised in that the slope of the side wall (36) directed towards the seat (28) corresponding to the unlocked position of said substantially hollow cylindrical elements (22, 24) is less inclined than that of the side wall (38) directed towards the seat (30) corresponding to the locked position of said elements.

4. A device according to claim 1, characterized in that said seats (28, 30) and the shaped section (34—38) forming a transition therebetween are provided by local deformation of the outer surface of the male element (22), while the female element (24) has a substantially smooth inner surface.

5. a device according to claim 1, characterized in that said seats (28, 30) and the shaped section (34—38) forming a transition therebetween are provided by local deformation of the inner surface of the female element (24), while the male element (22) has a substantially smooth outer surface.

Patentansprüche

1. Vorrichtung zum lösbaren Befestigen von zwei koaxialen im wesentlichen hohlen zylindrischen Einschiebe- und Aufnahmeelementen (22, 24), die auf eine bestimmte Länge teleskopartig ineinander geschoben werden können und die zu zwei Mastabschnitten, oder zu einem Mastkopf und zu einem Mastfuß, oder zu einer Mastkappe, in Masten für Transportmittel, insbesondere leichte Segelboote, der Art von Schwertbooten, Surfbrettern und dgl. gehören, bestehend aus einer Dichtung (40), die auf der Oberfläche des einen (22) der beiden im wesentlichen hohlen zylindrischen Elemente (22, 24), welches dem anderen (24) der beiden im wesentlichen zylindrischen Elemente (22, 24) gegenüberliegt, von einer unverriegelten Stellung, in der die Dichtung sich in einem Sitz (28, 30) befindet, in eine verriegelte Stellung, in der sie sich in einem anderen Sitz (30, 28) befindet, verschiebbar ist, dadurch gekennzeichnet, daß diese Sitze durch einen Profilabschnitt miteinander verbunden sind, der ein Zusammendrücken der Dichtung während der axialen Einschiebe- bzw. Ausziehbewegung der im wesentlichen hohlen zylindrischen Elemente (22, 24) bewirkt, wobei dieser Profilabschnitt eine im wesentlichen zylinderförmige obere Wand (34) sowie zu den Sitzen geneigte Seitenwände (36, 38) umfaßt.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Dichtung (40) aus elastischem Material hergestellt ist und eine toroidförmige Gestalt, vorzugsweise von kreisförmigen Querschnitt (O-Ring), aufweist.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Neigung der Seitenwand (36), die zum Sitz (28) gerichtet ist, der der unverriegelten Stellung der hohlen zylindrischen Elemente (22, 24) entspricht, geringer ist als diejenige der Seitenwand (38), die zum Sitz (30) gerichtet ist, der der verriegelten Stellung dieser Elemente entspricht.

4. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Sitze (28, 30) und die Profilabschnitte (34, 38), die einen Durchgangsabschnitt bilden, mittels einer örtlichen Verformung der Außenfläche des Einschiebeelements (22) vorgesehen sind, während das Aufnahmeelement (24) eine im wesentlichen glatte Innenfläche aufweist.

5. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Sitze (28, 30) und der Profilabschnitt (34—38), der einen Durchgangsbereich durch dieselben bildet, mittels einer örtlichen Verformung der Innenfläche des Aufnahmeelements (24) gebildet sind, während das Einschiebeelement (22) eine im wesentlichen glatte Außenfläche aufweist.

Revendications

1. Dispositif pour connecter de manière amovible deux éléments coaxiaux mâle et femelle substantiellement cylindriques creux (22, 24), qui peuvent être télescopés l'un dans l'autre pour une longueur déterminée et qui font partie de deux tronçons de mât, ou d'une tête de mât et d'un pied de mât, ou d'une tige de mât, dans des mâts pour des moyens de transports, en particulier des barques à voiles, des dériveurs, des planches à voile et analogues, du genre comportant un joint (40) mobile sur la surface de l'un (22) des deux éléments (22, 24) substantiellement cylindriques creux, via-à-vis de l'autre (24) des deux éléments substantiellement cylindriques (22, 24), d'une position débloquée, dans laquelle le joint se trouve dans un logement (28, 30) à une position bloquée dans laquelle il se trouve dans un autre logement (30, 28), caractérisé en ce que les logements sont reliés entre eux par une partie profilée, qui entraîne la compression du joint pendant le mouvement d'insertion et d'extraction des éléments substantiellement cylindriques creux (22, 24), ladite partie profilée comportant une paroi supérieure substantiellement cylindrique (34) ainsi que des parois latérales (36, 38) inclinées vers lesdits logements.

2. Dispositif selon la revendication 1, caractérisé en ce que ledit joint (40) est en un matériel élastique et présente une configuration torique, de préférence avec section circulaire (anneau en O).

3. Dispositif selon la revendication 1, caractérisé en ce que l'inclinaison de la paroi latérale (36) dirigée vers le logement (28) correspondant à la position débloquée desdits éléments substantiellement cylindriques creux (22, 24) est moins inclinée que celle de la paroi latérale (38) dirigée vers le logement (30) correspondant à la position bloquée desdits éléments.

4. Dispositif selon la revendication 1, caractérisé en ce que lesdits logements (28, 30) et la partie profilée (34—38) formant une partie de transition entre eux, sont formés par déformation locale de la surface externe de l'élément mâle (22), alors que l'élément femelle (24) présente une surface interne substantiellement lisse.

5. Dispositif selon la revendication 1, caractérisé en ce que lesdits logements (28, 30) et la partie profilée (34—38) formant une partie de transition entre eux, sont formés par déformation locale de la surface interne de l'élément femelle (24), alors que l'élément mâle (22) présente une surface externe substantiellement lisse.

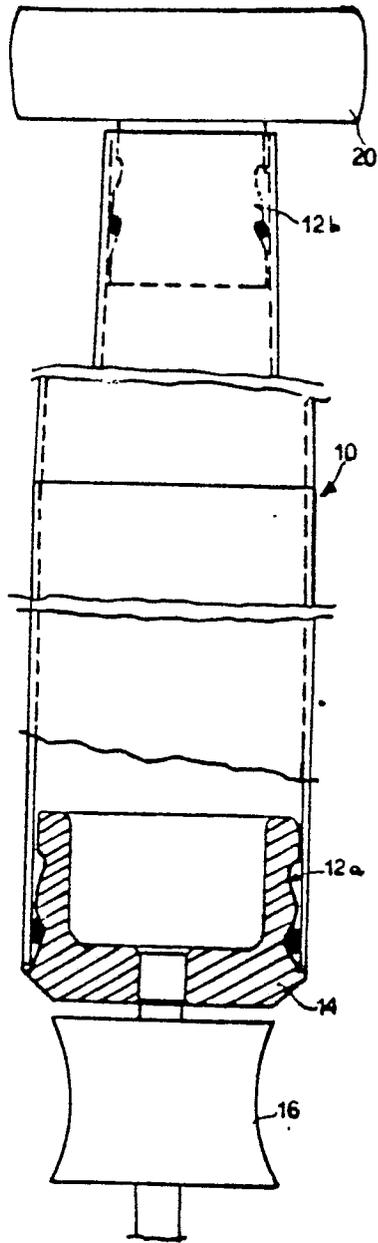


Fig. 2

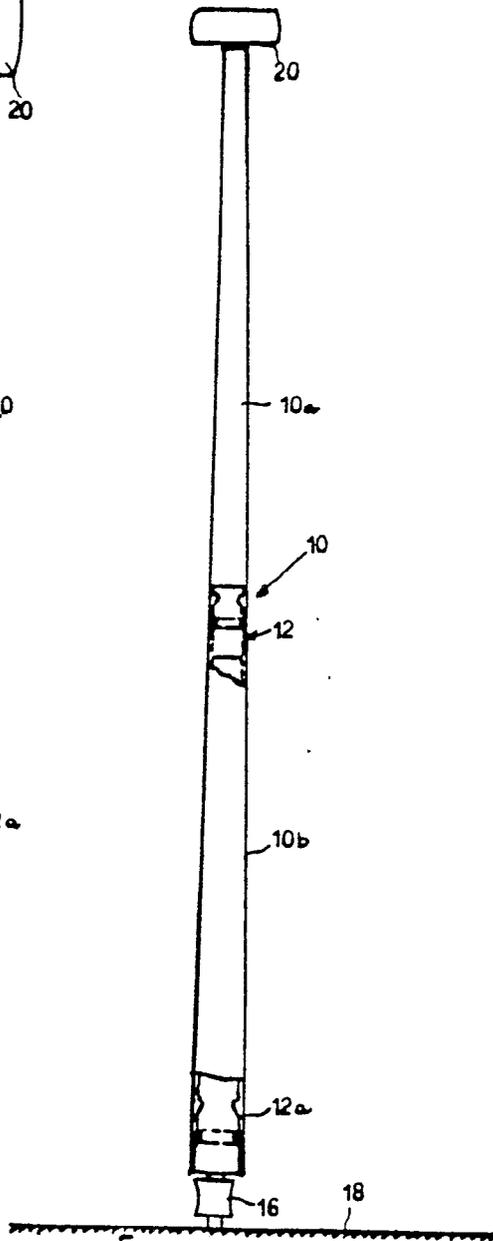


Fig. 1

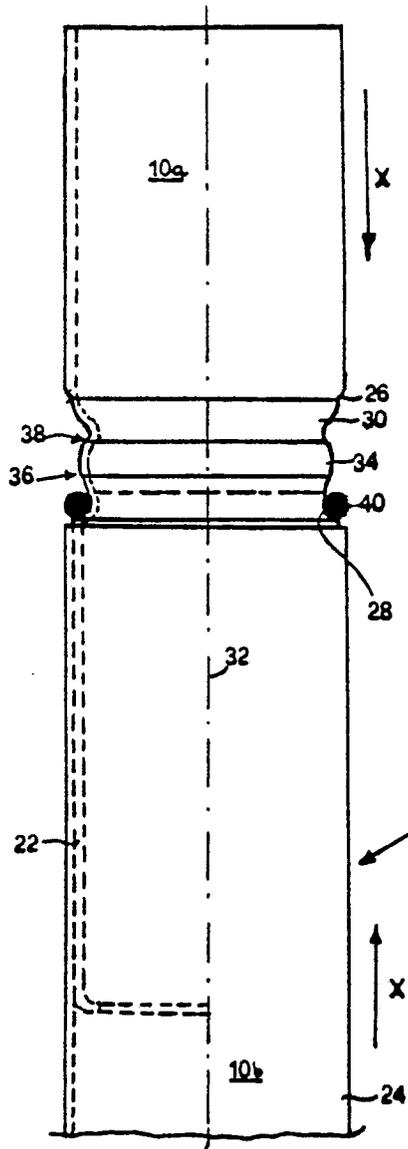


Fig. 3

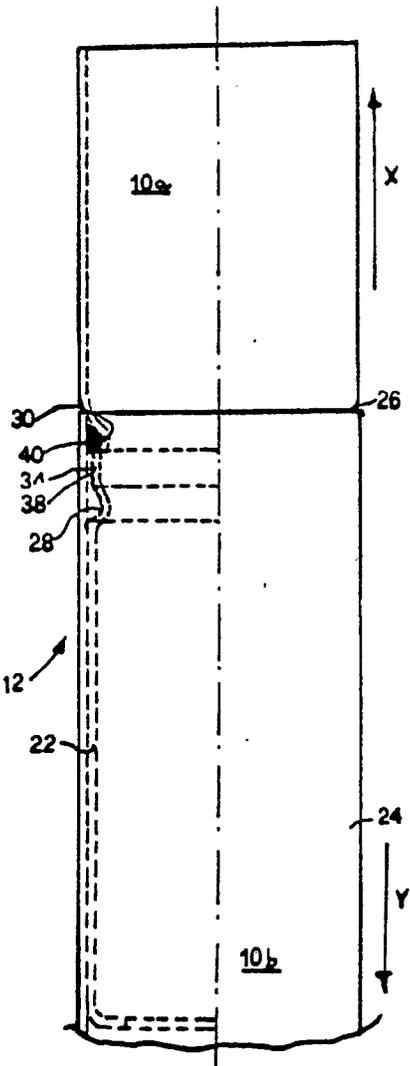


Fig. 4