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(54) **Adjusting and fastening device particularly for ski boots.**

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Description

This invention relates to an adjusting and fastening device particularly for ski boots.

As is known, to fasten ski boots or skiing footwear, a lever arrangement is currently used which, in its more general embodiment, includes a part articulated to one of the flaps to be secured together, to which part a ring or hook arrangement is connected for engagement with a mating part attached to the other of the flaps to be secured together, a rotation movement of the lever being effective to bring together and tighten such flaps.

With this type of lever arrangement, to make the fastener adjustable, i.e. to adjust the useful length of the link whereto the fastening hook or ring is connected, it is common practice to provide a threaded rod which is carried rotatably either on the lever or its mating part and is turned to effect a translation of the link, thereby the useful length of the latter is changed.

This form of adjustment has, first of all, the disadvantage that it must be performed with the lever in the open, i.e. unlatched, position, and moreover, cannot provide fine adjustment capabilities because, in order not to have the hook or ring located at the wrong position, it is generally required that a 360° rotation be completed, which results in a one pitch length translation of the threads utilized.

FR—A—2 068 227 discloses a fastening device in which a rack and pinion mechanism is provided for adjusting the tension of the fastening device.

A rack and pinion mechanism of the disclosed type is not self locking, so that additional mechanical component parts are to be provided in order to lock the mechanism under tension thereby rendering the mechanism complicated cumbersome and unreliable. Moreover, since necessarily the diameter of the pinion has a reduced size the transmission ratio of the rack and pinion mechanism is inherently such that on the one hand a great force has to be applied on the pinion in order to reach the desired tensioning and on the other hand a very fine adjustment of the tensioning can in practice not be obtained, since the pitch of the toothing cannot be reduced beyond those limits which determine the strength of the tooth under the occurring stresses. The above prior art has been acknowledged in the pre-characterizing part of claim 1.

It is a primary object of this invention to remove such prior drawbacks by providing an adjusting and fastening device specially designed for ski boot applications, which allows the useful length of the link to be very accurately and easily adjusted even with the device in its closed position, that is with the link under tension, thus enabling the user to directly perform a very accurate and reliable adjustment without going through the trial-and-error procedure involved by conventional devices and without the need of exerting great manual forces onto the device.

It is another object of the invention to provide

an adjusting and fastening device which, by virtue of its constructional features, can be used directly as a fastener without involving its attachment to a traditional tightening lever as usually employed in ski boot fasteners.

A further object of this invention is to provide an adjustment device which, owing to its peculiar design, can give full assurance of reliable and safe operation, while affording a high degree of versatility of the device.

A not unimportant object of the invention is to provide such a device, which is of simple construction and can be readily manufactured from widely available elements and materials.

These and other objects, such as will be apparent hereinafter, are achieved by an adjusting and fastening device particularly for ski boots, comprising a body (1) adapted for association with one of the ski boot flaps to be secured together, an actuating wheel-like element (2, 10) carried rotatably on said body (1) and having one part (3) thereof accessible from outside of said body (1), said actuating wheel element (2, 10) interacting with a rotary to translatory motion conversion unit (11—12) associated with a link element (21) connected to engagement means interacting with the other of said ski boot flaps to be secured together, characterized in that said rotary to translatory motion conversion unit (11, 12) comprises an axially stationary but rotatable nut screw formation (11) which is associated with said actuating wheel-like element (2, 10) and an axially slidable, but rotatorily stationary threaded rod (12) in screwing engagement with said nut screw formation (11) and wherein said link element (21) is connected with said threaded rod (12). The actuating wheel-like element (2, 10) comprises a gear member (10) having at the central part thereof said threaded nut screw formation (11).

Further features and advantages will be apparent from the following description of a preferred, though not limitative, embodiment of an adjusting and fastening device particularly for ski boots, as illustrated by way of example only in the accompanying drawing, where:

Figure 1 is a sectional view of this device;

Figure 2 is a sectional view of this device as attached to an actuating lever;

Figure 3 is a perspective view showing in detail the first actuating means and rotary to translatory motion conversion means; and

Figure 4 is a top plan view of the device, as attached to a lever.

Making reference to the drawing figures, the adjusting and fastening device particularly for ski boots, according to the invention, comprises a body, indicated at 1, which can be associated with either of the ski boot flaps to be secured together.

Mounted rotatably on said body 1 is a first actuating element which advantageously comprises a small wheel 2 having a knurled outer surface 3 and an axial center pin 4 which performs the dual function of an axle and element of engagement with the body 1.

Said wheel 2 has on one face thereof a flat serration 5 extending circumferentially around said pin 4.

The wheel 2 is attached to the body 1 and held in position by a small cover 6 from which portions of the wheel periphery protrude sideways to allow the wheel to be operated from the outside.

The wheel 2 interacts with a rotary to translatory motion conversion unit which advantageously comprises a nut screw 11 formed in a second wheel-like element consisting of a pinion gear 10 arranged for rotation about a substantially perpendicular axis to the rotation axis of the wheel 2 with said axially mounted nut screw formation 11 engaging with a threaded rod 12 which is acted upon by means effective to prevent the rod from rotating about its own axis, thereby the rotary motion imparted to the gear 10 is converted into a translation of the rod 12. As clearly visible in Figs. 1 and 2 the seat 1a prevents with walls 1b and 1c axial displacement of pinion gear 10.

The rod 12 is translatable within a recess 20 defined on the interior of the body 1 and is connected, at one end thereof, to a link 21 protruding out of the body 1 and having at its other end engagement means interacting with the other of the flaps to be secured together which may comprise either a ring or hook, in conformity with conventional practice.

The means which prevents the rod 12 from rotating may comprise a slot 30 formed through the body 1, wherethrough the link 21 projects outwardly which is advantageously of a foil-like or flat shape; similarly, the rod may have a polygonal shank which engages in a corresponding recess 20 of polygonal shape.

The pitch of the thread of the rod 12 and nut screw 11 is a very fine one, so that, owing to the gear 10 engaging with the wheel 2, a considerable tensile force may be applied by virtue of the large speed reduction effect provided by the fine pitch thread, whereby by manipulating the wheel 2 it becomes possible to apply such a pull force as to enable the ski boot to be tightened without the assistance of the conventional lever; moreover, the provision of the mechanisms just described affords a very fine adjustment capability of the useful length and, hence, enables the user to adjust at will the tightening force.

It should be noted that, owing indeed to the very high force which can be developed by acting on the wheel 2, the adjustment can be performed with the device in its fastened position, i.e. with the link under tension, in contrast with similar prior devices.

Furthermore, in order to favor an accurate adjustment, the link element 21 may be provided with an indexed scale displaying its useful length, and consequently the applied pull force.

It should be added to the foregoing that the body 1 may be hinge connected to a closure lever 50 attached to either of the flaps to be secured together, in which case the device would mainly perform an adjusting function, the fastening func-

tion proper of the fastening device being performed by the lever, which may be of conventional design.

The operation of the device described hereinabove is quite simple: in fact, the user, in order to effect an accurate adjustment of the applicable fastening force, is simply required to operate the wheel 2, turning it such as to alter, in either direction, the useful length of the link 21 and while being enabled to exert a considerable tightening force, owing to the coupling of the mechanisms just described which are of a non-reversible type, that is such that a tension applied on the link cannot result in the wheel 2 rotating, only the rotation of the wheel 2 being able of producing a translation of the link.

It will be appreciated from the foregoing description that the invention achieves its objects, and in particular that the provision of a geared device with a high reduction ratio, resulting from the fine pitch of the threads of the rod 12 and nut screw 11, enables the development of high tensile forces for an adequately small effort to operate the wheel 2.

The invention as described is susceptible of many modifications and variations without departing from the true scope of the instant inventive concept.

Moreover, all the details may be replaced with other technically equivalent elements.

In practicing the invention, the materials used, and the dimensions and contingent shapes, may be any selected one to meet individual application requirements.

Claims

1. An adjusting and fastening device particularly for ski boots, comprising a body adapted for association with one of the ski boot flaps to be secured together, an actuating wheel-like element carried rotatably on said body and having one part thereof accessible from outside of said body said actuating wheel element interacting with a rotary to translatory motion conversion unit associated with a link element connected to engagement means interacting with the other of said ski boot flaps to be secured together, characterized in that said rotary to translatory motion conversion unit comprises an axially stationary but rotatable nut screw formation, which is associated with said actuating wheel-like element and an axially slidable, but rotatorily stationary threaded rod in screwing engagement with said nut screw formation and wherein said link element is connected with said threaded rod.

2. A device according to claim 1, wherein said actuating wheel-like element comprises gear element having at the central part thereof said threaded nut screw formation.

3. A device according to claim 1, 2 wherein said actuating element comprises a small wheel (2) having centrally on one face thereof an axial pin (4) for pivotal engagement with said body (1) and a flat serration (5) of circular configuration ex-

tending around a circumference centered on said pin (4) and wherein a further actuating element is provided in the form of a gear member (10) comprising on the outside periphery thereof a toothed wheel formation (10) in transmissive engagement with said flat serration (5).

4. A device according to claim 1—3, wherein said small wheel (2) has a knurled peripheral edge surface (3) and wherein the device further comprises a small cover (6) associated with said body (1) for holding said wheel (2) in position, said knurled peripheral edge surface (3) at least partly projecting outwardly with respect to said cover (6).

5. A device according to one or more of the preceding claims, characterized in that the means for preventing said rod (12) from rotating about its own axis comprise a slot (30) formed through said body (1) and having a matched configuration to said link element (21), said link element having a flat shape flat protruding out of said body (1).

6. A device according to one or more of the preceding claims, characterized in that said means for preventing said rod (12) from rotating comprise a polygonal shank slidably engaged in a recess (20) of matched configuration formed on the interior of said body (1).

7. A device according to one or more of the preceding claims, characterized in that said body (1) is hinge connected to an actuating lever (50) journalled to said one of said flaps to be secured together.

8. A device according to one or more of the preceding claims, characterized in that said first actuating element (2) can be operated with said device in the closed position, i.e. with said link element (21) under tension.

9. A device according to one or more of the preceding claims, characterized in that it comprises an indexed scale on said link element (21).

Patentansprüche

1.. Regelbare Schließvorrichtung, insbesondere für Skischuhe, mit einem Körper, der einem der miteinander zu verbindenden Lappen des Skischuhes zugeordnet werden kann, einem radförmigen Betätigungselement, das drehbar auf dem genannten Körper gehalten ist und von dem ein Teil von der Außenseite des Körpers zugänglich ist, wobei das radförmige Betätigungselement mit einer Umwandlungseinheit zur Umwandlung der Drehbewegung in eine Translationsbewegung zusammenwirkt, die einem Verbindungselement zugeordnet ist, das mit Eingriffseinrichtungen verbunden ist, die mit dem anderen der miteinander zu verbindenden Lappen des Skischuhes zusammenwirken, dadurch gekennzeichnet, daß die Umwandlungseinheit zur Umwandlung der Drehbewegung in eine Translationsbewegung aus einer axial stationären, jedoch drehbaren Mutterschraubenausbildung, die dem radförmigen Betätigungselement zugeordnet ist, und einem axial verschiebbaren,

jedoch drehfesten Gewindestab, der mit der Mutterschraubenausbildung im Schraubeingriff steht und mit dem das Verbindungselement verbunden ist, besteht.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß, das radförmige Betätigungselement aus einem Zahnradelement besteht, in dessen Mittelteil die genannte Mutterschraubenausbildung vorgesehen ist.

3. Vorrichtung nach den Ansprüchen 1, 2, dadurch gekennzeichnet, daß das Betätigungselement aus einem kleinen Rad (2), das mittig an einer seiner Seiten einen axialen Zapfen (4) für den Dreheingriff mit dem genannten Körper (1) und eine umkreisförmige Flachzahnung (5) besteht, die sich um einen Umkreis erstreckt, dessen Zentrum durch den Zapfen (4) gebildet ist, und daß ein weiteres Betätigungselement in Form eines Zahnradteiles (10) vorgesehen ist, der an seinem Außenumfang eine Zahnradausbildung (10) besitzt, die mit der genannten Flachzahnung (5) übertragungsweise kämmt.

4. Vorrichtung nach den Ansprüchen 1—3, dadurch gekennzeichnet, daß das genannte kleine Rad (2) eine gerändelte periphere Randfläche (3) besitzt und daß die Vorrichtung weiters einen kleinen Deckel (6) aufweist, der dem Körper (1) zugeordnet ist, um das Rad (2) in seiner Lage zu halten, wobei die gerändelte periphere Randfläche (3) wenigstens teilweise nach außen in bezug auf den Deckel (6) vorsteht.

5. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Einrichtungen zur Verhinderung der Drehung des Stabs (12) um seine eigene Achse aus einem Schlitz (30) bestehen, der durch den Körper (1) ausgebildet ist und eine an das Verbindungselement (21) angepaßte Form besitzt, wobei das Gelenkelement eine flache Form besitzt und aus dem Körper (1) flach herausragt.

6. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Einrichtungen zur Verhinderung der Drehung des Stabs (12) aus einem vieleckigen Schaft bestehen, der in eine Ausnehmung (20) mit an den Stab angepaßter Form verschiebbar eingreift, die im Inneren des Körpers (1) ausgebildet ist.

7. Vorrichtung nach einem der mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Körper (1) schwenkbar mit einem Betätigungshebel (50) verbunden ist, der an einem der miteinander zu verbindenden Lappen angelenkt ist.

8. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das erste Betätigungselement (2) bei Schließstellung befindlicher Vorrichtung, d.h. bei unter Spannung stehenden Verbindungselement (21), betätigbar ist.

9. Vorrichtung nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß sie eine Einstellskala auf dem genannten Verbindungselement (21) aufweist.

Revendications

1. Dispositif d'ajustage et de fixation en particulier pour chaussures de ski, comprenant un corps adapté pour être associé avec une des parties de crochet de chaussures de ski qui doivent être réunies, un organe de commande en forme de roue monté tournant sur ledit corps et ayant une partie accessible de l'extérieur dudit corps, ledit organe de commande en forme de roue coopérant avec une unité de conversion de mouvement de rotation en mouvement de translation associée avec un élément de liaison connecté à un moyen d'engagement coopérant avec l'autre des parties de crochet de chaussures de ski qui doivent être réunies, caractérisé par le fait que ladite unité de conversion du mouvement de rotation en mouvement de translation comprend une structure à vis et à écrou tournant mais fixe axialement qui est associée avec ledit organe en forme de roue et une tige filetée coulissante axialement mais stationnaire en rotation en engagement de vissage avec ledit ensemble à vis et à écrous et dans lequel ledit élément de liaison est relié à ladite tige filetée.

2. Dispositif selon la revendication 1, dans lequel ledit organe de commande en forme de roue comprend un élément d'engrenage ayant à sa partie centrale ladite structure filetée à vis et à écrou.

3. Dispositif selon les revendications 1 et 2, dans lequel ledit organe de commande comprend une petite roue (2) comportant centralement sur une de ses faces un téton axial (4) pour un engagement pivotant avec ledit corps (1) et un engrenage plat (5) de configuration circulaire s'étendant autour d'une circonférence centrée sur ledit téton (4) et dans lequel un autre élément actif est constitué sous la forme d'un pignon (10) comportant sur sa périphérie externe une struc-

ture de roue dentée (10) en engagement de transmission avec ledit engrenage plat (5).

4. Dispositif selon la revendication 1 à 3, dans lequel ladite petite roue (2) possède une surface périphérique molletée (3) et dans lequel le dispositif comprend en outre un petit couvercle (6) associé avec ledit corps (1) pour maintenir en place ladite roue (2), ladite surface périphérique molletée (3) faisant au moins partiellement saillie vers l'extérieur hors dudit couvercle (6).

5. Dispositif selon ou plusieurs des revendications précédentes, caractérisé par le fait que le moyen pour éviter à ladite tige (12) de tourner autour de son propre axe comprend une fente (30) réalisée à travers ledit corps (1) et ayant une configuration correspondante à celle dudit élément de liaison (21), qui possède une forme plate faisant saillie hors dudit corps (1).

6. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé par le fait que ledit moyen pour éviter à la tige (12) de tourner comprend une tige polygonale engagée de manière coulissante dans un évidement (20) de configuration correspondante réalisée à l'intérieur dudit corps (1).

7. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé par le fait que ledit corps (1) est articulé relié à un levier (50) assujéti à une des parties de crochet qui doivent être réunies.

8. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé par le fait que ledit premier organe de commande (2) peut être actionné avec ledit dispositif en position verrouillée, c'est-à-dire avec ledit élément de liaison (21) sous tension.

9. Dispositif selon l'une ou plusieurs des revendications précédentes, caractérisé par le fait qu'il comprend une échelle indexée sur ledit élément de liaison (21).

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