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(71) Applicant: TECNOSKI S.n.c. di Giabelli Maria e Bianchi Bazzi Giuseppe & C.
Via Al Confine 7 - Frazione Curcio
I-22050 Colico Como(IT)

(72) Inventor: Bianchi Bazzi, Giuseppe
residing in Via Campione
I-22050 Colico (Province of Como)(IT)

(74) Representative: Modiano, Guido et al,
MODIANO & ASSOCIATI S.A.S. Via Meravigli, 16
I-20123 Milan(IT)

(54) **Ratchet fastener for the toothed strap of a closure lever, particularly for ski boots.**

(57) The present invention relates to a ratchet fastener for the toothed band of a closure lever, particularly for ski boots, comprising a small base (1) which can be fixed to one of the flaps to be fastened together and having lateral sides (3) defining the engagement region of a toothed band (20) connected with a lever associable to the other of the flaps to be brought together. To said small base (1) there is connected a movable dentated body (10) removably connectable with the toothed band (20). The peculiarity of the invention resides in the fact that it comprises a pair of pins (11, 15) spaced from each other and slideably engageable on sliding surfaces (12, 17) mutually defined between said lateral sides (3) and said movable dentated body (10) to increase the locking action of said dentated body (10) on said band (20) upon a pulling action being exerted on said band (20) in the direction of unthreading from said small base (1), and to uncouple said dentated body (10) from said band (20) upon a pushing action being exerted on said dentated body (10) in a direction opposite to said pulling action.

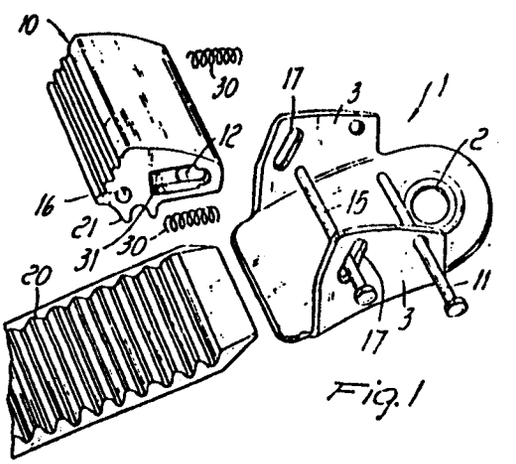


Fig. 1

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TITLE MODIFIED
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RATCHET FASTENER FOR THE TOOTHED BAND OF A CLOSURE LEVER, PARTICULARLY FOR SKI BOOTS

The present invention relates to a ratchet fastener for the toothed band of a closure lever, particularly for ski boots.

As is known, in order to perform the closure of ski boots, variously configured levers are currently used, which are connected to a flexible toothed band which engages in a ratchet fastener provided on the other of the flaps to be fastened together. This ratcheting buckle is generally composed of a small base, fixed to the boot, which supports a dentated body hinged at a middle portion thereof, which has a toothed end which is elastically thrust against the toothed band, and the other end is provided with an opening tab, on which it is sufficient to exert pressure to obtain the uncoupling of the dentated body from the toothed band.

The toothed band and the dentation provided on the body generally have a saw-tooth configuration, so as to obtain a locking coupling in the direction of unthreading by pulling the band, while they allow an insertion of the band in the ratchet with a motion of the dentated body which can be defined essentially as a ratchet-like motion.

This form of solution, though used universally, does not appear to be free from disadvantages; more specifically, an accidental impact on the tab of the body, opposite to that of the dentation, can cause a rotation of the body with the consequent uncoupling of the band from the dentated

body.

In an attempt to eliminate this disadvantage, the European patent application No. 0 161 441, in the name of the same Applicant, implies the use of a small base the lateral sides of which have an undercut region which engages with a pin protruding from the dentated body, which has the possibility of moving with respect to the articulation pin so as to obtain a fixing action which prevents the accidental opening of the body and which, furthermore, allows the possibility of obtaining an increase in the locking action as the pulling force increases.

However, this device conversely has the disadvantage that it does not allow the opening of the ratchet fastener when the band is being pulled, so that the opening must be necessarily performed by the lever.

Another disadvantage of this type of coupling is that the peculiar configuration of the teeth, which are of the saw-tooth type, do not allow obtainment of a locking action which is capable of withstanding high stresses.

To eliminate this disadvantage, in the French patent application No. 2563978 a band is illustrated which has teeth with an approximately sinusoidal configuration in which the dentation of the ratchet has an obviously matching configuration which allows the obtainment of a greater locking force.

In this solution, however, it is necessary to use an auxiliary lever which acts on the movable body to push it in a locking action on the toothed band and consequently leads to a significant increase in structural complexity.

The aim of the invention is indeed to eliminate the

above described disadvantages by providing a ratchet fastener for the toothed band which allows the possibility of increasing the locking action as the pull on a toothed band in the direction of unthreading of the small base increases, by using teeth with a sinusoidal configuration which have a greater resistance to coupling and which are furthermore less subject to wear.

Within the scope of the above described aim, a specific object of the invention is to provide a ratchet fastener for a toothed band which allows the possibility of obtaining the opening of the ratchet by exerting a simple pushing action on the dentated body in the direction opposite to the pulling action exerted on the toothed band by means of the closing lever.

Still another object of the invention is to provide a ratchet fastener for a toothed band which has a simple structure yet offers the greatest assurances of reliability and safety in use.

Not least object of the present invention is to provide a ratchet fastener which can be operated with extremely simple motions, since it allows the insertion of the toothed band with a ratchet-like oscillation of the dentated body and allows the uncoupling with a simple pushing action on the dentated body.

The above described aim, as well as the objects mentioned and others which will become apparent hereinafter, are achieved by a ratchet fastener for the toothed band of a closure lever particularly for ski boots, comprising a small base fixable to one of the flaps to be fastened together and provided with lateral sides defining the engagement region

of a toothed band connected to a lever associable to the other of the flaps to be fastened together, to said base there being connected a movable dentated body removably engageable with said toothed band, characterized in that it comprises a pair of pins mutually spaced apart and slideably engageable with sliding surfaces mutually defined between said lateral sides and said movable dentated body to increase the locking action of said dentated body on said band upon a pulling action being exerted on said band in the direction of unthreading from said small base, and to uncouple said dentated body from said band upon a pushing action being exerted on said dentated body in a direction opposite to said pulling action.

Further characteristics and advantages will become apparent from the description of a preferred, but not exclusive, embodiment of a ratchet fastener for the toothed band of a closure lever particularly for ski boots, illustrated only by way of non-limitative example in the accompanying drawing, wherein:

Fig.1 is a schematic perspective exploded view of the ratchet fastener according to the invention;

Fig. 2 is a view of the ratchet fastener applied to a band connected to a lever;

Fig. 3 is a cross section view of the ratchet along a plane which is transverse with respect to the supporting pins of the dentated body in locking conditions;

Fig. 4 is a cross section view of the ratchet during the uncoupling of the toothed band;

Fig. 5 is a different embodiment of the ratchet fastener;

Fig. 6 is an exploded perspective view of the ratchet fastener with a small lever which facilitates uncoupling.

With reference to Figs. 1 to 4, the ratchet fastener for the toothed band of a closure lever particularly for ski boots comprises a small base 1 which has, in a known manner, a substantially U-shaped configuration with a through hole 2 in the central portion for the coupling to one of the flaps to be brought together.

The small base 1 has counterposed lateral sides 3 with which a movable dentated body engages, generally indicated with the reference numeral 10.

The peculiarity of the invention lies in that the dentated body 10 is associated with the sides 3 by means of a first pin 11 supported by the sides 3 and slideably engaging with a first sliding surface, composed of an elongated slot 12 which is elongated along a direction which is approximately parallel to the extension of the toothed band 20, which can be inserted in the small base 1 and is engageable by the teeth or dentations 21 which is defined on the lower face of the body 10 substantially on the opposite side with respect to the region of the body 10 where the elongated slot 12 is defined.

The coupling between the dentated body 10 and the small base is completed by a second pin 15 spaced from the pin 11, which is supported by a seat 16 defined by the body 10 and extending substantially parallel with respect to the longitudinal extension of the slot 12.

The second pin 15 engages with a second sliding surface which is composed of a pair of slots 17 provided in the lateral sides 3.

The slots 17, as illustrated in the drawings, have a rectilinear path and are inclined so as to allow their lower end, i.e. the end on the side of the toothed band 20, which is further from the first pin 11 than the other end of the slot 17.

With this arrangement a pulling action exerted on the toothed band 20 causes a tightening of the movable body 10 on the same band, since the engagement between the second pin 10 and the slots 17 creates a rotational component of the movable body towards the dentellated band.

Elastic means are furthermore provided which push the dentation 21 against the toothed band 20, said elastic means, in the embodiment illustrated in the drawing, being composed of springs 30 accommodated in recesses 31 provided laterally on the movable body 10; the springs act between the bottom of the recesses and the first pin 11 so as to exert an elastic pushing action which keeps the dentations 21 engaged with the toothed band 20.

With this type of arrangement, to insert the toothed band in the small base it is sufficient to exert a pushing action on the band, in the direction of insertion of the same band in the small base, which causes a rotary motion of the movable body 10 with a consequent "ratchet-like" motion thereof and the possibility of inserting the band itself.

If instead a pulling action is exerted on the band, as in the case of locking by means of the lever 40 to which the band is connected, by virtue of the coupling described above the pin 15, by engaging with the slots 17 which are inclined, tends to move the movable body in rotatatory-translatory motion so as to increase the locking action.

To perform the opening it is sufficient to exert a pushing action on the dentated body 10 in a direction opposite to the pulling action which is exerted on the toothed band in the closure phase, so that, by overcoming the elastic biasing action exerted by the springs 31, there is a rotary-translatory motion of the dentated body, with the consequent uncoupling of the dentations 21 from the toothed band 20, as illustrated in Fig. 4.

Fig. 5 illustrates a conceptually similar but structurally different embodiment, in which the dentated body, indicated by the reference numeral 10', has in its front portion a sloping sliding surface, indicated by the reference numeral 17', which engages with a second pin 15' so that there is an increase in the locking action between the dentation 21' and the band 20' as the pulling action exerted by the same toothed band increases.

The dentated body 10' is pivoted on a first pin 11' by means of an elongated slot 12' which is arranged below the line of action of the engagement force between the dentation 21' and the toothed band 20'.

A pin-spring 31' is furthermore provided which acts between the small base itself and the end of the dentated body 10' to keep the dentation 21 elastically engaged with the toothed band 20'.

In this embodiment the small base, indicated with the reference numeral 1', has a deflector element 50 which guides the band during its insertion so as to avoid interfering with the first pin 11'.

Fig. 6 illustrates a further embodiment, in which a dentated body is provided which is conceptually and

structurally similar to the one illustrated in the Figs. 1 to 4, with the addition of an uncoupling lever, indicated with the reference numeral 60, which facilitates the uncoupling of the dentellated body from the toothed band.

In this embodiment the uncoupling lever 60 is pivoted on the pivot 11 and is provided with a cam slot 61. The cam slot 61 is shaped so as to allow an initial, free raising of the lever 60 and a subsequent coupling with the pivot, again indicated with the reference numeral 15, so as to bring about, in the manner described above, the raising of the dentation with a rotary motion caused by the combination of the motions imposed by the slot 12 and by the slots 17.

In practical operation, the ratchet fastener described above offers the possibility of increasing the locking action of the dentated body on the band, when the pulling action is exerted on the band in the direction of unthreading from the small base, since the engagement between the pivot 15 and the slots 17 causes a tightening of the dentations 21 on the same band, with a rotary motion, and the engagement ensuing between the pivot 11 and the elongated slot 12 allows a motion of the dentated body.

To perform the uncoupling, it is sufficient to exert a pushing action on the front part of the dentellated body 10, in a direction opposite to the pulling action exerted by the band when closing, to achieve the raising of the dentated body again with a raising motion due to the sliding of the pin 15 in the slots 17 and a rotatory motion about the pivot 11.

This pushing action on the dentated body is performed against the biasing action of the springs 31.

From what has been described, it can thus be seen that the invention achieves the intended aims, and in particular the fact is stressed that a ratchet fastener is provided which is structurally simple and remarkably effective, since it allows the possibility of easily achieving the uncoupling, though it has a firm locking action which is determined by the mutual engagement of teeth which advantageously have a sinusoidal configuration and therefore have wide and stable mutual coupling surfaces.

It should be furthermore added that, from a functional point of view, it is possible to modify the configuration and reciprocally invert the positioning of the slots or of the holes and of the pins between the dentated body and the small base, without abandoning the principle that the dentated body can perform a rotary motion.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

Furthermore, all the details may be replaced by other technically equivalent elements.

In practice, the materials employed, so long as compatible with the specific use, as well as the dimensions and the contingent shapes, may be any according to the requirements.

CLAIMS

1. Ratchet fastener of the toothed band of a closure lever, particularly for ski boots, comprising a small base (1) fixable to one of the flaps to be fastened together and having lateral sides (3) defining the engagement region of a toothed band (20, 20') connected with a lever (40) associable with the other of the flaps to be fastened together, to said small base (1) there being connected a movable dentated body (10, 10') removably connectable with said toothed band (20,20'), characterized in that it comprises a pair of pins (11, 15; 11',15') spaced from each other and slideably engageable with sliding surfaces (12, 17; 12',17') mutually defined between said lateral sides (3) and said movable dentated body (10, 10') to increase the locking action of said dentated body (10, 10') on said band (20, 20') upon a pulling action being exerted on said band (20, 20') in the direction of unthreading from said small base (1), and to uncouple said dentated body (10, 10') from said band (20, 20') upon a pushing action being exerted on said dentated body (10, 10') in a direction opposite to said pulling action.

2. Ratchet fastener, according to the preceding claim, characterized in that the sliding surface (12, 12') arranged on the opposite side with respect to a dentation (21, 21') of said dentated body (10, 10') extends substantially parallel to the direction of engagement of said band (20, 20'), the sliding surface (17,17') positioned on the side of said dentation (21, 21') having such an inclination as to have the lower end directed towards said toothed band (20,

20') at a greater distance from the pin (11, 11'), engageable with the other sliding surface (12, 12'), with respect to the other end.

3. Ratchet fastener according to one or more of the preceding claims, characterized in that it comprises a first pin (11) supported by said lateral sides (3) and engaging with a sliding surface composed of an elongated slot (12) defined by said dentated body (10) and elongated in a direction which is approximately parallel to that of the positioning of said band (20) inserted in said small base (1).

4. Ratchet fastener according to one or more of the preceding claims, characterized in that it comprises a second pin (15) engageable in a seat (16) defined by said dentated body (10) on the side of said toothed band (20), said second pin (15) engaging with a sliding surface composed of a pair of elongated slots (17) defined by said lateral sides (3), said elongated slots (17) extending with an inclined path to have their lower end, directed towards said band (20), at a greater distance than the other end of the elongated slots with respect to said first pin.

5. Ratchet fastener according to one or more of the preceding claims, characterized in that it comprises elastic means (30, 30') interacting between said dentated body (10, 10') and said small base (1) to elastically push said dentation (21, 21') to engage with said toothed band (20, 20').

6. Ratchet fastener according to one or more of the preceding claims, characterized in that said elastic means are composed of a pair of springs (30) accommodated in

lateral recesses (31) defined by said dentated body (10), said springs (30) acting between the bottom of said recesses (31) and said first pin (11) supported by said lateral sides (3).

7. Ratchet fastener according to one or more of the preceding claims, characterized in that it comprises a dentated body (10') provided in a middle portion with an elongated slot (12') slideably and rotatably engaging with a transverse pin (11') of said small base (1), at the end having the dentation (21') said dentated body (10') defining an inclined surface (17') engageable with a fixed transverse pin (15') defined by said small base (1), a torsion spring (30') being furthermore provided which engages between said small base (1) and the operating end of said dentated body (10').

8. Ratchet fastener according to one or more of the preceding claims, characterized in that it comprises an uncoupling lever (60) pivoted on said first pin (11) and provided with a cam slot (61) engageable with said second pin (15) and shaped so as to define a first section of free raising with respect to said small base (1) and a coupling section with said second pin (15) for the uncoupling of said dentated body from said band.

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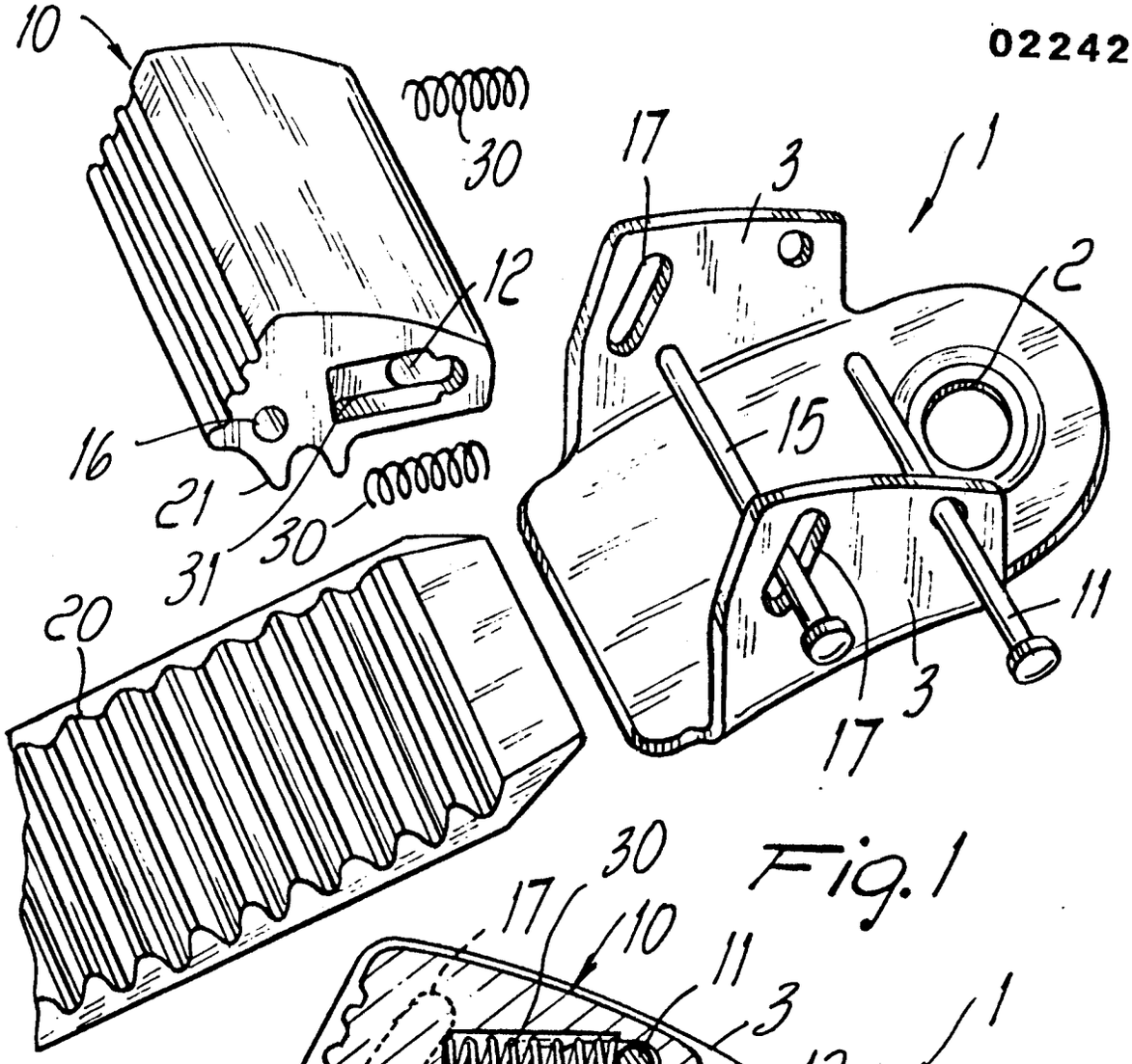


Fig. 1

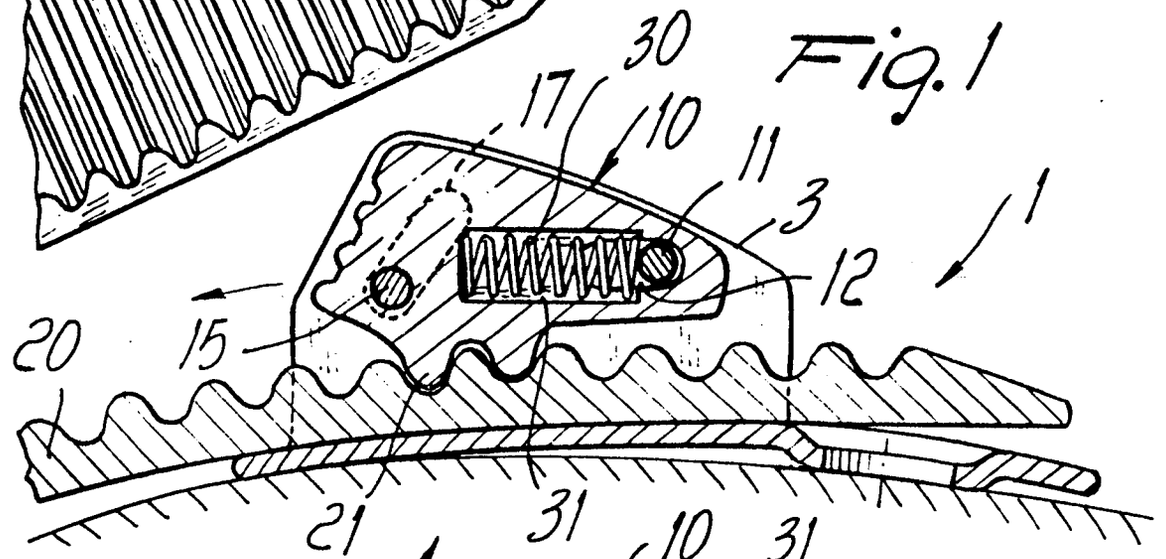


Fig. 3

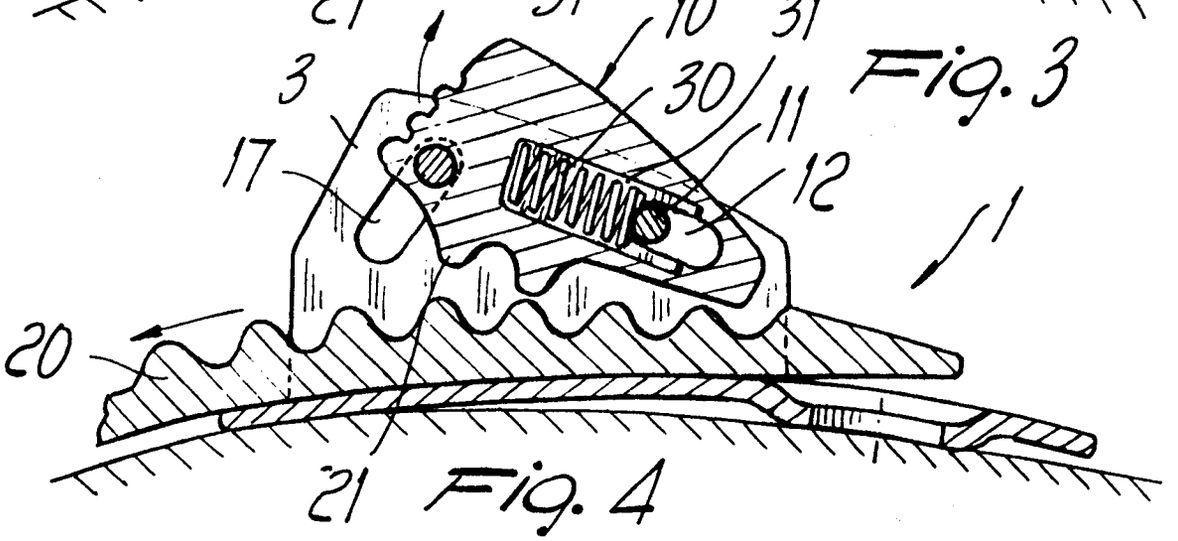


Fig. 4

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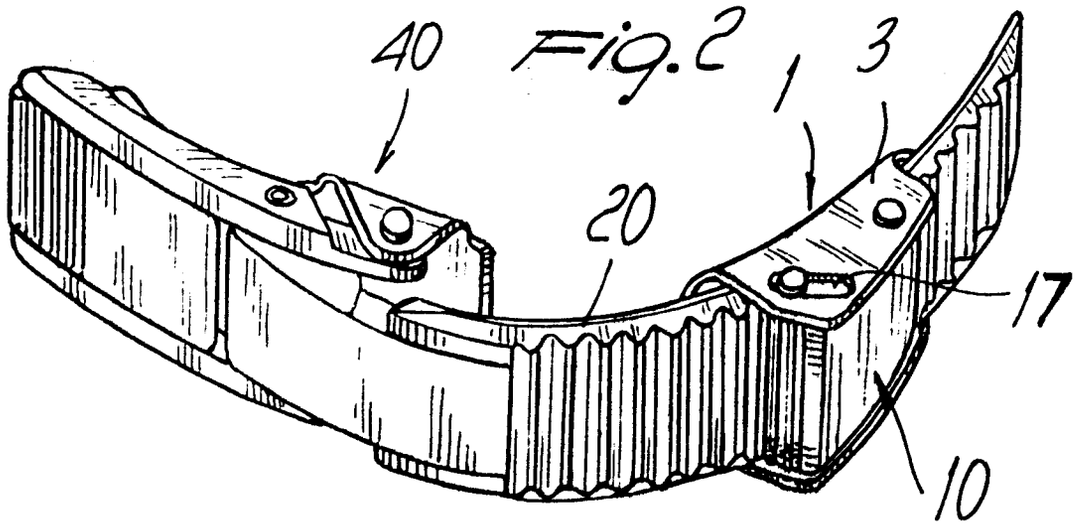


Fig. 2

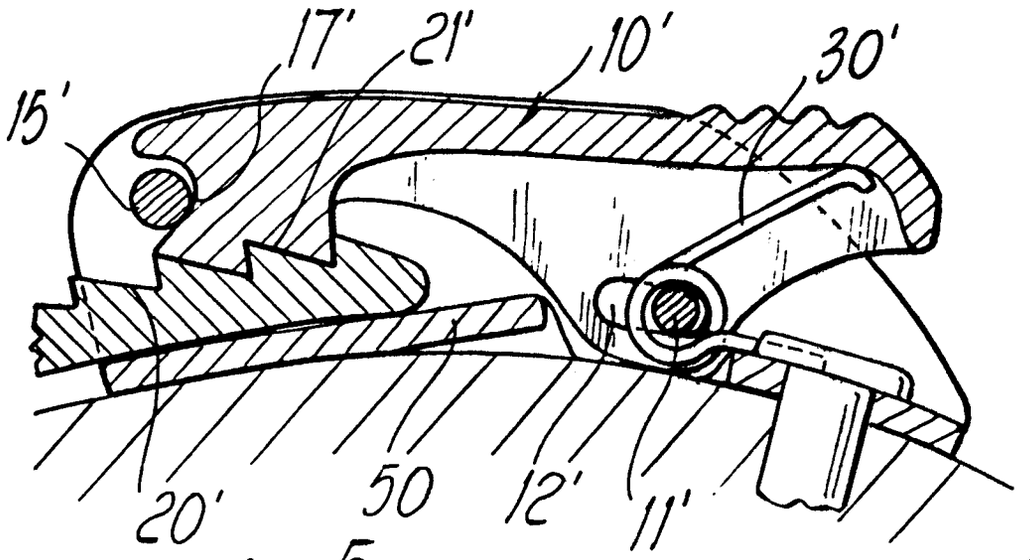


Fig. 5

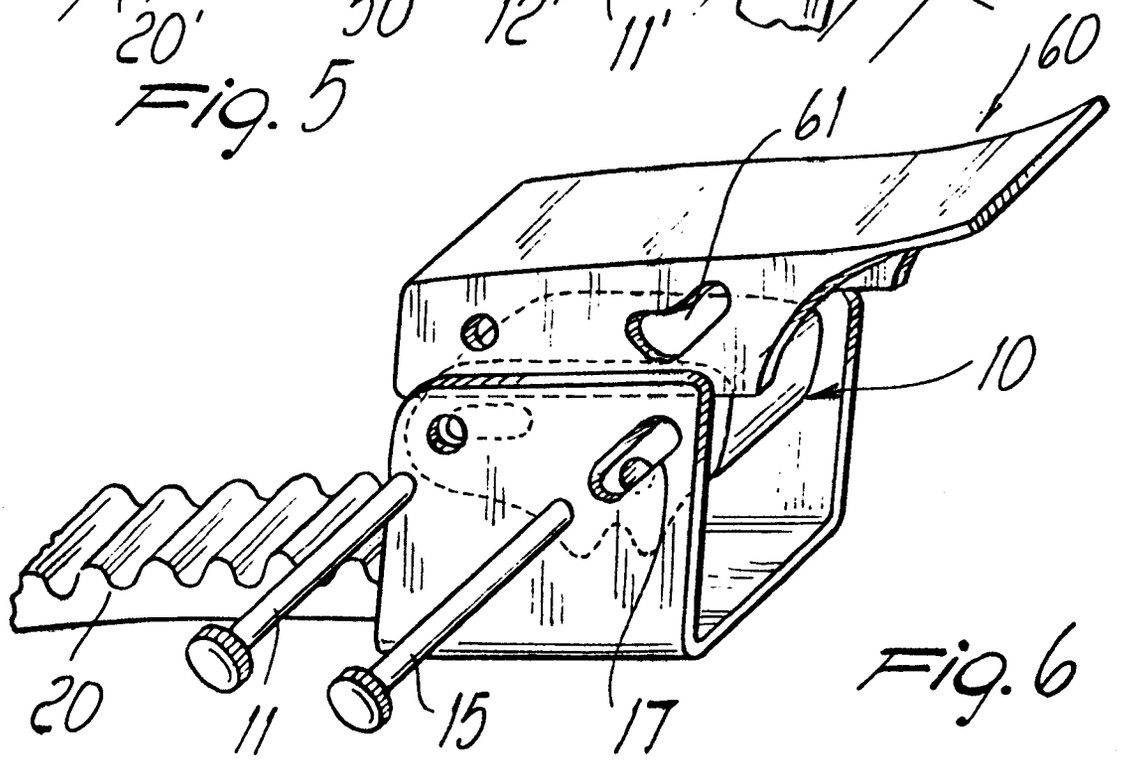


Fig. 6

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European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 20 1879

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl 4)
D,A	FR-A-2 180 250 (I.J.ALLSOP) * Claim 1; figures 1-11 *	1	A 43 C 11/14
A	FR-A-2 063 379 (STARPOOL) * Claim 1; figures 1-7 *	1	
D,P A	EP-A-0 161 441 (TECNOSKI) * Abstract; figures 1-4 *	1	
D,P A	FR-A-2 563 978 (C.VALSECCHI et al.) * Abstract; figures 1-4 *	1	

TECHNICAL FIELDS SEARCHED (Int Cl 4)

A 43 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-01-1987	MALIC K.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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