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(54) Locking device for toothed chin-straps of safety helmets for motorcyclists

(57) Locking device for chin-straps of safety helmets for motorcyclists comprising a base (22) for taking a toothed chin-strap (16) provided with a terminal for restraining the chin-strap, an oscillating ratchet (12) provided at the bottom with engagement teeth and a "C"-

shaped front profile (17) and a cam-shaped oscillating control lever (18) having a convex arched upper profile (20).

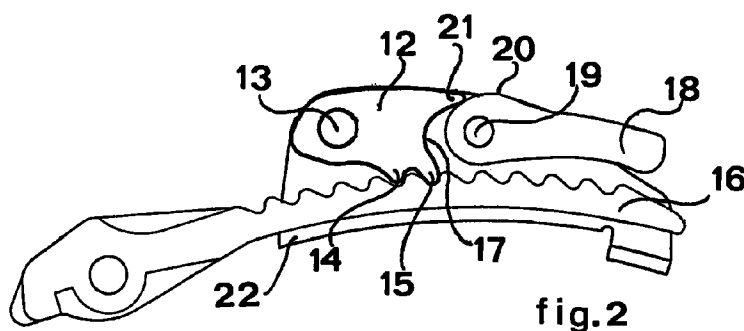


fig. 2

EP 0 772 983 A1

Description

This invention relates to a ratchet gear device for locking toothed chin-straps of safety helmets for motorcyclists and the like, having high resistance characteristics.

As is known, safety helmets for motorcyclists are restrained by means of lengths of small belts, bands or strips, with one end anchored to the sides or the edge of the helmet opening and the free ends stably connectable to one another and adjustable by means of various buckle- lever- ratchet-like locking devices or the like, and such as to keep the system taut.

For the locking of the chin-strap, instead of the traditional buckles, locking devices of various type and structure are generally used, which comprise usually an oscillating ratchet gear within a prismatic boxed body or base substantially "U"-shaped and a lever which in some cases, by a shift in a direction parallel to the boxed body and therefore the toothed length of the strap, causes the ratchet to engage or disengage with the strap teeth; in other cases, said lever is oscillatably mounted, in opposition to prewound springs, around a pin integral with the boxed body, so as to keep the ratchet in the locking position and to allow afterwards the unlocking by acting on the free arm of the same lever.

The types of ratchet gear devices with oscillating control lever according to the known art have the drawback of keeping the free end of the lever very exposed from the boxed body, so that the accidental release of the ratchet is made easier by possible hits of the same lever against obstacles.

The ratchet gear devices of the type controlled by a lever translatable parallelly to the plane of the toothed strap and opposed to the return spring of the ratchet in locking position do not always allow the raising of the toothed end of the ratchet relatively to the teeth of the strap, such as to allow the easy introduction of the same strap, and consequently the height of the strap teeth must be limited, to the detriment of the locking safety. Besides, they are very complicated from the point of view of their mechanical realization, and therefore subject to deterioration, seizing and poor working in general.

To try to obviate at least partly the drawbacks noticed especially in the known ratchet gear devices controlled by an oscillating lever, a device has been proposed deriving from a type already utilized for ski-boots.

This oscillating lever device is formed by a substantially "U"-shaped base, in one end of which the toothed strap is introduced; around a pin fixed to the opposite flanges of the base a ratchet is oscillatably mounted whose front part is corrugated or has a sinusoidal profile; the ratchet is also profiled at the bottom with a couple of teeth engageable with the teeth of the strap.

Around a second pin also fixed to the flanges of the base, a raisable control lever is oscillatably mounted, whose lower end, engaged with the corrugated front part of the ratchet, is substantially wedge-shaped, while

the upper face, which transmits by sliding touch the movement to the ratchet, has substantially a flat shape.

Both the ratchet and the control lever are provided with return springs.

By lifting the free end of the control lever, the wedge-shaped lower end disengages from the ratchet, allowing in this way the latter to raise slightly, enough to allow the passage of the toothed strap for its introduction; by furtherly raising the lever, the ratched is fully raised, allowing in this way also the slipping off of the toothed strap.

In another ratchet gear locking device utilized for ski-boots, described in patent US 4683620 (Valsecchi et al.), the end of the oscillating lever opposite to the sinusoidal profile face of the ratchet is also shaped with a corrugated profile corresponding to the profile of the front part of the ratchet and fits with said front part in rest position.

These devices, realized from rigid plastic materials, satisfy very well the aim when they are used for closing and locking ski-boots, but cannot always satisfy the different requirements either formal or of resistance to the various stresses, as are provided for by the many regulations in force in the field of safety helmets for motorcyclists.

It is actually known that the locking devices of chin-straps for motorcyclists must comply with requirements of dimensions, functionality and resistance to given stresses according to specific safety regulations defined by now at the international plane. For instance, according to the EEC directive 22-04, the small belt locked in the locking device must be such as to withstand a 200 kg tensile stress even when the system has already undergone a given number of opening cycles in a corrosive environment. Besides, the unlocking lever of the device submitted to a given strain cycle, must be controllable and be in condition of unlocking and release the small belt, allowing the latter to slip off from the device, under a stress not greater than 3 kg. Also the terminal connecting the chin-strap to the small belt must comply with the requirements of tensile strength established by the recent norms. A terminal realized according to the known art is formed, for instance, by a metal lamina folded and tightened on the strap in a special impression or housing obtained on the ends of said straps.

In any case, the device must be so configured as to exclude the danger of the spontaneous unlocking and slipping off of the small belt following accidental hits.

It has been found that the locking devices of the oscillating lever straps as well as the connecting terminals realized according to the known art, do not comply with all the requirements provided for by the new EEC directive 22-04, sometimes because of their shape, and sometimes because of problems of resistance to stresses.

Besides, some devices realized always according to the known art have also the drawback that the toothed strap, when its is inserted in the device in lock-

ing position and is subject to a tensile stress, exercises on the ratchet teeth a stress that, through the ratchet, is transferred to the lever, so that the latter tends to lock, and anyhow its control is difficult and the release and extraction of the strap is strongly hindered, contrary of the provisions of the EEC directive 22-04.

It is an object of this invention, therefore, to provide a ratchet gear device controlled by an oscillating lever for locking the chin-straps of safety helmets for motorcyclists or the like, so designed and structured as to obviate the drawbacks and limitations of the present hatchet gear devices, both the oscillating lever ones, and the ones provided with a slide transable parallelly to the sliding plane of the small belt.

Another object of the invention is to provide a ratchet gear device of the above precised type, such as to be structurally strong and suitable to avoid releases due to possible unexpected hits of the lever against obstacles or involuntary release manoeuvres.

A further object of this invention is to provide a type of locking device for chin-straps of safety helmets, so designed as to be easily manoeuvrable in the release stage and the stage of introduction of the toothed strap under the ratchet, and such also as to allow the utilization of small belts provided with variously shaped teeth, for instance saw-teeth, rounded off teeth, and the like.

Still another object of this invention is to provide a locking device for toothed chin-straps having reduced dimensions, and therefore a reduced weight and overall size and being more comfortable for the user.

Still another object of this invention is to provide a device of the aforementioned type, specifically designed so as to comply with the requirements of stress resistance as defined by the competent bodies and the national and international commissions for safety control, in particular according to the contents of the EEC directive 22-04.

These and still other objects and related advantages which will be more clearly stressed by the following description are achieved by a device for locking small belts or chin-straps of safety helmets for motorcyclists and the like, comprising a quadrangular supporting boxed body or base for taking a toothed strap, an oscillating ratchet around a first pin opposite to the return springs and provided at the bottom with teeth engageable with the teeth of the strap, and a control lever oscillating around a second pin, also opposite to return spring for the control of said ratchet from the locking to the unlocking position of the strap, which device, according to this invention, comprises:

- a toothed strap provided with a terminal for the connection and the restraint of a chin-strap or small belt,
- an oscillating ratchet provided in the concave shape frontal part having a "C"-profile, the lower flange of said "C" being connected with teeth engageable with the teeth of said strap, and
- an oscillating control lever, substantially cam-shaped, the upper face of said cam, which trans-

mits the movement to said ratchet by sliding touch with the end of the upper flange of said "C", having a convex arched profile.

More particularly, always according to this invention, said supporting body or base and said ratchet is preferably made from metal, such as steel or light alloys.

Besides, said terminal for the connection and the restraint of the chin-strap to the toothed strap is formed, according to a preferred embodiment of this invention, by a metal frame or buckle provided on the one side with a seat for an eyelet of a chin-strap, and on the other side with a pin, fixed between to opposite side flanges of the buckle at a level higher than the level of the strap seat and inserted oscillatably in a through-seat obtained in the end of said strap, on the end of said strap a protrusion being also provided suitable to prevent the oscillation of said terminal upwards, allowing on the contrary its free oscillation downwards.

In this way, while the terminal and therefore all the device still have very reduced dimensions, it is possible to obtain in the end of the strap a seat for the pin of the terminal having a thickness and therefore a strength sufficient to comply with the norm on tensile strength. Besides, the protrusion provided on the end of the strap prevents the oscillations of the terminal upwards, allowing however a free movement downwards, ensuring in this way the utmost comfort for the user, compatibly with the provisions of the EEC directive 22-04.

Further characteristics and advantages of this invention will be more apparent from the following detailed description, made with reference to the drawings attached by way of non limitative example, and wherein:

Fig. 1 shows schematically a cross section of a locking device for toothed chin-straps for helmets for motorcyclists realized according to the known art,

Fig. 2 shows schematically a cross section of a locking device for toothed chin-straps for helmets for motorcyclists according to this invention,

Fig. 3 shows schematically a plan view of the locking device of Fig. 2, realized according to this invention,

Fig. 4 shows a side view of the toothed chin-strap of figure 2,

Fig. 5 shows a schematic side view of the terminal for the connection of the toothed strap to the chin-strap according to this invention, while

Fig. 6 shows a top view of the terminal of Fig. 5.

With reference to the above figures, the locking device according to the known art of Fig. 1 is formed by the "U"-base in which the toothed strap 2 is inserted; around pin 3, ratchet 4 is oscillatably mounted whose front part 5 is corrugated or has a sinusoidal profile; the ratchet is provided at the bottom with a couple of teeth 6 and 6a engageable with the teeth of strap 2.

The return spring 7 provides to keeping ratchet 4 engaged with the strap teeth in resting position (locking). Around the second pin 8, lever 9 controlling ratchet 4 is mounted, which lever has its lower end 10 wedge-shaped and the upper face 11, which transmits by sliding touch the movement to ratchet 4, with a flat profile.

The locking device realized according to this invention, as is schematically illustrated in Figs. 2 and 3, comprises a base 22 and a ratchet 12 rotating around the first pin 13 integral with the side flanges of base 22, with a return spring not shown in the drawing; the ratchet is provided at the bottom with the couple of teeth 14 and 15 engageable with the teeth of strap 16, shown in the figure inserted in the device in locking and rest position. The front part 17 of the ratchet is "C"-shaped, and connected at the bottom with tooth 15.

The control lever 18, oscillating around the second pin 19, also integral with the side flanges of base 22, opposite to a return spring not shown in the drawing, is cam-shaped; the convex upper profile 20 of the cam transmits the movement to ratchet 12 by sliding touch against the end of the upper flange 21 of the "C"-profile of the concave front part of the ratchet, when the free end of lever 18 is pushed upwards, moving teeth 14 and 15 away from the teeth of the strap, and allowing in this way the latter to be slipped off. On the contrary, the insertion of the strap takes place without acting on the lever, as the very teeth of the strap provide to shift upwards teeth 14 and 15 to the extent necessary to allow the passage of the toothed strap.

The toothed strap 16 is also connected with the chin-strap 23 through terminal 24. The latter is formed by a metal frame or buckie provided with seat 25 to which strap 23 is connected by means of an eyelet or the like. The terminal is also provided with pin 26, which inserts and is oscillatably fixed in seat 27 of strap 16. Pin 26 is fixed to the two opposite side flanges 24a and 24b of the buckle at a higher level relatively to the level of seat 25 of constraint of strap 23, as shown in Fig. 5. Besides, at the end of the toothed strap 16 a protrusion 28 is provided which prevents the upwards movement of the terminal with the strap relatively to the toothed strap and the strap locking device in the direction of arrow B, ensuring in this way the utmost comfort for the user.

As has been shown, the device realized according to this invention fully complies with all the requirements provided for by the EEC directive 22-04 recently enforced, and it performs particularly well as concerns tensile strenght.

Which is more, it has been shown that such requirements are complied with by far also when the teeth of the strap are not sharp-edged or saw-shaped, but have a rounded off profile: this makes more smooth and comfortable the insertion of the strap without jeopardizing or even reducing the guarantees of resistance of the device against accidental releases, or of tensile strength of the same strap.

In the following are shown the results of the tensile strength tests concerning the locking device of Fig. 1

realized according to the known art (device A) and the locking device realized according to this invention (device B), by acting in both cases on a strap of analogous width and having the same thickness between the base and the teeth apex.

Device A of Fig. 1	
Ultimate tensile strength	N 1362.76
Device B of Fig. 2	
Ultimate tensile strength	N 2715.71

The above tests demonstrate the marked increase in the resistance achieved with the use of the device subject matter of this invention.

The combination of metal parts, such as the ratchet and the base according to this invention, with parts from plastic material lends the device a permanent rigidity, without substantially affecting its weight, which rigidity ensures a regular control of the lever on the ratchet and a regular working of the device even after a long use.

It has also been found that, even by submitting the strap, inserted and locked in the device, to the stress cycles provided for by the EEC directive 22-04, the strain necessary to control the lever is by far lower than the 3 kg provided for by said directive.

Claims

1. Device for locking chin-straps or small belts of safety helmets for motorcyclists and the like, of the type comprising a quadrangular boxed supporting body or base (22) for taking a toothed strap (16), a ratchet oscillating around a first pin (13) opposite to return springs and provided at the bottom with teeth engageable with the teeth of strap (16), and a control lever oscillating around a second pin (19), also opposite to return springs for shifting said ratchet from the locking position to the unlocking position of strap (16), characterized in that it comprises:

- a toothed strap (16) provided with a terminal (24) for the connection and the restraint of a chin-strap or small belt (23),
- an oscillating ratchet (12) provided with a concave shaped front part (17) having a "C"-profile, the lower flange of said "C" being connected with teeth (14, 15) engageable with the teeth of said strap (16), and
- an oscillating control lever (18), substantially cam-shaped, the upper face (20) of said cam, which transmits the movement to said ratchet (12) by sliding touch with end (21) of the upper flange of said "C", having a convex arched profile.

2. Device according to claim 1, characterized in that said supporting boxed body (22) and/or said ratchet (12) are made from rigid metal, such as steel or light alloys.

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3. Device according to claim 1, characterized in that the teeth of said toothed strap (16) have a rounded off profile.

4. Device according to claim 1, characterized in that said terminal for the connection and the stable restraint of the chin-strap (23) with the toothed strap (16) is formed by a metal frame or buckle (24), provided on the one side with a seat (25) for taking an eyelet of a chin-strap (23) and on the other side with a pin (26) fixed between the two opposite side flanges (24a, 24b) of buckle (24) at a higher level relatively to the level of the strap seat and inserted oscillatably in a through-seat (27) obtained in the end of said strap, on the end of said strap a protrusion (28) being also provided, suitable to prevent the upwards oscillation of said terminal, while allowing its free downwards oscillation.

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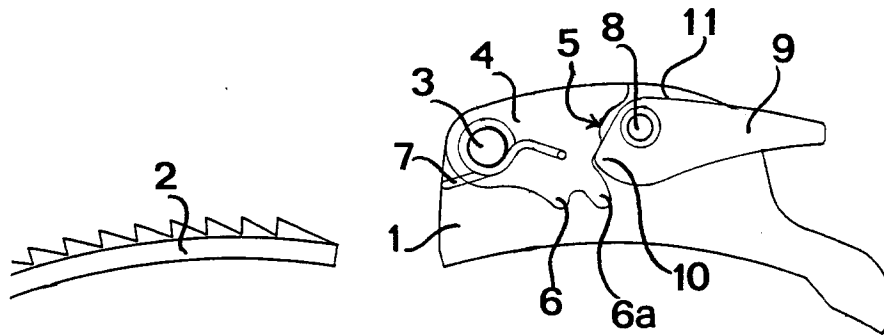


fig.1

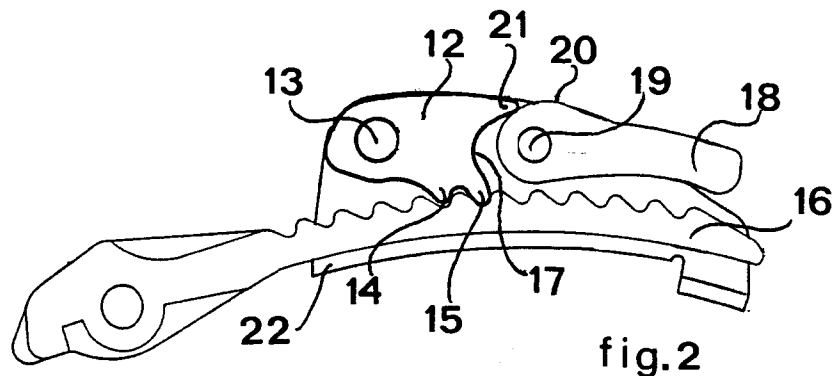


fig.2

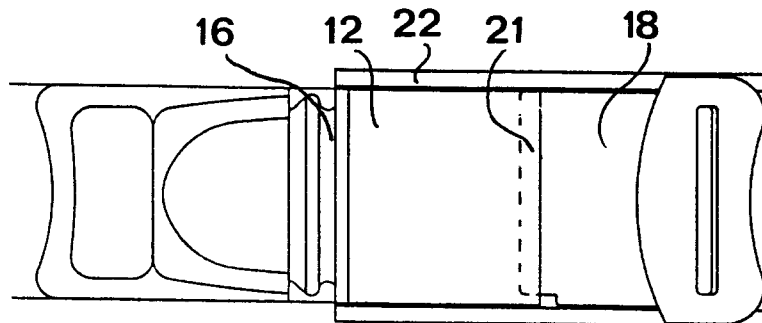


fig.3

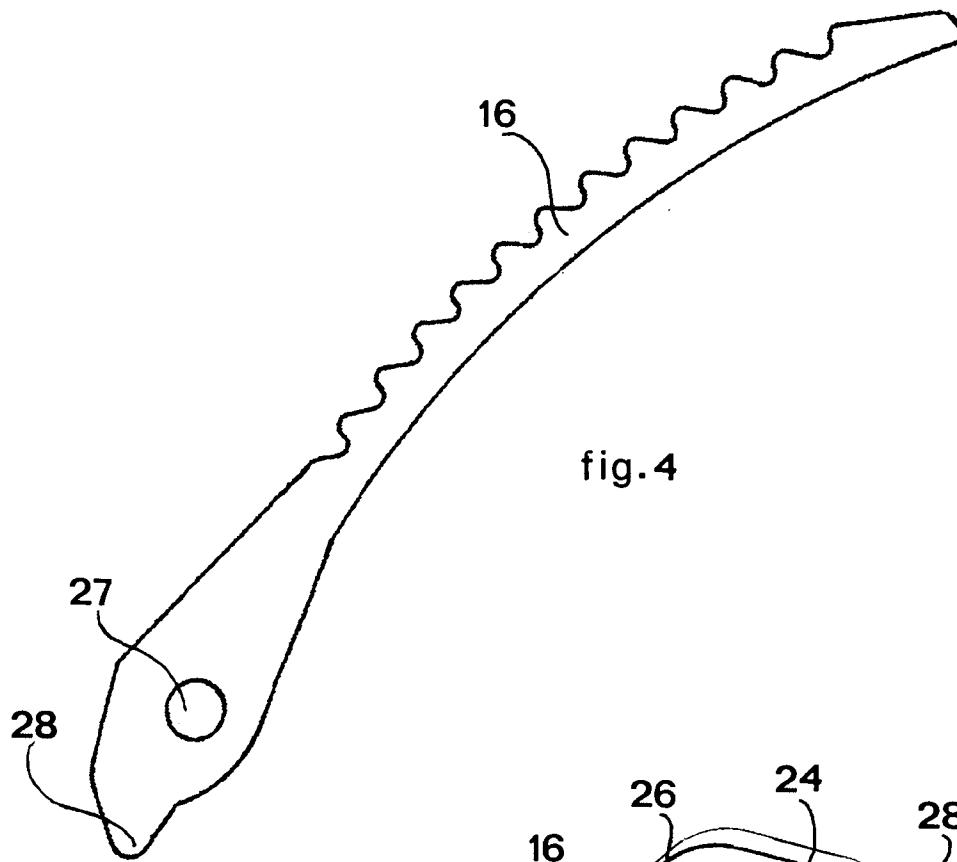


fig.4

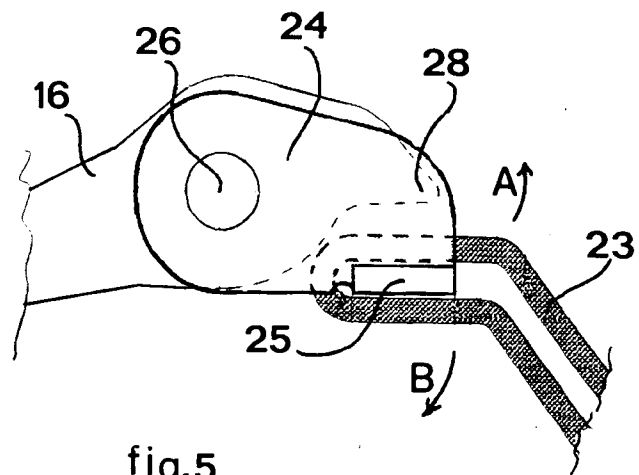


fig.5

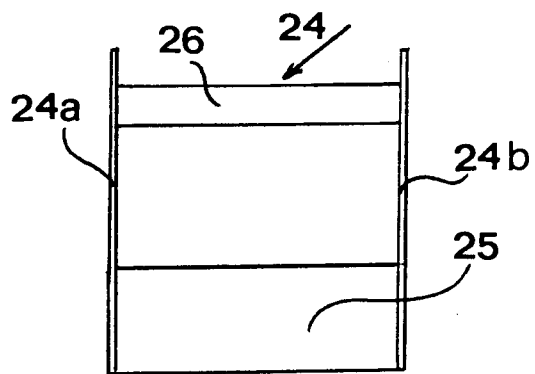


fig.6



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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0474

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.6)
D,X	US-A-4 683 620 (C. VALSECCHI & AL) * column 2, line 34 - column 5, line 57; figures *	1-3	A44B11/25
A	DE-U-86 18 392 (ICARO OLIVIERI & CO SPA) * page 5, line 11 - page 7; figures *	1-3	
A	EP-A-0 161 441 (TECNOSKI SNC) * abstract; claims; figures *	1,2	
A	US-A-5 416 952 (D.J. DODGE) * column 3, line 58 - column 5, line 16; figures *	1,2	
A	FR-A-2 527 463 (ICARO OLIVIERI & CO SPA) * page 2, line 6 - page 4; figures *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A44B A43C A42B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 March 1996	Examiner Vanmol, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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