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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 :		(11) International Publication Number:
A44B 11/25	A1	WO 87/ 00736
		(43) International Publication Date: 12 February 1987 (12.02.87)

(21) International Application Number: PCT/SE86/00347

(22) International Filing Date: 1 August 1986 (01.08.86)

(31) Priority Application Number: 8503683-8

(32) Priority Date: 2 August 1985 (02.08.85)

(33) Priority Country: SE

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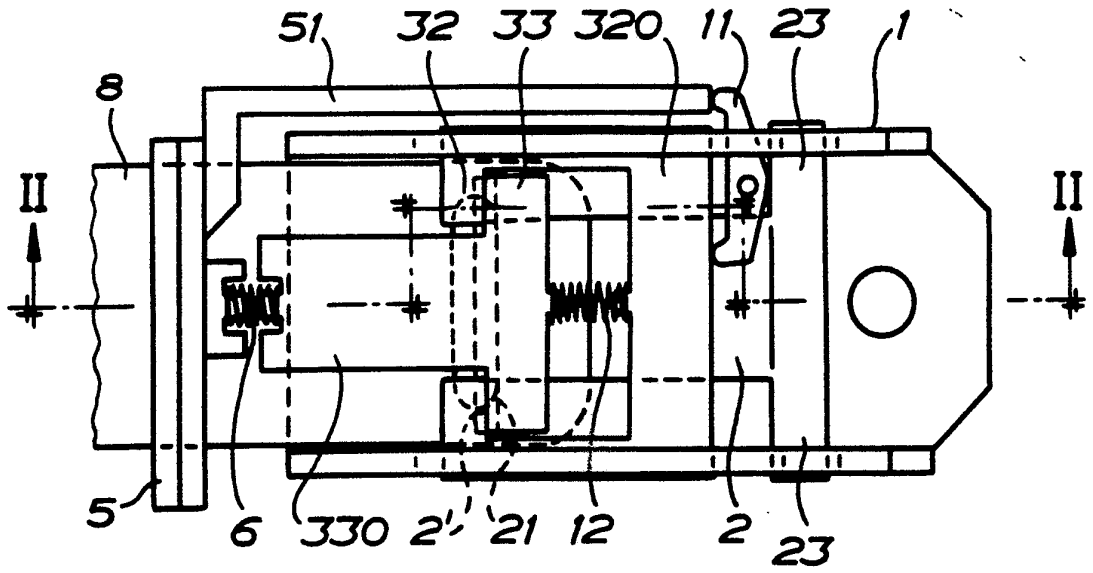
(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.

Published
With international search report.
In English translation (filed in Swedish).

(54) Title: LOCK MECHANISM



(57) Abstract

Lock mechanism having two separate latch elements (32, 33) which are displaceable between a disengaged position and an engaged position at either side of a partition line between the elements. Each latch element has the centre of gravity thereof at the side of the partition line between the latch elements, which is opposite to the related element.

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LOCK MECHANISM

The present invention relates to a lock mechanism having two separate latch elements which are displaceable between a disengaged position and an engaged position on either side of a partition line between the elements.

In several fields, lock mechanisms are used in order to protect human life or to secure or retain persons or objects in such a manner that they can be released rapidly and easily when required. Such lock mechanisms are used e.g. in automotive safety belts and other safety belts but the use of these lock mechanisms is of interest also in many other fields. Even if the invention has been developed particularly in connection with automotive safety belts it is not limited to this narrow field; the invention can be applied more generally in different technical fields where the same problem is encountered as in connection with automotive safety belts.

The lock mechanism of an automotive safety belt in the first place must provide a locking of the belt which is so safe that the lock can fulfil the vital function thereof in a reliable manner but at the same time it is required that the lock mechanism can be operated and disengaged without major effort, e.g. in order to release rapidly the user of the automotive safety belt after an accident. Usually, this means that the lock mechanism is operated at a push button or the like, the latching force provided in the lock mechanism by some springs being overcome. Since the push button or other operating member always has a specific inertia mass, shocks and vibrations as well as centrifugal acceleration and retardation forces in some cases may cause unintentional operation of the lock mechanism to

the disengaged position, the consequences of which can of course be disastrous when such disengagement occurs at the time of an accident.

It is the intention to provide by the present invention an improved lock mechanism which as such excludes the possibility that external uncontrolled centrifugal forces which may arise at the time of the accident proper, act on the lock mechanism in such a manner that said mechanism at a critical instant is unintentionally disengaged.

According to the invention, the lock mechanism for the purpose mentioned has obtained the characteristics according to claim 1.

In order to explain the invention in more detail reference is made to the accompanying drawings in which

FIG. 1 is a plan view of the lock mechanism according to the invention,

FIG. 2 is a longitudinal cross-sectional view of the lock mechanism,

FIGS. 3 to 5 disclose diagrammatically different positions of the latch elements,

FIG. 6 is a perspective view of a primary latch member forming part of the lock,

FIG. 7 is a plan view of the primary latch member according to FIG. 6 in a modified embodiment thereof,

FIG. 8 is a plan view of a lock tongue and latch elements engaged therewith, and

FIG. 9 is a perspective view of one of the latch elements in FIG. 8.

In FIGS. 1 and 2 there is shown a lock housing 1 having a primary latch member 2 for engagement with a lock tongue 8. In order to maintain the latch member 2 in an engaged position according to FIG. 1 there are provided two secondary latch elements 32, 33 which are

displaceably guided in a slot 3 in the lock housing and are displaceable towards and away from each other. They are spring-biased to the position shown in FIGS. 1 and 2 wherein they are positioned over an engagement surface 2' of the latch member 2. In this position the latch elements prevent the latch member 2 from disengaging the lock tongue. A push button 5 can be actuated against the bias of a spring 6 to displace the latch elements to the disengaged position, FIG. 3, in which the latch member 2 can be pivoted upwards to disengage the lock tongue. An ejector 7 which is biased by means of a compression spring 9, is provided to eject the lock tongue when disengaged.

In FIG. 4, the lock mechanism is also in the latching position or engaged position, but the two elements 32 and 33 are displaced to the left, and then the element 32 maintains the primary latch member 2 in the engaged position. In FIG. 5, the elements are displaced to the right, and then the element 33 maintains the primary latch member in the engaged position.

The lock mechanism can be brought to the disengaged position only if the latch elements simultaneously are moved apart completely. At rectilinear accelerations or retardations the lock mechanism will maintain the engaged position, because if one element moves away from the primary latch member 2, the other element will still be in the latching position. If it is assumed that the primary latch member 2 is latched by means of both elements 32 and 33, FIG. 2, and that the lock suddenly starts to rotate about an axis which extends perpendicularly to the elements and therebetween, or about an axis which extends between the elements and is substantially parallel thereto, it may occur that the elements are moved apart by the centrifugal acceleration.

Now, in order to solve this problem, the elements

32 and 33 according to the invention are shaped such that the centre of gravity of the element 32 is located in the area of the element 33, i.e. at that side of the partition line between the elements, which is opposite to the element 32, and the centre of gravity of the element 33 is located in an analogous manner in the area of the element 32. The element 32 is constructed as part of a frame 320 while the element 33 is constructed as part of a T-piece 330. The centres of gravity of the frame and the T-piece thus are reversed in relation to the partition line between the elements 32 and 33. The primary latch member 2 has a recess 20, FIG. 6, for the stem of the T-piece in order that said stem cannot lock the primary latch member. However, this member has two projecting shoulders 21, the two latch elements 32 and 33 co-operating with said shoulders. Moreover, the latch element 2 has a lock detent 22 to engage the lock tongue, and two arms 23 for the pivotal mounting in the lock housing 1.

In order to disengage the primary latch member 2 the element 32 must be displaced to the left as seen in FIGS. 1 and 2, i.e. in the opposite direction of the push button 5. This can be achieved by the push button 5 being provided with arms 51 one at each side of the lock, but only one arm is shown in FIG. 1, these arms providing the necessary movement of the element 32, i.e. the frame 320, over rockers 11. Between the elements 32 and 33 a compression spring 12 is provided which orientates the two elements in relation to each other, but which does not determine the level at which the lock mechanism opens by itself at an acceleration, if any, as in case of prior art lock mechanisms. In order to balance completely the lock mechanism it is only necessary to make the frame 320 heavier than the push button 5 and the spring 6 (not shown in FIG. 1)

co-operating with the push button. In this connection it should be noted that the rockers 11 comprise autonomous bodies sensitive to rotation, but can actuate only one of the elements 32 and 33, and thus the security of the lock mechanism is not jeopardized as a consequence thereof.

If only one of the elements 32 and 33 engages the primary latch member 2, FIGS. 4 and 5, and the acceleration should be reversed, the risk of the latch member 2 being unintentionally disengaged, is exceedingly small, because the overlapping distance is large in relation to the gap in the disengaged position of the other element and corresponds to the thickness of the shoulders 21. The overlapping distance can be increased by angling the shoulders in the manner shown in FIG. 7 wherein the overlapping distance is indicated at 1.

In FIG. 8 the two latch elements 32 and 33 are provided as primary latch members to engage directly the lock tongue 8, the latch elements forming hooks 32' and 33', respectively, to engage recesses 8' at the edges of the lock tongue. The latch elements are displaced to engage and disengage the recesses transversely of the lock tongue as indicated by a double-arrow in FIG. 8. The partition line between the hooks of the latch elements is indicated by a dot-and-dash line, and as will be seen, each latch element has the hook and the centre of gravity, indicated at X, at opposite sides of the partition line.

CLAIMS

1. Lock mechanism having two separate latch elements (32, 33) which are displaceable between a disengaged position and an engaged position at either side of a partition line between the elements, c h a r a c t e r i z e d in that each latch element (32, 33) has the centre of gravity thereof at the side of the partition line between the latch elements, which is opposite to the related element.

2. Lock mechanism as claimed in claim 1, c h a r a c t e r i z e d in that the latch elements (32, 33) are mutually engaged in the engaged position.

3. Lock mechanism as claimed in claim 1 or 2, c h a r a c t e r i z e d in that the latch elements (32, 33) are displaceable towards and away from each other in one plane.

4. Lock mechanism as claimed in any of claims 1 to 3, c h a r a c t e r i z e d in that the latch elements (32, 33) are spring-biased towards the engaged position.

5. Lock mechanism as claimed in any of claims 1 to 4, c h a r a c t e r i z e d in that one latch element (32) forms part of a frame (320) and the other element forms part of a T-piece (330) the cross beam of which is located inside the frame.

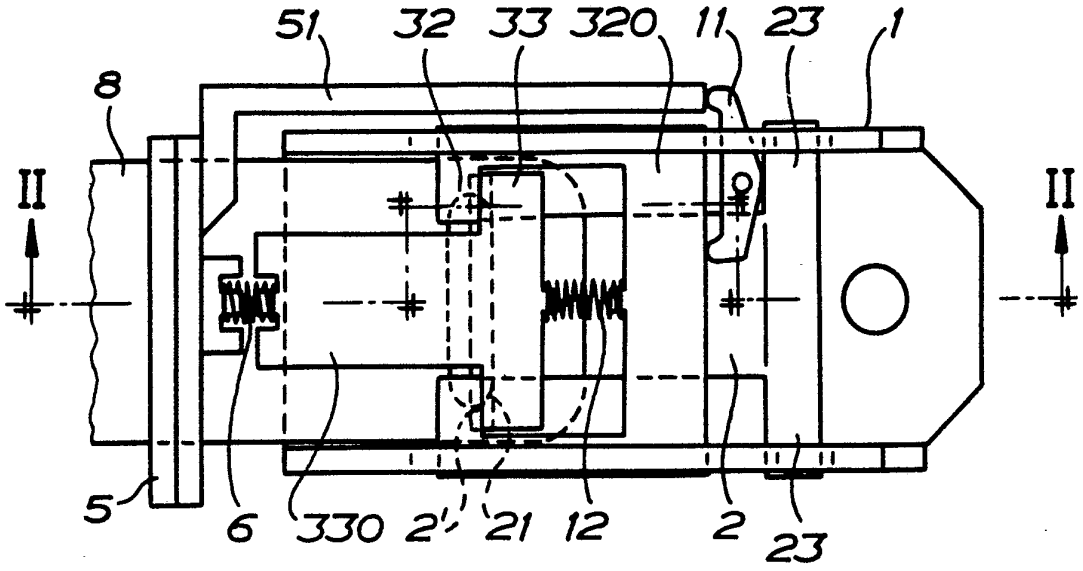
51
32
33
320
11
23
1
8
II
II
5
6
330
2'
21
12
2
23

FIG. 1

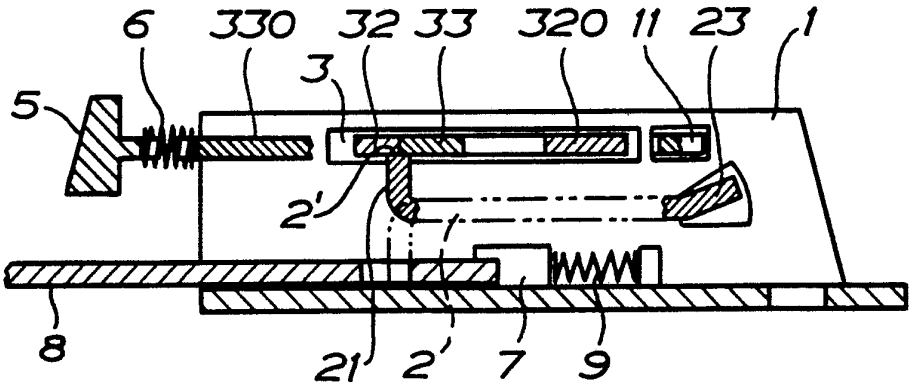
6
330
32
33
320
11
23
1
3
5
2'
8
21
2'
7
9

FIG. 2

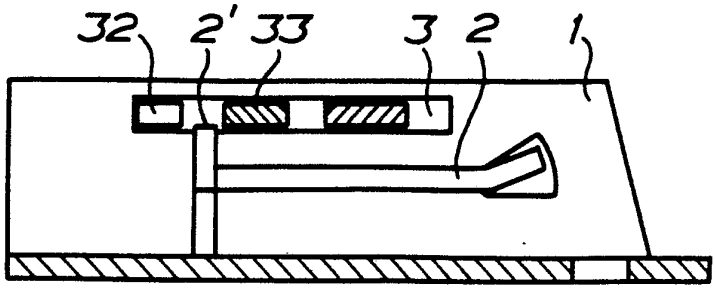

FIG. 3

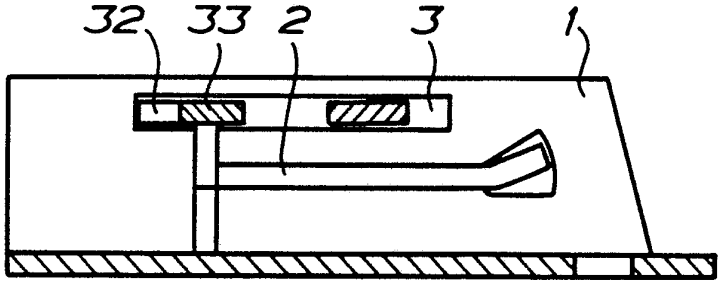

FIG. 4

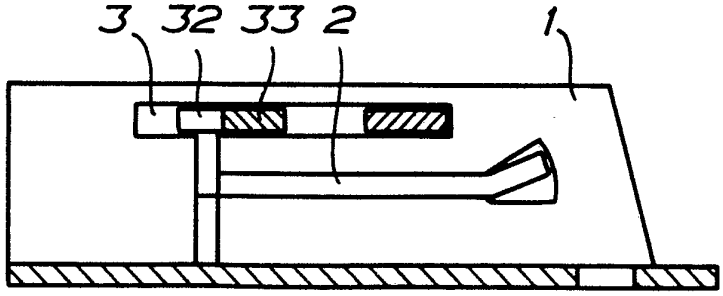

FIG. 5

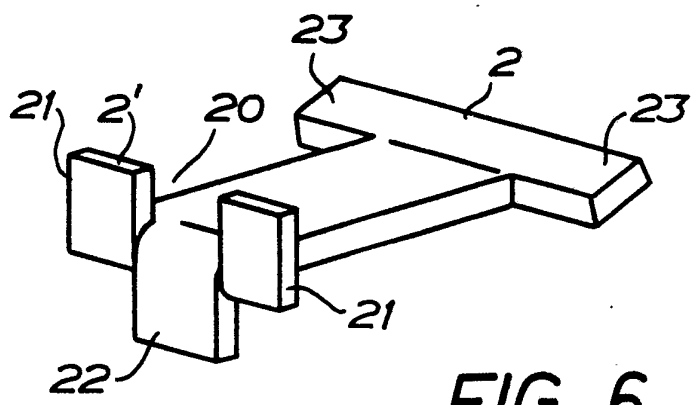

FIG. 6

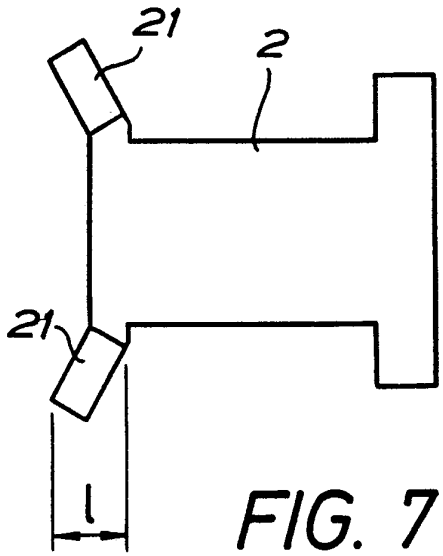

FIG. 7

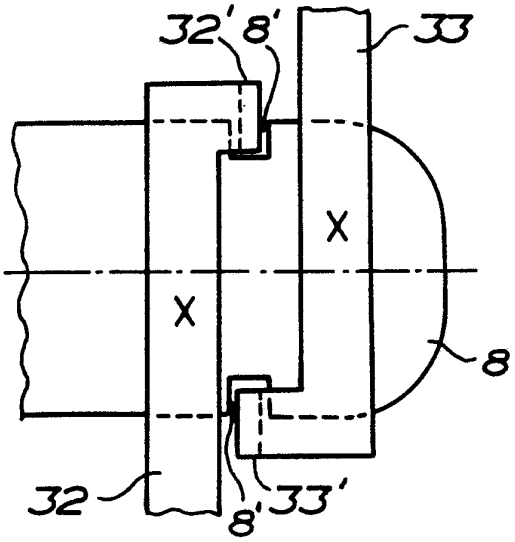

FIG. 8

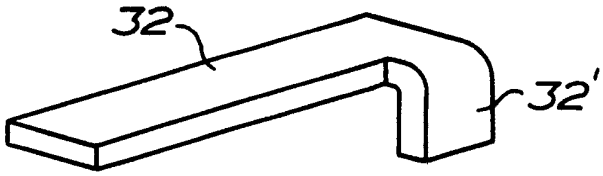

FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE86/00347

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC 4

A 44 B 11/25

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC 4	A 44 B 11/25, /00, /06, /14, /20
US Cl	24: 230, 160

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

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IV. CERTIFICATION

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