Sept. 24, 1957 P. M. BAYON 2,807,067

CLOSING DEVICE FOR BELTS

Filed Dec. 9, 1955 3 Sheets-Sheet 1

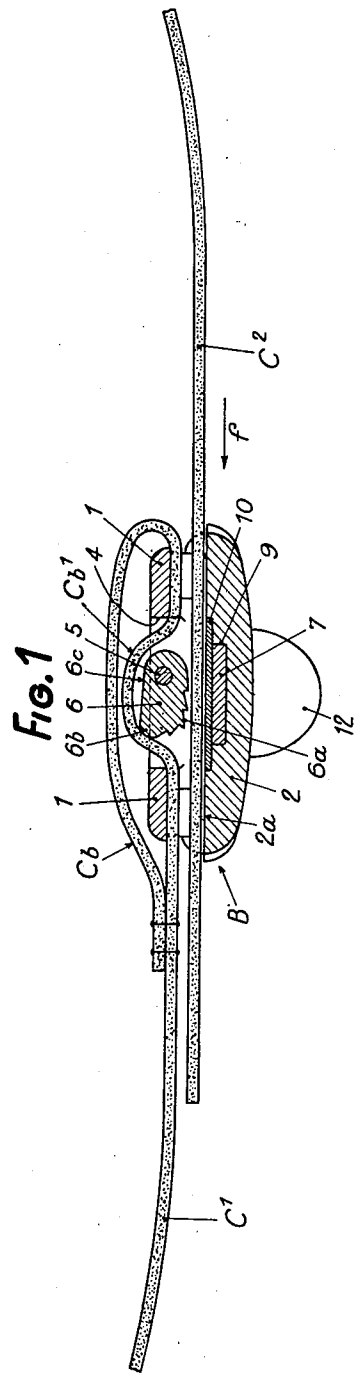


FIG. 1

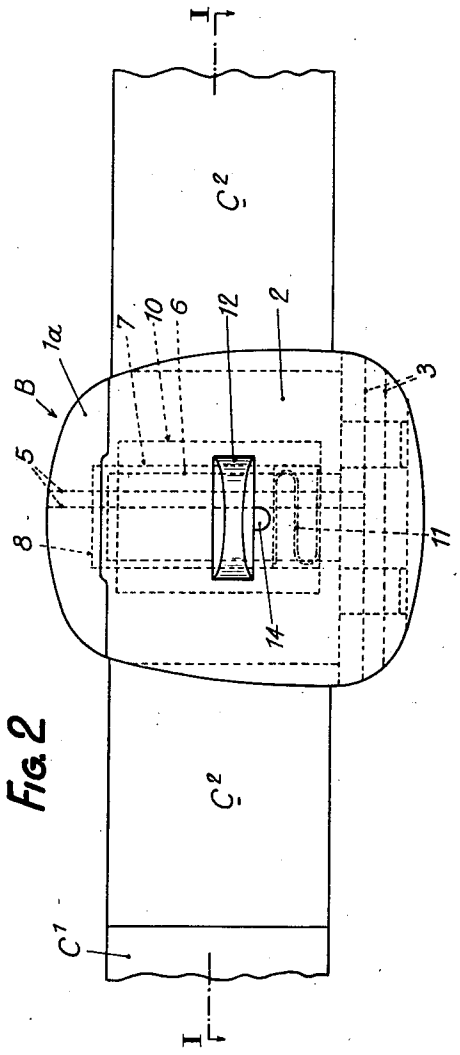


FIG. 2

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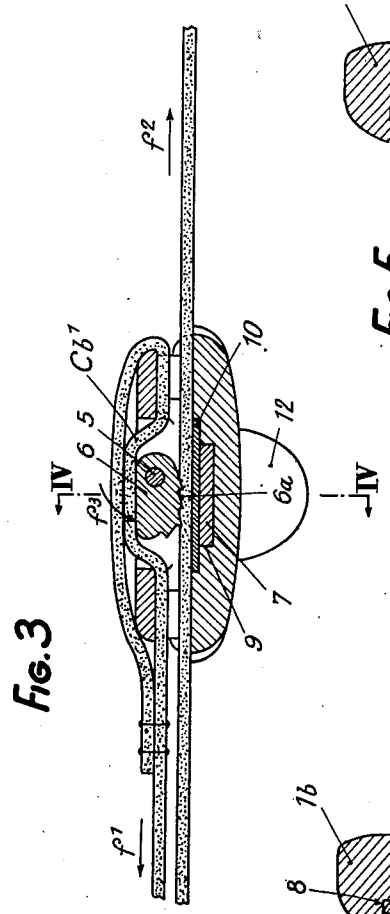


FIG. 3

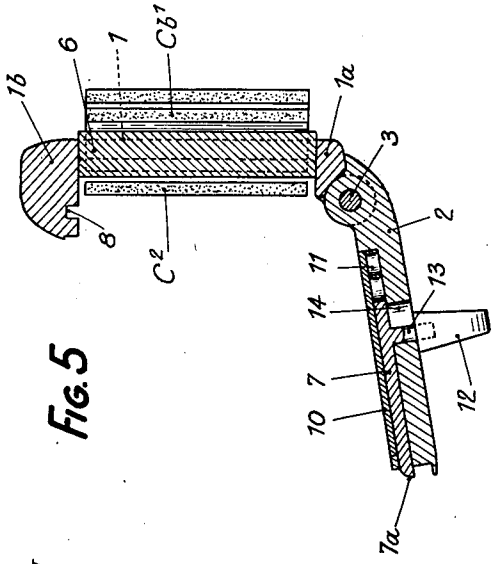


FIG. 5

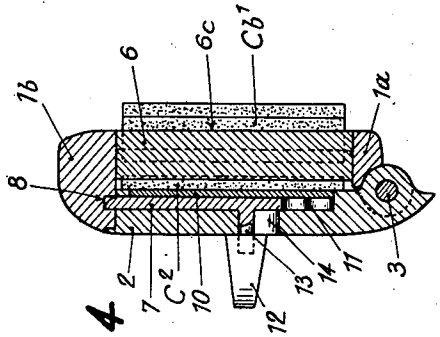


FIG. 4

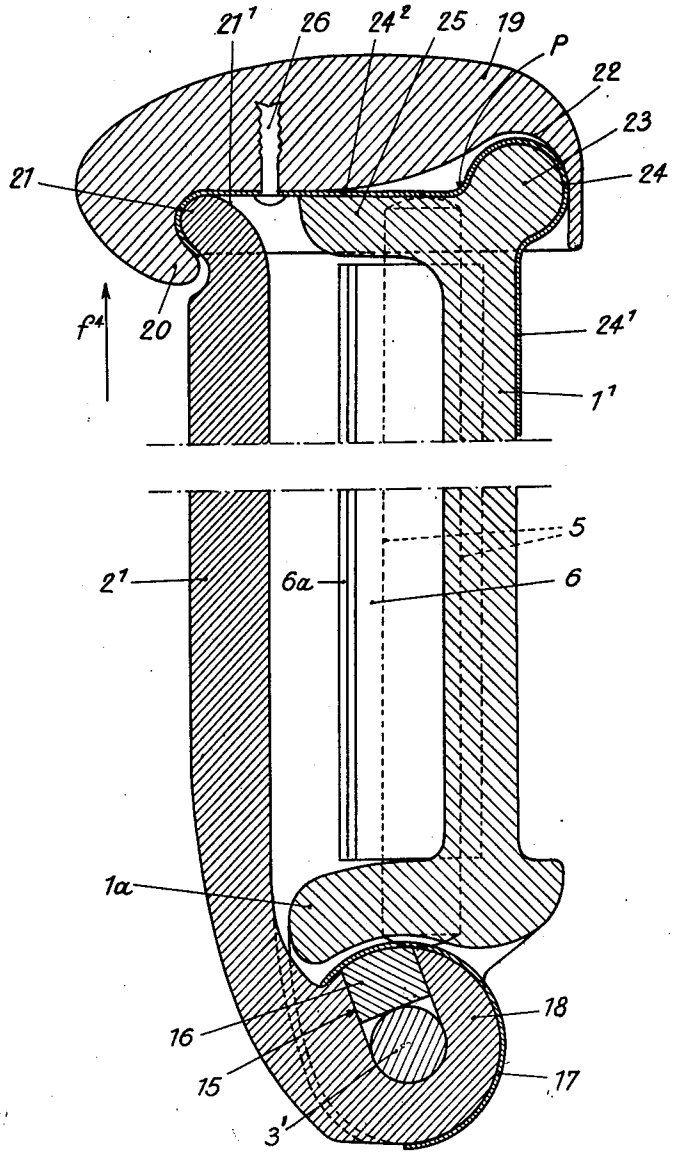
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CLOSING DEVICE FOR BELTS

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FIG. 6



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CLOSING DEVICE FOR BELTS

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Application December 9, 1955, Serial No. 552,158
Claims priority, application France October 19, 1955
7 Claims. (Cl. 24—170)

The invention relates to closing devices for belts, particularly but not exclusively for security belts by which the passengers of automobiles, airplanes and other vehicles fasten themselves to their seats, of the kind comprising a buckle in which the free end portion of the belt is locked against a plate, by a pivotally mounted cam provided with a toothing which is eccentrical with respect to the pivot of the cam.

In the devices of this kind, as presently used particularly on airplanes, the said cam is submitted to the action of a torsional spring which tends constantly to engage said cam partially with the free end portion of the belt, this engagement being increased under the effect of the traction exerted upon said free end portion when the passenger tends to be projected forward, and the cam is provided with an unlocking lever by which said cam can be moved against the action of said spring, in view of the introduction of the free end portion of the belt into the buckle and its subsequent withdrawal therefrom, whilst the other end of the belt is attached to the plate of the buckle, outside the pivoting area of the cam.

The present invention relates to improvements in closing devices of this kind. Due to these improvements, the spring acting upon the cam and the unlocking lever thereof can be dispensed with, thus avoiding the drawbacks of the known closing devices, in which the control of the unlocking lever requires a considerable effort when the spring is sufficiently strong, or else the spring is fragile when it is designed so as to provide for an easy control of the unlocking lever. The improved closing device according to the invention has the further advantage that the complete and instantaneous disengagement of the end portion of the belt requires the use of only one hand and even of only one finger.

According to the invention, the buckle comprises a rear wall formed with an opening, a cam pivotally mounted in said opening and having a toothing on its front, and a plate mounted in front of said rear wall, the toothing of said cam being directed towards the inner surface of said plate, the fixed end portion of the belt engaging said rear wall on both sides of said opening and forming a loose loop the inner side of which passes round the back of said cam, and the free end portion of the belt being engaged between said cam and said plate, in such manner that when said loop formed by the fixed end portion of the belt is tensioned by the forward projection of the body of the user, the pressure exerted by the inner side of said loop upon the back of said cam causes said cam to be swung forward so that the toothing of said cam locks said free end portion of the belt against said plate; said plate being movably connected to said rear wall of the buckle, so that said plate can assume an inactive position in which said free end portion of the belt is disengaged, and an active position in which said plate is adapted to cooperate with said cam for locking said free end portion of the belt, and means being provided for disengageably locking said plate in said active position.

According to an embodiment, to which the invention is however not limited, the plate is hingedly connected at its lower part to the rear wall of the buckle and is normally held in its active position by a vertically movable spring actuated bolt which engages a recess formed in an upper flange of said rear wall, said bolt being provided with a finger piece by which it can be disengaged from said recess.

Thus, when a downward pressure is exerted upon said finger piece, the bolt is disengaged and the plate swings to the front and downwards, so that the free end portion of the belt is automatically completely disengaged from the buckle. On the contrary, in the known device described at the beginning of this specification, it was necessary to use one hand for acting upon the unlocking lever of the cam, and the other hand for withdrawing the end of the belt from the buckle.

In the aforesaid embodiment of the invention, the axis of the hinge connection between the plate and the rear wall of the buckle is parallel to the longitudinal edge of the belt, so that the plate, when it is swung away from the rear wall of the buckle, is brought completely out of the way of the belt, sideways with respect to the longitudinal extension of said belt, so that the latter is entirely free to drop out of the buckle, and it is also possible to replace the belt directly into the buckle and to close the plate thereon, with a single hand, while in the known devices the belt had to be threaded lengthwise in and out of the buckle.

In another embodiment of the invention, in which the plate is again hingedly connected at its lower part to the rear wall of the buckle, the plate is normally held in its active position by a cap which is resiliently hinged at its rear portion to the top of the rear wall of the buckle and is hooked at its front portion on the upper edge of the plate.

The appended drawings represent by way of example the two above-mentioned embodiments of the invention.

Fig. 1 is a sectional plan view, on line I—I of Fig. 2, of the first embodiment, the free end portion of the belt being not yet locked by the cam.

Fig. 2 is a front elevation of said first embodiment.

Fig. 3 is a sectional plan view similar to that of Fig. 1, but showing the free end portion of the belt locked by the cam.

Fig. 4 is a vertical cross section of the buckle, on line IV—IV of Fig. 3.

Fig. 5 is a cross section similar to that of Fig. 4, but in which the free end portion of the belt is unlocked, the plate of the buckle being swung open.

Fig. 6 is a cross section of the buckle according to the second embodiment.

On the drawing and more particularly on Figs. 1 and 2, B designates the buckle as a whole, C^1 the fixed end portion of the belt and C^2 the free end portion of the belt. The connection of these two belt portions to the airplane or other vehicle is not shown.

According to Figs. 1 to 5, the buckle B comprises a rear wall **1** and at the front thereof a plate **2** whose inner surface is flat. The plate **2** is spaced from the rear wall **1** and is hingedly connected to a lower flange **1***a* thereof, so as to be able to swing about the horizontal pin **3**. The rear wall **1** is formed with an opening **4** in which a cam **6** is mounted so as to be able to swing freely about the vertical pin **5**. The cam **6** has a toothing **6***a* which is eccentrical with respect to the pin **5** and the portion of said cam which is located at the left of the pin **5** on Fig. 1 is longer than the opposite portion, so as to form a kind of lever **6***b*. The fixed end portion C^1 is attached to the rear wall **1** of the buckle B, on both sides of the opening **4**, by means of a closed loop *Cb* which

is loose when the belt is not tensioned (as shown on Fig. 1) and whose inner side Cb^1 passes round the back **6***c* of the cam **6**.

The plate **2** is normally held in its active position (shown on Figs. 1 to 4) by a bolt **7** the upper part of which engages in a recess **8** formed in an upper flange **1***b* of the rear wall **1**. The bolt **7** is vertically slidable in a recess **9** formed in the plate **2** and closed by a cover **10**, the downward sliding of the bolt **7** taking place against the action of a spring **11** (Figs. 2, 4 and 5) which tends to maintain it engaged in the recess **8**. In order to enable the bolt **7** to be pushed downwards and disengaged from the recess **8**, it is provided with a finger piece **12** which projects at the front of the plate **2** and is connected to the bolt **7** by a rod **13** which slides in a vertical slot **14** formed in the plate **2**. In order to facilitate the engagement of the bolt **7** into the recess **8**, the upper edge of the bolt **7** is rounded or chamfered at **7***a* (Fig. 5).

Referring to Fig. 1, it will be understood that when the free end portion C^2 of the belt is inserted into the buckle B in the direction indicated by the arrow *f*, said free end portion rubs slightly on the toothing **6***a* of the cam, so that the latter takes the position shown in Fig. 1, its back **6***c* being slightly inclined and protruding backward through the opening **4**. As long as the belt is not tensioned, the user can adjust it at will, since there is no spring urging the cam **6** against the belt portion C^2, which can thus be pushed more or less through the buckle. The user can also easily unfasten the belt completely, without opening the plate **2**, by sliding his thumb behind the rear wall **1** and exerting a pressure on the right hand portion of the cam **6** as viewed in Fig. 1, so as to displace said cam slightly clockwise as viewed in said Fig. 1, thus disengaging the toothing **6***a* completely from the belt portion C^2, which can then be withdrawn from the buckle.

Once the passenger has placed the free end portion C^2 of the belt in the buckle B, tightening the belt more or less, at his convenience, he is solidly fastened to his seat, for when for any reason his body tends to be projected forward, the belt cannot unfasten itself because its two end portions are tensioned in opposite directions as shown by arrows f^1 and f^2 on Fig. 3, and consequently the loop *Cb* formed by the belt ceases to be loose, its inner side Cb^1 straightens and pushes the cam **6** in the direction of the arrow f^3, so that the toothing **6***a* of said cam bites into the belt portion C^2 and locks it strongly against the front plate **2** (Fig. 3). The eccentricity of the toothing **6***a* has of course been suitably designed so as to produce the aforesaid effect.

When the passenger subsequently wants to unfasten his belt, he has only to depress the finger piece **12**, thus disengaging the bolt **7** from the recess **8**, so that the front plate **2** swings downward (see Fig. 5) and thus disengages the free end portion C^2 of the belt.

As the pin **3** is parallel to the longitudinal extension of the belt and runs along one side edge thereof, the plate **2**, when swung down as shown on Fig. 5, is completely out of the way of the belt, which can thus freely drop out of the buckle. Also, when the plate **2** is in the open position shown on Fig. 5, the belt can simply be inserted into the buckle and the plate **2** can be closed thereon, with a single hand. This simple way of unfastening and fastening the device according to the invention constitutes a marked advantage with respect to known constructions in which the belt must be threaded lengthwise in and out of the buckle.

The second embodiment, shown on Fig. 6, where the same reference numerals primed designate the same elements as above, differs from the embodiment shown on Figs. 1 to 5 only by the way of mounting and locking the front plate.

In this second embodiment, the front plate 2^1 is again hingedly connected to the rear wall 1^1 of the buckle B by a hinge pin **3'** placed at the lower part thereof, but said front plate is engaged on the pin **3'** by the walls of

a groove **15** into which a key **16** is then inserted, the whole being held together by a spring clip **17** which is clasped around the hinge shoulder **18** of the plate 2^1.

On the other hand, the front plate 2^1 is locked in its active position by a cap **19** which is resiliently hinged to the top of the rear wall 1^1 and is hooked by its front edge **20** on the upper edge **21** of the plate 2^1, the edges **20** and **21** being conveniently rounded off. The resilient hinge connection of the cap **19** with the rear wall 1^1 can be made by any convenient means. In the shown example, the cap **19** is formed with a recess **22** by the walls of which it is engaged on a cylindrical swelling **23** extending along the upper rear edge of the wall 1^1. On the swelling **23** is clamped, by its own resiliency, a leaf spring **24** conforming substantially to the shape of said swelling **23**, of its depending wall 1^1 and of flange **25** described hereafter. Said spring has two extensions: an extension 24^1 applied against the back of the wall 1^1 and an extension 24^2 resting on a flange **25** of the wall 1^1 and secured to the cap **19**, for example by rivets **26**.

In order to open the buckle B, it suffices to raise the hook **20** in the direction of the arrow f^4, whereby the spring portion 24^2 is bent about the point P and the front plate 2^1 swings downward due to its own weight, about its hinge pin **3**. In order to close the plate 2^1 again, it suffices to swing it upward until the rounded portion 21^1 of its upper edge **21** raises the hook **20** and said edge **21** snaps in under the latter.

It will be understood that the invention is not limited to the embodiments which have been described and shown, but covers also any modifications and other embodiments thereof, within the scope of the appended claims.

I claim:

1. A closing device for belts including a free belt end portion, a fixed belt end portion, a buckle attached to said fixed belt end portion and means in said buckle for releasably locking said free belt end portion in said buckle, said buckle comprising a rear wall formed with an opening, a cam pivotally mounted in said rear wall so as to be able to swing about an axis extending across said opening, a plate movably connected to said rear wall in such manner that said plate can assume an active position in which it is placed in spaced relation in front of said rear wall and an inactive position in which said plate is removed from the front of said rear wall, and means for disengageably locking said plate in said active position, said cam having a front and a back, said front of the cam being formed with a toothing which is eccentric with respect to the pivoting axis of said cam, said fixed belt end portion forming a loose loop engaging said rear wall on both sides of said opening, said loop having an inner side passing round the back of said cam, in such manner that when said loop is tensioned, said free belt end portion being placed between said rear wall and said plate, the pressure exerted by said inner side of the loop against the back of said cam causes said cam to be swung forward so that the toothing of said cam locks said free belt end portion against said plate.

2. A closing device for belts including a free belt end portion, a fixed belt end portion, a buckle attached to said fixed belt end portion and means in said buckle for releasably locking said free belt end portion in said buckle, said buckle comprising a rear wall formed with an opening, a cam pivotally mounted in said rear wall so as to be able to swing about an axis extending across said opening, a plate movably mounted on said rear wall by a hinge whose axis extends along one edge of said rear wall, perpendicularly to the pivoting axis of said cam, in such manner that said plate can assume an active position in which it is placed in spaced relation in front of said rear wall and an inactive position in which said plate is removed from the said position in front of said rear wall, and means for disengageably locking said plate in said active position, said cam having a front and

a back, said front of the cam being formed with a toothing which is eccentric with respect to the pivoting axis of said cam, said fixed belt end portion forming a loose loop engaging said rear wall on both sides of said opening, said loop having an inner side passing round the back of said cam, in such manner that when said loop is tensioned, said free belt end portion being placed between said rear wall and said plate, the pressure exerted by said inner side of the loop against the back of said cam causes said cam to be swung forward so that the toothing of said cam locks said free belt end portion against said plate.

3. A closing device as claimed in claim 2, wherein said means for disengageably locking said plate in its active position comprise a spring actuated bolt slidably mounted in said plate and adapted to engage a recess formed in a flange of said rear wall, and a finger piece connected to said bolt, for disengaging said bolt from said recess.

4. A closing device for belts including a free belt end portion, a fixed belt end portion, a buckle attached to said fixed belt end portion and means in said buckle for releasably locking said free belt end portion in said buckle, said buckle comprising a rear wall formed with an opening, a cam pivotally mounted in said rear wall so as to be able to swing about an axis extending across said opening, a plate movably mounted on said rear wall by a hinge whose axis extends along the lower edge of said rear wall, perpendicularly to the pivoting axis of said cam, in such manner that said plate can assume an active position in which it is placed in spaced relation in front of said rear wall and an inactive position in which said plate is removed from the said position in front of said rear wall, and means for disengageably locking said plate in said active position, said cam having a front and a back, said front of the cam being formed with a toothing which is eccentric with respect to the pivoting axis of said cam, said fixed belt end portion forming a loose loop engaging said rear wall on both sides of said opening, said loop having an inner side passing round the back of

said cam, in such manner that when said loop is tensioned, said free belt end portion being placed between said rear wall and said plate, the pressure exerted by said inner side of the loop against the back of said cam causes said cam to be swung forward so that the toothing of said cam locks said free belt end portion against said plate.

5. A closing device as claimed in claim 4, wherein said means for disengageably locking said plate in its active position comprise a cap resiliently hinged at its rear portion to the top of said rear wall, the front portion of said cap forming a hook adapted to engage the upper edge of said plate.

6. A closing device as claimed in claim 4, wherein said hinge comprises a hinge shoulder extending along the lower edge of said plate and formed with a longitudinal groove, a hinge pin extending along the lower edge of said rear wall, said groove being engaged on said pin, a key placed in said groove after said pin, and a spring clip clasped around said hinge shoulder and holding said key and pin in said groove.

7. A closing device as claimed in claim 4, wherein said means for disengageably locking said plate in its active position comprise a cap and resilient hinge means connecting said cap to the top of said rear wall, the front portion of said cap forming a hook adapted to engage the upper edge of said plate, and said resilient hinge means comprising a cylindrical swelling extending along the upper edge of said rear wall and a leaf spring clamped on said swelling, said leaf spring having an extension applied against the back of said rear wall and another extension secured to said cap and resting on an upper flange of said rear wall.

References Cited in the file of this patent

UNITED STATES PATENTS

381,265	Martens	Apr. 17, 1888
974,637	Borup	Nov. 1, 1910
1,243,108	Richardson	Oct. 16, 1917