DEVICE FOR THE RETRACTING OF STRAPS SUCH AS SAFETY BELTS USED IN AUTOMOBILES

INVENTORS
KURT CZIPTSCHIRSCH
GERT MAHLER

BY

ATTORNEYS
DEVICE FOR THE RETRACTING OF STRAPS SUCH AS SAFETY BELTS USED IN AUTOMOBILES

Filed March 4, 1968

INVENTORS
KURT CZIPTSCHIRSCH
GERT MAHLER

ATTORNEYS
DEVICE FOR THE RETRACTING OF STRAPS SUCH AS SAFETY BELTS USED IN AUTOMOBILES

Kurt Czipschirsch, Wuppertal-Barmen, and Gert Mahler, Radevormwald, Germany, assignors to GEBR. Happich G.m.b.H., Wuppertal-Elberfeld, Germany, a corporation of Germany

Filed Mar. 4, 1968, Ser. No. 709,972
Claims priority, application Germany, July 25, 1967, H 63,382; Oct. 25, 1967, H 60,598

Int. Cl. B62B 72/48
U.S. Cl. 242—107.11

ABSTRACT OF THE DISCLOSURE

A strap retractor comprising a rectangular loop of resilient material, on the interior flank of one longitudinal side of which is located a depression for receiving a strap holding roller, and on the interior flank of the opposite side is a slotted pin for receiving the end of a torsion spring; a roller having a slotted pin extending thereinto; a torsion spring fitted within the roller and having an end which fits into the slotted pin within the roller; to insert the roller in the loop, the aforementioned opposite longitudinal sides of the loop are forced apart, then the roller end having the free exposed end of the torsion spring adjacent thereto is mounted by having the receiving pin on the one longitudinal side receive the free end of the spring and by having the receiving depression on the other longitudinal side receive the other roller end; the resilient sides are released, supporting the roller therebetween; the roller is slotted to hold a strap to be retracted; the torsion spring is placed under tension to rotate the roller and retract the strap.

The present invention relates to a device for the retracting of straps such as safety belts used in automobiles. It comprises a frame-like housing, the transverse members of which serve as supporting and/or guide elements for the belt, and comprises a roller, which is rotatably supported between the longitudinal members of the housing. The roller is under spring tension and receives the belt.

In one known strap retractor of the aforementioned type, the roller is rotatably supported on a cylindrical shaft which extends transversely through the frame of the housing and is mounted at its ends in recesses in the longitudinal members of the housing. One end of the shaft is fixedly connected with the corresponding longitudinal member, so that the shaft is held against rotation in the frame of the housing. A coil spring is positioned in the roller and passes through an opening in its shell. The spring has the shaft passing through it. The spring is engaged at one end in an axial slot in the shaft, while its other end is attached to the cylindrical wall of the roller.

In this known belt retractor, a total of three parts, namely the housing frame, the roller and the shaft, are formed as plastic injection moldings. The molds required for this purpose result in a high cost of production due to their complicated structure. Furthermore, considerable difficulties arise in assembling the individual parts to form a complete belt retractor. At the time of the insertion of the roller, a mistake can be made, since it is important how the spring is arranged in the roller, with respect to the direction of rotation of the latter. Also, the spring must be inserted in such a manner that upon rotation of the roller, the end of the spring attached to the cylindrical wall of the roller does not come loose. Furthermore, the shaft, despite the presence of two holes of equal size in the ends of the roller, can be introduced into the roller only from that end which does not have it radially inwardly extending end of the spring which is within the axial slot in the shaft. Finally, special difficulties result from the fact that the end of the shaft which is to be securely connected with a longitudinal member of the frame can be inserted into the corresponding recess in the longitudinal member only at one precisely established position.

The object of the present invention is to provide a simple strap retracting device which is suitable for mass production and which avoids the aforementioned disadvantages of known belt retractors.

This object is achieved in the present invention by having two pins extending into the roller to serve as the support for a torsion spring. One of the pins is integrally attached to the housing and the other is integrally attached to the roller. Because of this, the use of a separate shaft is no longer necessary. In addition, the number of individual parts of a device employing the invention is reduced to three, as compared with known belt retractors, and only two of these parts have to be produced by injection molding. There is a consequent saving of material and manufacturing expense, and the time required for assembly of the device is reduced.

A simple support for the roller is obtained with the present invention wherein each of the longitudinal members of the housing has at an opposed place on the inner flank with a cylindrically defined recess which serves as a support for one of the ends of the roller.

Another feature of the invention resides in the frame-shaped housing being resilient and in the distance between its two longitudinal members being smaller than the length of the roller. By manually pressing the longitudinal members apart, the distance between them is increased so that the roller can be inserted between them in the housing. After the longitudinal members are released and the housing has sprung back into its position of rest, the roller is held against axial movement, while remaining rotatable between the recesses in the longitudinal members. The roller cannot come out of engagement with the housing by itself.

Further, in the apparatus in accordance with the invention, a pin formed on one longitudinal member of the housing has an axial slot to receive one end of the torsion spring and, a pin formed on the roller has an axial slot to receive the other end of the torsion spring. The identical formation of the two pins serving as the support for the spring has the advantage that the bends on the two ends of the spring can be also made identical to each other, so that it is immaterial which end of the spring comes into engagement with which pin.

Additionally, the roller may be provided at one end with a pivot pin which is formed thereon and integral therewith. The pin extends into an opening in the longitudinal member and is provided with recesses, such as slots, which permit the insertion of tools. It may also be advantageous to provide the pivot pin guided rotatably in the opening, to be provided with surfaces which permit the use of tools.

One embodiment of the subject matter of the invention is shown by way of example in the drawings, in which:

FIG. 1 shows an apparatus in accordance with the invention with retracted belt, stressed in tension, seen in perspective;

FIG. 2 shows the apparatus without belt, in plan view;

FIG. 3 shows the frame-shaped housing in perspective;

FIG. 4 shows the frame-shaped housing in section along the line IV—IV of FIG. 3;

FIG. 5 shows the roller in perspective;

FIG. 6 shows the coil spring in perspective;

FIG. 7 is an end view of the coil spring; and

FIG. 8 is a view of the other end side of the roller of FIG. 5.

Referring to the figures, the device 2 for retracting a belt 1 comprises a frame-shaped housing 3, a roller 14 and a coil spring 22.

The frame-shaped housing 3 is made of resilient plastic and contains two longitudinal members 4 and 5 which are connected to each other by two transverse arms 6. Parallel to and spaced away from each transverse arm 6 are two fingers 7 extending inward from the longitudinal members 4 and 5. Fingers 7 form, along with each transverse arm 6, a slot 8 for the guiding of belt 1. Belt 1 is inserted between the free ends of the two fingers 7 into the slot 8. For supporting roller 14 in housing 3, a cylindrical recess 9 having circular hole 9a therein is provided in the longitudinal member 4, while an annular groove 10 is provided in the longitudinal member 5. The groove 10 surrounds the reinforced bottom 11 of the pin 12 that extends from the longitudinal member 5 into the space surrounded by the housing 3. Pin 12 has an axial slot 13.

Roller 14 is a hollow cylinder with a closed cylindrical wall 15 extending around half its circumference and two arcurate roof-shaped wall parts 16 extending in from the ends of the roller and having their free ends facing each other. Slot 17 formed between wall parts 16 and cylindrical wall 15 receives belt 1. Roller 14 has an opening 18 at one end, while at its other end it has a closed end wall 19. Integral with end wall 19 is a pin 20 which extends into the cavity of the roller 14 and is provided with an axial slot 21. End wall 19 has an outward facing central pivot pin 25 which is formed integrally thereon and which extends into the opening 9a of the longitudinal member 4 and is rotatable therein. Pivot pin 25 is provided with surfaces or depressions, for instance, slots 26, into which a tool such as a screwdriver can be engaged from the outside for its actuation.

The coil spring 22 is stressed in torsion, has a left-hand pitch and is wound with an initial tension. Its two ends 23 and 24 are bent radially inward.

When roller 14 and coil spring 22 are installed in housing 3, bent end 23 of coil spring 22 is inserted through roller open end 18 into roller 14 in such a manner that spring end 23 enters axial slot 21 of pin 20 and outward facing spring end 24 is flush with the open end of the roller 14. While retaining this relative position of roller 14 and coil spring 22, the combined unit is pushed onto pin 12 of housing 3, the spring end 24 being received in the axial slot 13. Roller 14 is pushed over the pin 12 until a part of the open end of the roller engages the groove 10 of longitudinal member 5. Thereupon the two longitudinal members 4 and 5, which, in the absence of external forces, are spaced apart a distance a, are pressed apart by hand to such an extent that the pivot pin 25 on the roller 14 can be inserted in opening 9a of longitudinal member 4, while the open end of roller 14 also completely enters groove 10. When roller 14 is engaged in its bearing positions, longitudinal members 4 and 5 and is permitted to spring back into their original position. Since the restored distance a between the two longitudinal members 4 and 5 is smaller than the length b of the roller 14, the roller 14 which is locked against axial movement is prevented from accidently becoming disengaged from housing 3.

To operate device 2, roller 14 is turned several times in the direction indicated by the arrow X relative to housing 3, whereby coil spring 22, one end of which is connected with housing 3 and the other end with roller 14, is tensioned. To rotate roller 14 a screwdriver may be introduced into slots 26 of pivot pin 25 and spring 22 is tensioned by turning the screwdriver. Thereafter, belt 1 is inserted into slot 17 of roller 14 and into slots 8 of housing 3. As shown in FIG. 1, belt 1 is stressed in tension in directions Y and Z, the tensile forces being at least as great as the torque of the tensioned coil spring 22. When no outward pulling forces are exerted on the belt 1, coil spring 22 moves back into its original position and thus turns the roller 14 opposite the direction indicated by the arrow X. Upon this rotation, belt 1, guided by slot 17, is carried along by roller 14 so that belt 1 is retracted.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, the invention is to be limited, not by the specific disclosure herein.

We claim:

1. Device for the retracting of belts such as safety belts used in automobiles, comprising a frame-shaped housing (3) having longitudinal members (4, 5), and transverse members (6) transverse to said longitudinal members for supporting and guiding the belt; and comprising a roller (14) rotatably supported between said longitudinal members of said housing; said roller being under spring tension for taking up the belt; said device having two pins (12, 20) thereon, for supporting and fastening a torsion spring (22) thereon, extending into the roller (14); said torsion spring connected between said pins; one of said pins (12) is integral with said housing (3), while the other said pin (20) is integral with said roller (14).

2. Device according to claim 1, wherein said longitudinal members (4, 5) of said housing (3) are each provided on opposite points of their inner flanks with a cylindrical depression each serving as support for one of the ends of said roller (14).

3. Device according to claim 1, wherein said frame-shaped housing (3) is comprised of resilient material and the distance (a) between its two said longitudinal members (4, 5) is less than the length (b) of said roller (14).

4. Device according to claim 1, wherein said pin (12) on said one longitudinal member (5) of said housing (3) has an axial slot (13) to receive the one end of said torsion spring (22).

5. Device according to claim 1, wherein said pin (20) formed on said roller (14) has an axial slot (21) to receive the other end of said torsion spring (22).

6. Device according to claim 1, wherein said roller (14) has one end wall (19) with a bearing pin (25) integrally formed thereon, which pin extends outward into an opening (9a) in said longitudinal member (4); said pin (25) being provided with depressions (26) which permit the use of tools thereon.

7. Device according to claim 6, wherein said bearing pin (25) which is rotatably supported in said opening (9a) is provided with surfaces which permit the use of tools.

References Cited

UNITED STATES PATENTS

452,799 5/1891 Matteson .......... 242—107.11
3,319,907 5/1967 McNamnich et al. ... 242—107.11

STANLEY N. GILREATH, Primary Examiner
W. H. SCHROEDER, Assistant Examiner