BODY RESTRAINING MEANS

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ABSTRACT
A body restraining means in the nature of a safety belt having a novel and efficient belt locking means. A safety belt comprising a flexible strip of material has a tongue at one end and a safety buckle at the other end. The safety buckle is formed from a frame having converging, confronting plate members and rollers which are resiliently secured to the surfaces of the plate members. The arrangement is such that the tongue, when inserted between the rollers of the buckle, is frictionally secured by the rollers and forces which would withdraw the tongue from between the rollers in the direction normal to the roller axes, act to tighten the grip of the rollers on the tongue and prevent removal thereof.

8 Claims, 9 Drawing Figures
BODY RESTRANNG MEANS

CROSS-REFERENCE TO PRIOR APPLICATION

This application is a continuation-in-part of copending application Ser. No. 882,569 filed on May 16, 1969, now U.S. Pat. No. 3,653,708, by the inventor of the present invention and entitled "Gripping Device."

BACKGROUND OF THE INVENTION

The present invention relates generally to a body restraining means and more specifically to a safety belt having a novel buckle. Safety belts are used extensively in vehicles such as automobiles, trucks and planes. While providing for secure restraining of the body of a seat occupant, the belt, to be commercially acceptable, must also be readily releasable and have as simple a construction as possible. In addition to use as seat belts, safety belts are also used by workers, such as telephone linemen, window washers, etc., who must climb to extreme heights in order to perform their duties. Because of the risk that these workers are exposed to, it is of great importance that the safety belts be flawless in their performance.

In my aforesaid co-pending application, there is disclosed a gripping device and I have found that by arranging such a gripping device, in the nature of a buckle for a safety belt, a belt is provided which is extremely safe, especially in view of the fact that forces that would normally effect loosening of the belt, or slippage of the tongue of the belt from a buckle, instead, in my arrangement, exert a tightening effect on the tongue of the belt and assures a safe or secure grasp on the belt tongue.

SUMMARY OF THE INVENTION

The body restraining means of the present invention comprises a strip of flexible material having a tongue at one end thereof and a specific safety buckle at its other end. The safety buckle comprises a pair of opposed plates having converging roller surfaces and a pair of resiliently secured rollers, one for each roller surface, the resilient means used to secure a roller to a roller surface, biasing the rollers in confronting parallel relationship to each other, and providing the support for the rollers on their respective surfaces. The rollers, upon insertion of the tongue of the belt therebetween, frictionally secure the tongue and any movement of the tongue, so as to remove it from its securement between the rollers in the direction normal to the axes of its rollers, increases the grip of the buckle on this tongue to more securely retain the belt in closed position. In order to release the tongue from the buckle, the tongue is moved in the direction of the axes of the rollers and removed from the buckle through an opening provided therein. A releasable catch may be used to close the opening through which the tongue is removed and prevent premature removal of the tongue.

BRIEF DESCRIPTION OF THE DRAWINGS

The body restraining means of the present invention is better understood by reference to the attached drawings wherein:

FIG. 1 is a side elevational view of the device using a single pair of plate members;
FIG. 2 is a top plan view of the device illustrated in FIG. 1;
minded distance which is less than the thickness of the tongue 3. Upon insertion of the tongue 3 through the inlet 10, the tongue will contact the rollers 11 and 11' and by urging the tongue further into the buckle 4, will cause the rollers to roll along the surfaces 9 and 9' of the plates 8 and 8' until the tongue passes between the rollers. When buckling the belt, the tongue is inserted through an opening 18 provided between the side plates 8 and 8' opposite the base 7, preferably with slight forward motion, i.e.,, towards outlet 17, and urged between the confronting rollers 11 and 11'. Or, as is conventionally done, the tongue may be inserted through the inlet 10 and the resilient means 12 and 12' provide frictional engagement of the rollers on the tongue. The belt may be easily adjusted to the size of the user, as the rollers, while engaging more tightly the tongue if the tongue is moved in the direction of the convergence of the roller surfaces 8 and 8' and inlet 10 to provide a secure and safe grasping of the strip 2 therebetween, will permit easy movement of the tongue towards the outlet 17 and thus adjustment and tightening of the belt.

In order to remove the tongue 3 from the grasp of the rollers 11 and 11' and thus unbucket the belt, the tongue is moved in the direction of the axes of the rollers, away from the base 7 and the tongue removed from the opening 18 provided between the side of plate 8 and 8' opposite the base 7. The belt is easily buckled, adjusted, and unbucked by movement in the required directions and yet the buckle provides a very secure grip on the strip to prevent premature unbucketing or loosening of the belt.

In FIG. 5, the body restraining means is illustrated in a plan view as a vehicular seat, such as an automobile seat 19, with the belt 2 in two sections 2a and 2b. The section 2a comprises the portion of the belt having the tongue 3, while the section 2b has the buckle 4 adjacent one end, and the seat 19 is intermediate the two sections 2a and 2b. Also, as is often done with vehicular safety belts, the two sections 2a and 2b may be fastened to the floor of the vehicle or some other common support by fastening means such as bolts 20.

A further embodiment of the body restraining device of the present invention is illustrated in FIGS. 6-9 wherein a double pair of roller surfaces and double pair of rollers are provided as an added safety precaution. The safety belt 21 has a flexible strip 22 with a tongue 23 at one end and a buckle 24 adjacent the other end 25. The buckle 24 has a pair of confronting plates 26 and 26' which are held together by a base 27. The strip end 25, plate 26', base 27 and plate 26 are all attached together by means of bolts 28, and fastener plate 29. Each plate 26 and 26' has a first pair of confronting, converging roller surfaces 30, 30' and a second pair 31, 31' respectively. The roller surfaces 30 and 30' converge and terminate in spaced relation to each other to form an inlet 32 for the tongue 23. A second pair of confronting, converging roller surfaces 31, 31' provided, in alignment with the first pair, which terminate in a spaced relationship at a channel 33, formed between opposed ridges 34 and 34' on the respective plates 26 and 26'. An outlet 35 is provided in the buckle 4, at the end of the buckle through which the tongue 23 of the strip 22 may extend. Each roller surface, 30, 30', 31 and 31' has a respective roller 36, 36', 37 and 37' and resilient means 38, 38', 39 and 39' to secure each of the rollers on the respective roller surface, providing support for the rollers and biasing them in opposed, paired, parallel relationship.

When the tongue 23 of strip 22 is inserted through the opening 40, the tongue is urged through the two pairs of confronting rollers, 36, 36' and 37, 37' and both pairs of rollers will grasp the tongue. Or, the tongue may be inserted through the inlet 36, so that the tongue contacts the first pair of rollers 36 and 36' and further urging will force the rollers 36 and 36' to roll along surfaces 30 and 30' until the rollers are spaced apart sufficiently to allow the tongue to pass between them. Continued urging of the tongue and strip in this manner through inlet 32 will cause the tongue to pass through the channel 33 between ridges 34 and 34' and the tongue will contact the second pair of rollers 37 and 37'. The rollers 37 and 37' will then be urged apart, and the tongue 23 will pass therebetwehen and exit through the outlet 35. By providing first and second pairs or rollers, the safety margin is increased such that if one pair might, for some reason, fail, the second pair will still frictionally engage the strip 22 and prevent premature opening of belt.

The strip 22 is removed from buckle 24 by moving it in the directions of the axis of the rollers and removing the strip through an opening 40 provided between the sides of the plates 26 and 26' opposite the base member 27. As a further precaution to prevent premature removal of strip 22 from the buckle 24 through opening 40, a catch or closure means 41 is provided on the buckle as illustrated in FIG. 9. In the catch illustrated, a brace 42 is attached to plate 26 by a bolt 43 and a closure strip 44 is connected to the brace by a hinge 45, which strip is, when abutting the ends of plates 26 and 26', securely held by a latch 46. The latch 46 may be bolted, welded, or otherwise attached to plate 26' and extends therefrom to enable engagement of the closure strip 44 by the latch. With such a closure means, the tongue 33 cannot be removed from the buckle 24 until the latch 46 is released, to a position illustrated in phantom, to permit movement of the closure strip 44.

There has been described a novel body restraining means, for use as a safety belt for vehicular seats, as safety belt for workers, or other use where the need exists to securely restrain a person but to permit ready release of the belt. The buckle of the belt is so constructed that attempts to pull the tongue of the belt from the buckle prematurely effectively tightens the grip on the tongue, while the user may easily release the tongue from the buckle at the desired time.

I claim:

1. A body restraining device comprising a strip of flexible material, the strip having a tongue at one end and a safety buckle adjacent the other end thereof, the safety buckle comprising:
   a. a base;
   b. at least one pair of confronting plate members connected to the base in a plane generally normal to the base, the plate members constituting converging roller surfaces terminating in spaced relation to each other, the plate members terminating at their ends opposite the base so as to provide an opening therebetween;
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c. at least one pair of friction rollers, a said roller associated with each confronting roller surface; and
d. resilient means directly connecting each of the rollers of a pair of said rollers to its associated roller surface in opposed parallel relationship to each other, and biasing each roller against its associated roller surface, the resilient means supporting the rollers on the frame, the arrangement further being such that, upon insertion of the tongue the opening into engagement with the rollers the resilient means will bias the rollers simultaneously against both the tongue and the roller surfaces to frictionally engage the tongue whereby forces acting to separate the tongue from between the rollers, in a direction normal to the roller axes and in the direction of convergence of the plate members, will increase the gripping force applied to the tongue by the rollers coacting with the frame.

2. A body restraining device as defined in claim 1 having a single pair of confronting converging plate members.

3. A body restraining device as defined in claim 2 wherein each plate member is an angular plate having an acute angle, with both ends of each angular plate terminating in spaced relation to the confronting angular plate.

4. A body restraining device as defined in claim 1 in combination with a vehicular seat, the strip of flexible material being separated into two sections, with one section having the tongue at its outer end and a second section having the safety buckle at its outer end, both sections being fastened to support means and arranged in combination with the seat to restrain a seat occupant upon insertion of the tongue through the buckle.

5. A body restraining device as defined in claim 1 wherein a single pair of plate members are provided with each plate member constituting a pair of said converging roller surfaces and first and second pairs of friction rollers, a roller associated with of said confronting roller surfaces.

6. A body restraining device as defined in claim 1 wherein the plate members, at their ends opposite the base, have a releasable closure means associated therewith to prevent removal of the strip from the buckle, upon movement of the strip in the direction of the axes of the rollers.

7. A safety buckle usable with a safety belt having a strip of flexible material with a tongue, the buckle arranged to receive the tongue and restrain the user of the belt, the buckle comprising:
   a. a base;
   b. at least one pair of confronting plate members connected to the base in a plane generally normal to the base, the plate members constituting converging roller surfaces terminating in spaced relation to each other, the plate members terminating at their ends opposite the base so as to provide an opening therebetween;
   c. at least one pair of friction rollers, a said roller associated with each confronting roller surface; and
   d. resilient means directly connecting each of the rollers of a pair of said rollers to its associated roller surface in opposed parallel relationship to each other, and biasing each roller against its associated roller surface, the resilient means supporting the rollers on the frame, the arrangement further being such that, upon insertion of the tongue through the opening into engagement with the rollers, the resilient means will bias the rollers simultaneously against both the tongue and the roller surfaces to frictionally engage the tongue whereby forces acting to separate the tongue from between the rollers, in a direction normal to the roller axes and in the direction of convergence of the plate members, will increase the gripping force applied to the tongue by the rollers coacting with the frame.

8. A safety buckle as defined in claim 7 having a single pair of confronting converging plate members.
UNIFIED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,711,154 Dated January 16, 1973
Inventor(s) Anthony Merola

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Column 5, lines 8 and 18, and in Column 6, lines 26 and 37,

"frame", each occurrence, should read --roller surfaces--.

Signed and sealed this 5th day of February 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR. RENE D. TEGTMeyer
Attesting Officer Acting Commissioner of Patents