June 27, 1950 O. H. GRISWOLD 2,513,169

SAFETY BELT BUCKLE

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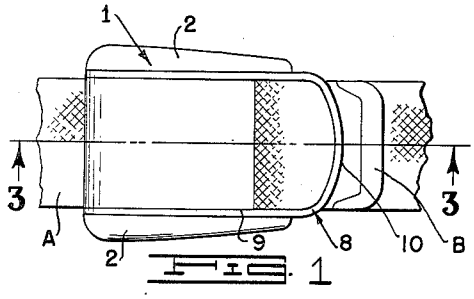

FIG. 1

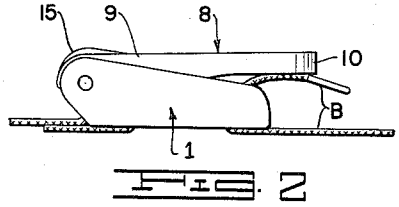

FIG. 2

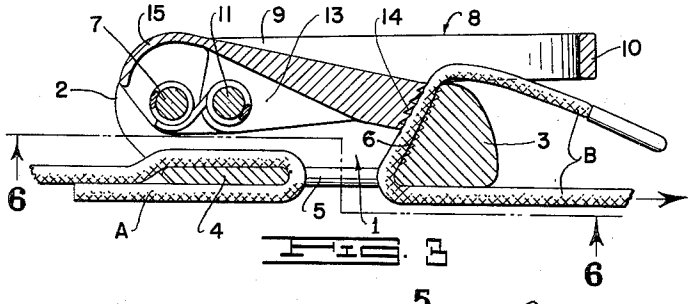

FIG. 3

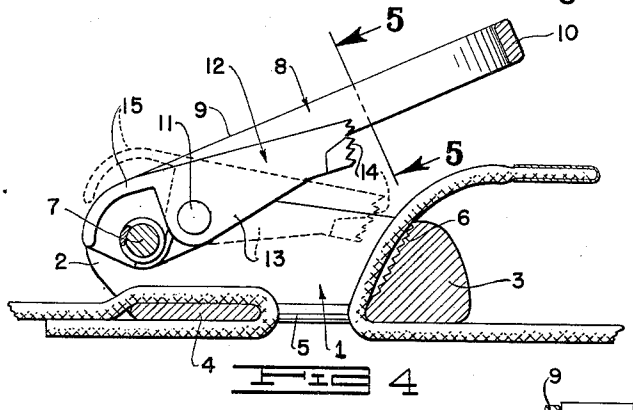

FIG. 4

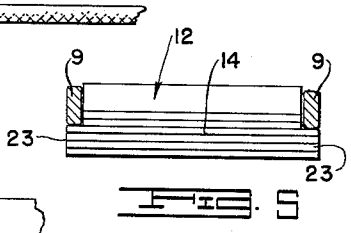

FIG. 5

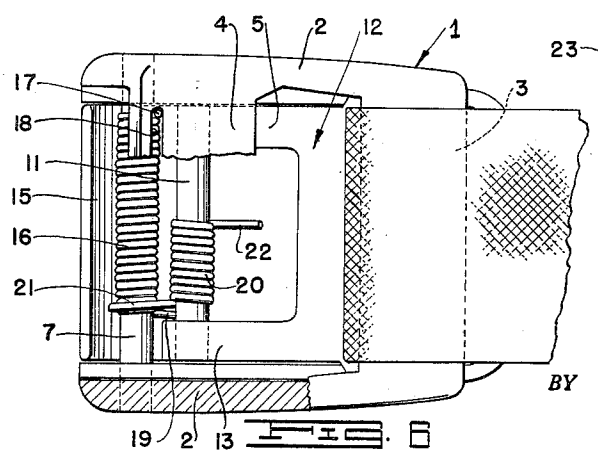

FIG. 6

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SAFETY BELT BUCKLE

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7 Claims. (Cl. 24—170)

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My invention relates to safety belt buckles intended to connect safety belts used to restrain passengers in airplane seats. Included in the objects of my invention are:

First, to provide a safety belt buckle which assures a firm grip on the safety belt capable of withstanding extreme loads although inexpertly or hurriedly fastened.

Second, to provide a safety belt buckle which, although capable of maintaining a firm and dependable grip, may be quickly and easily unbuckled when desired irrespective of whether the safety belt buckle is subjected to normal or excessive loads at the time it is desired to release the buckle, the buckle thus being particularly advantageous in case the safety belt must be quickly unfastened under adverse conditions as might occur in the event of a crash landing.

Third, to provide a safety belt buckle which incorporates a novel clamping means in which extremely powerful leverage is available to open the jaws of the clamping means when desiring to release the safety belt.

Fourth, to provide a safety belt buckle which tends to adjust the safety strap automatically to passengers of different girth for the reason that the buckle automatically locks when released by the passenger after drawing the safety belt about him.

With the above and other objects in view as may appear hereinafter, reference is directed to the accompanying drawings, in which:

Figure 1 is a plan view of my safety belt buckle shown attached to and securing a safety belt, the belt being shown fragmentarily.

Figure 2 is a side elevational view thereof.

Figure 3 is a longitudinal sectional view through 3—3 of Figure 1.

Figure 4 is a similar sectional view showing the movable jaw in its released position and indicating by broken lines the movable jaw in confronting relation with the fixed jaw.

Figure 5 is a transverse sectional view through 5—5 of Figure 4 showing the movable jaw in its relation to the release lever.

Figure 6 is a bottom view of the safety belt buckle with a portion broken away and in section, the sectional portion corresponding approximately to line 6—6 of Figure 3.

My belt buckle includes a frame 1 having parallel side members 2. The side members are joined at one end by a fixed clamp jaw 3 and are connected by their lower margins adjacent their opposite ends by a mounting web 4. A slot 5 is defined between the fixed clamp jaw 3 and

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the mounting web 4. The side of the fixed clamp jaw confronting the slot 5 slopes upwardly therefrom and forms a serrated clamping face 6.

The side members 2 extend upwardly and slightly beyond the mounting web 4. A journal pin 7 is secured between these portions of the side members and supports a release lever 8. The release lever is U-shaped to form legs 9 journaled on the pin 7 and a rounded handle portion 10. The legs extend from the pin 7 along the inside surfaces of the side members 2 and overlie the fixed clamp jaw 3. The handle portion projects beyond the fixed clamp jaw.

The legs 9 adjacent the journal pin 7 support a second journal pin 11 on which is pivotally mounted a movable jaw member 12. The movable jaw member is in the form of a plate having depending lugs 13 to receive the journal pin 11. The extended end of the movable jaw member is provided with a serrated clamping face 14 adapted to confront and conform to the slope of the serrated clamping face 6 of the fixed clamp jaw. The movable jaw member includes a cover portion 15 which extends over the two journal pins 7 and 11 in substantial conformity with the extremities of the legs 9 and the side members 2.

The journal pin 7 receives a helical spring 16. One extremity 17 of the spring 16 is anchored in a slot 18 provided in the mounting web 4. The other extremity 19 of the spring 16 is adapted to hook over the journal pin 11. A second spring 20 is fitted on the journal pin 11 and has an extremity 21 which hooks over the journal pin 7 and a second extremity 22 which bears against the movable jaw member 12.

The action of the spring 20 is such that the extremity of the movable jaw member is urged upwardly between the legs of the release lever 8. Such upward movement is limited by stop lugs 23 extending laterally from the extremity of the movable jaw member.

Operation of my safety belt buckle is as follows: The buckle is attached to a safety belt strap indicated by A which is looped around the mounting web 4 and suitably secured to itself. The extremity of a mating safety belt or strap B is threaded through the slot 5 and folded upon itself over the fixed clamping face 6. This is accomplished while the release lever 8 is held in its raised position shown in Figure 4. When the lever 8 is released the spring 16 functions to urge the release lever and movable clamp jaw to the position shown in Figure 3. Tension applied to the web exerts a force in a direction tending

to tighten or increase the clamping action between the movable and fixed clamping faces.

When it is desired to release the safety belt buckle the release lever 8 is raised. This can be done by directly engaging the handle portion 10 or by pulling upwardly on the extremity of the safety belt B.

The movable clamp jaw, particularly if the web B is under tension in the direction of the arrow in Figure 3, does not, at first, raise with the releasing lever; however, movement of pin 11 about pin 7 draws the movable clamp jaw away from the fixed clamp jaw until the strap is freed. This also frees the moveable clamp jaw which then rotates under urge of the spring 20 until the stops 23 engage the release lever.

Stated otherwise, the operating end of movable clamp jaw when pivoting about either pin 7 or 11 moves in a path which approaches tangency to the fixed jaw so that a self-tightening wedging action is obtained. When the operating end of the movable jaw is restrained, the movable jaw is simultaneously pivoted about both axes of pins 7 and 11 and said operating end is thereby moved approximately normal to the surface of the fixed clamp jaw.

It will thus be observed that the leverage available to withdraw the movable clamp jaw is extremely large. In fact, it has been found under test that, after applying a load of 3000 pounds in tension between the belts A and B, then reducing the load to 600 pounds, the force required to operate the release lever is in the neighborhood of 20 pounds. If desired, the releasing force may be materially less than 20 pounds. A releasing force is selected which is sufficient to avoid accidental tripping of the release lever but well under the strength of the user even under adverse conditions.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A safety belt buckle comprising: a frame including side members connected by a fixed clamp jaw and means for attachment to a strap, said clamp jaw and said means being spaced to defined a slot to received the free extremity of a strap whereby said strap may be threaded through said slot and over said fixed clamp jaw to form a free extended end; a release lever pivotally connected to said side members at points remote from said jaw and movable between a position overlying said jaw and extended portion of said strap and a position spaced therefrom; a movable clamp jaw pivotally carried by said release lever and extending between said side members for cooperation with said fixed jaw; means yieldably urging said release lever toward said fixed clamp jaw and means yieldably urging said movable clamp jaw toward said release lever whereby said release lever and movable clamp jaw tend to move in unison, said release lever being engageable by the extended end portion of said strap to effect release of said movable clamp jaw and free said strap.

2. A safety belt buckle comprising: a frame including a fixed clamp jaw; a release lever pivotally connected to said frame, said fixed clamp jaw having a substantially planular operating face directed toward the pivotal axis of said release lever; a movable clamp jaw pivotally connected to said release lever between its pivotal axis and said fixed jaw, said movable clamp jaw having a substantially planular operating face at its extended end for cooperation with the operating face of said fixed clamp jaw; yieldable means and stop means cooperating to place said movable clamp jaw in predetermined relation to said release lever for movement as a unit, about the pivotal axis of said release lever, said yieldable means being responsive to a restraining force placed on said operating face of the movable clamp jaw whereupon coincidental pivotal movements of said movable clamp jaw and release lever withdraws said movable clamp jaw from said fixed jaw, said jaws adapted to receive a belt therebetween, and said release lever and fixed jaw adapted to receive a continuation of said belt therebetween, said release lever being engageable by said continuation to release said clamp jaws from said belt.

3. A buckle comprising: a fixed and a movable clamp jaw having jaw faces cooperating to engage a strap; means forming a primary pivotal axis for rotation of the jaw face of said movable clamp jaw about an arc approaching tangency to said fixed clamp jaw, thereby to grip said strap; other means forming a planetary pivotal axis for said movable clamp jaw, said planetary pivotal axis movable about said primary pivotal axis to and from a position between said primary pivotal axis and said fixed clamp jaw, whereby simultaneous travel of said movable clamp jaw about both said axes causes its jaw face to recede from said fixed jaw face; and yieldable means tending to restrain said movable jaw to travel about said primary pivotal axis, said yieldable means responsive to restraint placed on the jaw face of said movable jaw member by a strap gripped between said jaw faces to permit pivotal travel of said movable jaw member about said planetary pivotal axis thereby to free said strap, said fixed clamp jaw and said release lever adapted to receive a continuation of said strap therebetween said release lever adapted to be engaged by said continuation to effect release of said clamp jaw from said belt.

4. A buckle comprising; a frame having a fixed clamp jaw; a release lever; a primary journal connecting said lever and frame, the extended end of said release lever extending toward, over and beyond said fixed clamp jaw; a movable clamp jaw having an operating end cooperable with said fixed clamp jaw to engage a strap threaded between said jaws with a continuation thereof between said fixed jaw and said release lever, a secondary journal connecting said movable clamp jaw to said release lever on an axis between the axis of the release lever and the fixed jaw, the operating end of said movable clamp jaw adapted, when pivoted about said primary journal, to travel in an arc approaching tangency to said fixed clamp jaw, and adapted when simultaneously pivoted about both said axes to travel in a substantially radial path between said primary journal and said fixed jaw; and yieldable means tending to restrain said movable clamp jaw to travel about said primary axis, said yieldable means being responsive to restraint placed on said movable clamp jaw by reason of clamping cooperation with said fixed jaw to cause said movable jaw to recede from said fixed jaw, said release lever being engageable by the continuation of said strap to effect release of said jaws.

5. A buckle comprising: a frame including side members, a strap attachment web connecting the bottom margins of said members adjacent

their first extremities, and a fixed clamp jaw connecting said members by their other extremities, said fixed clamp jaw and web defining a slot for insertion of a first strap for encirclement of said web and a second strap adapted to overlie said fixed clamp jaw; a U-shaped release lever including legs and a cross portion; a primary journal extending between the first extremities of said side members and receiving the extremities of said release lever legs, said release lever adapted to extend over and beyond said fixed clamp jaw as well as over the end portion of said second strap, and movable to and from said fixed clamp jaw; a movable clamp jaw having an operating end for cooperation with said fixed clamp jaw; a secondary journal mounting said movable clamp jaw between the legs of said release lever, the operating end of said movable clamp jaw adapted to pivot with said release lever about said primary axis and travel in a path approaching tangency to said fixed clamp jaw, thereby to wedge said second strap between said jaws, said operating end adapted, when said movable clamp jaw pivots about both said axes, to travel in a radial path between said primary axis and said fixed clamp jaw thereby to free said strap; and yieldable means tending to move said movable clamp jaw about said primary axis as a unit with said release lever, said yieldable means responsive to restraint imposed by a strap wedged between said jaws to permit said radial travel of the movable clamp jaw as said release lever is pivoted away from said fixed clamp jaw, the extended end of said release lever engageable by the end portion of said second strap for releasing movement away from said fixed clamp jaw.

6. A buckle comprising: a fixed jaw and a movable jaw having operating surfaces adapted to engage and clamp therebetween a strap positioned with a continuation overlying said fixed jaw; means defining a primary axis of rotation and a second axis of rotation for said movable jaw, both axes being so positioned that when said movable jaw is pivotable about either of said axes its operative end travels in a path approaching tangency to said fixed jaw thereby to wedge a strap therebetween, and when said movable jaw is pivoted about both axes simultaneously, its operating end moves normal to the surface of said fixed jaw; a release lever incorporating said primary and secondary axis defining means

for operating said movable jaw; yieldable means tending to move said movable jaw as a unit with said release lever; and other yieldable means urging said release lever in a direction to effect wedging action between said movable and fixed jaws, said release lever projecting over said fixed jaw as well as over the continuation of said strap whereby the continuation of said strap when pulled outwardly from said fixed jaw engages and releases said release lever.

7. A buckle comprising: a pair of U-frames pivotally connected at their extremities, one of said frames forming a fixed jaw at its closed end, the other forming a release lever having a handle at its closed end; a movable jaw pivotally connected to said release lever and having an extended operating end cooperating with said fixed jaw to receive a belt therebetween the continuation of which extends between said release lever and fixed jaw, the axes of rotation of said release lever and said movable jaw being so located that travel of said movable jaw about either axis causes said operating end to describe an arc approaching tangency to said fixed jaw, and movement of said movable jaw about both said axes simultaneously moves said operating end in a path substantially normal to said fixed jaw; yieldable means tending to move said movable jaw as a unit with said release lever, said yieldable means responsive to restraint placed on said movable jaw by reason of cooperating with said fixed jaw to permit said normal movement of the movable jaw upon pivotal movement of said release lever, said release lever being engageable by the continuation of said belt to effect release of said clamp jaws from said belt.

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