

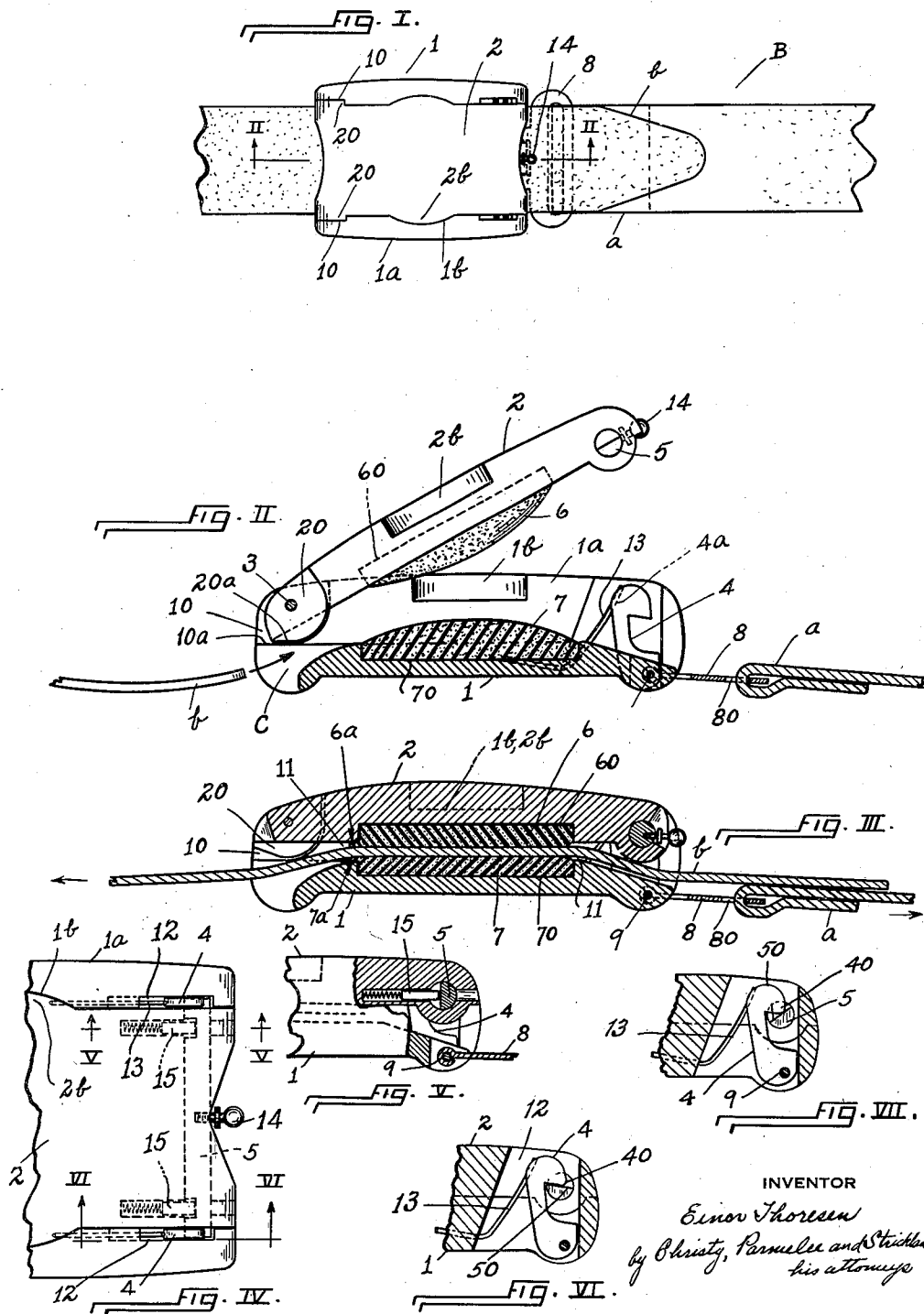
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BUCKLE AND LATCH MECHANISM

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BUCKLE AND LATCH MECHANISM

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9 Claims. (Cl. 24—170)

My invention relates to belt buckles, particularly to friction buckles, buckles that secure the end of a belt by friction, and consists in improvements in structure, by virtue of which the buckle is more effective in service.

The invention embraces in addition to the objects herein appearing those revealed in my co-pending application Serial No. 295,776, filed September 20, 1939, and the structure of the invention includes certain refinements and elaborations of the buckle described in such application.

A buckle embodying the invention is illustrated in the accompanying drawing, in which:

Fig. I is a view of the buckle in plan, with the belt on which the buckle is assembled shown fragmentarily;

Fig. II is a view of the buckle to larger scale and partly in side elevation and partly in section on the plane II—II of Fig. I. The buckle is shown in open position, ready to receive the free end of the belt to be secured;

Fig. III is a sectional view of the buckle in closed position;

Fig. IV is a fragmentary view of the buckle in plan, to the scale of Figs. II and III;

Fig. V is a fragmentary view, showing the buckle partly in side elevation and partly in section on the plane V—V of Fig. IV, and illustrating the latch device that secures the buckle in closed position;

And Figs. VI and VII are fragmentary views, showing the buckle in section on the plane VI—VI of Fig. IV, and illustrating alternate positions of certain elements of the latch device.

Referring to the drawing the buckle consists in two bodies 1 and 2 that are desirably, if not essentially, formed of a molded plastic material, such as urea formaldehyde. The two members are united on a hinge pintle 3, and are adapted to secure the end of a belt introduced and clamped between them. More specifically, the assembled buckle members are attached to one end *a* of a belt B, and are adapted to receive and secure between them the opposite end *b* of the belt. The two buckle members severally carry blocks 6 and 7 of sponge rubber, or other highly compressible and elastic material, that frictionally engage the interposed end *b* of the belt. The buckle member 2, the so-called cap or cover member, is movable on the axis of the hinge between the open, belt-receiving position of Fig. II, and the closed, belt-securing position of Fig. III. Opposite to the hinged end of the buckle, the members 1 and 2 are severally equipped with latch members 4 and 5, which (as will presently appear) are

adapted to secure the buckle in closed or belt-clamping position.

The hinge on which the buckle opens and closes extends transversely of the direction of extent of the belt, and by virtue of this feature the opening and closing of the buckle is facilitated. And, as shown, the hinge is arranged at one end of the assembled buckle, thereby affording maximum mechanical advantage when pressure is applied to the cover member, to close the buckle. The cover member carries integrally lugs 20 that nest in pockets 10 formed in the basal member 1. The edges of the lugs are so shaped relatively to the edges of the pockets that the buckle can not be opened wider than need be; that is, the edges 20*a* of the lugs are adapted to come to abutment upon the edges 10*a* of the pockets, in such way as to limit the movement of the cover member 2 when it has reached the desired open position (Fig. II)—a position in which full clearance is provided for the insertion of the belt end *b*, and in which the cover member is sufficiently close to the basal member to permit the buckle readily to be grasped between the thumb and forefinger in closing the buckle.

The buckle members 1 and 2 are so particularly fashioned as to provide an outwardly flared mouth C for the belt-receiving channel between the buckle members. As shown, such mouth of the channel opens beneath the hinge pintle 3 and between the lugs 20.

The buckle is secured to the end *a* of the belt, by means of a metal tongue 8 that is articulated to the basal member 1, as by a pin 9, and that is provided with a slot 80, through which the end of the belt is threaded, overlapped and secured, say by stitching. Thus, the union of the buckle to the belt end *a* is a flexible union, a feature that admits of more ready manipulation of the buckle in use.

The two buckle members are shaped to nest one within the other when the buckle is closed, in such manner that the hinge is protected and safeguarded from the effects of stress applied to the belt in service, stress that tends to pull the clamped end of the belt from the buckle. In this case the channel-shaped basal member 1 includes in its opposite side walls 1*a* recesses 1*b*, and the cover member 2 is provided on its periphery with laterally extending portions 2*b* that nest or dovetail in the recesses. Such structure manifestly is effective to the end in view.

The above described structural features are valuable, in that they permit the buckle members 1 and 2 to be readily constructed of plastic ma-

terial, a material that, after shaping under heat and pressure in known way, is hardened to bone-like consistency. The buckle is strong and durable, and avoids the objections that might otherwise be raised against a clamp type buckle formed of plastic.

The structure and arrangement of the friction blocks or elements 6 and 7 are of great importance. As above indicated, these elements consist in bodies of a highly compressible and elastic material, such as sponge rubber. They are secured in opposing relation, one to each of the buckle members 1 and 2, in such manner that the end *b* of the belt clamped in the buckle is frictionally engaged and secured between such elements. Advantageously, the bodies of the members 1 and 2 are formed with recesses 60 and 70, and the frictional clamping elements 6 and 7 are secured and peripherally supported in the recesses. The bodies of the elements 6 and 7 are normally of substantially greater volume than the recesses in which they are positioned, and preferably the portions of the elements that project from the recesses when the buckle is open (Fig. II) are of approximately semispherical shape. When the buckle is closed upon the interposed end of the belt, these relatively thick, cushion-like elements 6 and 7 are compressed to relatively thin, disk-like members, as shown in Fig. III. In the course of the closing of the buckle, the belt-engaging elements 6 and 7 first make point contact with the body of the belt, and then (as the closing movement of the buckle continues) the contact of the progressively compressed elements with the belt spreads over increasing areas, forcing all air from between the elements and the opposite surfaces of the belt, until at length the elements are compressed to substantially the volume of the recesses 60 and 70, respectively, and the elements over their entire effective areas make snug contact with the body of the belt. As thus compressed, the members 6 and 7 provide friction disks that engage and secure the end *b* of the belt in the buckle.

Another important feature is to be noted. As may be perceived upon considering Fig. III, the buckle members 1 and 2 are so shaped and proportioned that, when the buckle is secured in closed position, clearances 11 are left between the body of the belt and the body portions of the buckle members 1 and 2 that extend contiguous with the peripheries of the recesses 60 and 70. When the belt is subjected to tension, tension effective in the direction of the arrows in Fig. III and tending to pull the engaged belt end *b* from the buckle, portions 6*a* and 7*a* of the highly yieldable bodies of the elements 6 and 7 are drawn into and tightly wedged in such clearances. The greater the tension on the belt, the tighter is the wedging of the portions 6*a* and 7*a* against the belt. Thus, the elements 6 and 7 are caused to engage the belt with a wedging effect that augments the security obtained by the frictional engagement of the elements with the belt.

The latch device that secures the buckle in closed position is particularly effective for a friction type buckle. The elasticity of the compressed belt-engaging elements cooperates with the latch device; that is to say, when the buckle is closed and the latch device 4, 5 is engaged, the forces of restitution of the compressed elements 6 and 7, tending to spring the buckle open, are utilized to maintain the latch in engaged position. Alternately, when the buckle is to be opened, these

forces of restitution are caused to assist, rather than to resist, the disengagement of the latch.

More particularly, the latch member carried by the basal member 1 of the buckle consists in a pair of hook-shaped catches 4 that are pivotally mounted, in spaced apart relation, on the pin 9, already mentioned. The two side wall portions 1*a* of the basal member 1 include each a recess 12 in which one of the catches is disposed, and a wire spring 13 is arranged with each catch, to urge it into position of engagement with the latch member 5 carried by the cover member 2 of the buckle. The edge of each catch 4 is notched, as indicated at 4*a* in Fig. II, to receive the distal end of the associate spring 13. The latch member 5 consists in a cylindrical bar or stem that is mounted for rotary movement in a transverse bore in the buckle member 2. The bar 5 extends at its opposite ends from the side edges of said member 2, and it is these projecting ends of the bar that are severally engaged by the catches 4, to secure the buckle in closed position.

The said projecting ends of the cylindrical bar 5 are partly cut away, providing at each end of the bar a facet 50 that, with the buckle in closed position, is engaged by the hooked end of the associate or corresponding catch 4, Fig. VI. The engagement of the tips 40 of the hooked-shaped catches with the bar 5 is an over-center or off-center engagement; that is, the tips 40 of the hooked end of each catch bears on the facet 50 of the associate end of the bar 5 at a point lying to one side—to the right in Fig. VI—of the axis of the bar, and it will be perceived that the forces of restitution of the compressed belt-engaging elements 6 and 7, in tending to spring the buckle members apart, exert through the bodies of the buckle members and the points (40) of contact of the catches with the bar 5 a pressure that tends to turn the bar clockwise, as it is seen in Fig. VI. Manifestly, this tendency to rotate the bar clockwise increases the security of engagement between the latch members, and prevents the latch device from becoming unintentionally released and the buckle opened.

In order to release the latch device, the bar 5 is axially rotated through such angle as will tilt the facets 50 into the position shown in Fig. VII, in which position the points of contact of the tips 40 of the catches with the bar are caused to shift to the left of the axis of the bar; the forces of restitution, above mentioned, become effective to open the buckle, the inclined facets 50 acting through the tips 40 of the catches to swing the catches counter-clockwise (Fig. VII) against the resistance of springs 13 and free from the ends of the bar 5. The means for so turning the bar 5 into release position consists in a trigger 14, a small stem or knob that extends radially from the side of the bar and is made accessible to the thumb or finger of the user, by the forming of the right-hand edge of the buckle member 2, as shown. In order to release the latch, it is merely necessary to lift the end of the trigger about one-eighth of an inch or less—the elasticity of the compressed elements 6 and 7 does the rest.

In closing the buckle the latch members move automatically into engagement; that is, when the cover member 2 is swung shut upon the basal member 1, the cylindrical nether surfaces of the projecting ends of the bar 5 bear upon the curved top edges of the catches 4 and press them aside, against the tension of their springs 13. As the buckle comes to fully closed position and the projecting ends of the bar 5 pass below the tips

40 of the catches, the catches "snap" into engaged position, Fig. VI. It only remains to be noted that means are provided normally to restrain the bar 5 in a predetermined position in its range of permissive rotation, in the position in which the facets 50 lie substantially horizontally, as the buckle is shown in Fig. VI. Such means consist in two spring-backed blocks or pins 15, each of which bears upon the flat base of a kerf cut in the cylindrical body of the bar. Note Figs. IV and V.

Within the terms and intent of the appended claims various refinements and modifications are held in contemplation.

I claim as my invention:

1. In a device of the class described that includes in structure two buckle members united one to the other for relative movement and adapted to be secured to one end of a belt, each of said buckle members carrying a belt-engaging element, and a latch device for securing the buckle members in closed position, clamped upon the opposite end of said belt, with said belt-engaging elements compressed against such end of the belt; the invention herein described in which each of said buckle members includes a recess in which the associate belt-engaging element is positioned and peripherally supported, each belt-engaging element comprising a relatively thick body of readily compressible material that, when the buckle is open, is of substantially greater volume than the recess in which it is positioned, and that, when the buckle is latched in closed position, is compressed in frictional engagement with the belt to a relatively thin disk-like body of only slightly greater volume than the recess.

2. In a device of the class described that includes in structure two buckle members united one to the other for relative movement and adapted to be secured to one end of a belt, each of said buckle members carrying a belt-engaging element, and a latch device for securing the buckle members in closed position, clamped upon the opposite end of said belt, with said belt-engaging elements compressed against such end of the belt; the invention herein described in which each of said buckle members includes a belt-engaging element comprising a relatively thick body of readily compressible material that, when the buckle is open, is of relatively great volume, and that, when the buckle is latched in closed position, is compressed in frictional engagement with the belt to a relatively small volume, said latch device comprising a member mounted for rotary movement in one of said buckle members, and a catch member carried by the other of said buckle members, said catch member making over-center engagement with said rotary member when the buckle is closed, with the effect that the forces of restitution of the compressed belt-engaging elements react through the buckle members with latch-locking effect upon said engaged latch members.

3. In a device of the class described that includes in structure two buckle members, a latch device for securing said buckle members in clamped position upon the body of a belt, one of said buckle members carrying an element that frictionally engages the belt when the buckle is secured in said clamped position; the invention herein described in which said belt-engaging element comprises a body of readily compressible material which when the buckle is open is of relatively thick cushion-like form, and which

when the buckle is closed is of thin disk-like form, the closed buckle structure including between the body of the engaged belt and the body of said element-carrying buckle member a clearance into which a portion of the body of said compressed disk-shaped element is adapted, when the engaged belt tends to slip in the buckle, to be drawn and wedged, said wedged portion of the compressed belt-engaging element affording augmented security of the belt in the closed buckle.

4. In a device of the class described that includes in structure two buckle members, a latch device for securing said buckle members in clamped position upon the body of a belt, one of said buckle members carrying an element that frictionally engages the belt when the buckle is secured in said clamped position; the invention herein described in which said belt-engaging element comprises a body of readily compressible material which when the buckle is open is of relatively thick cushion-like form, and which when the buckle is closed is of thin disk-like form, the closed buckle structure including between the body of the engaged belt and the body of said element-carrying buckle member a clearance into which a portion of the body of said compressed disk-shaped element is adapted, when the engaged belt tends to slip in the buckle, to be drawn and wedged, said wedge portion of the compressed belt-engaging element affording augmented security of the belt in the closed buckle, said latch device comprising a member mounted for rotary movement in one of said buckle members, and a catch member carried by the other of said buckle members, said catch member making over-center engagement with said rotary member when the buckle is closed, with the effect that the forces of restitution and of the wedging effect of the compressed belt-engaging element react through the buckle members with latch-locking effect upon said engaged latch members, and a trigger whereby said rotary latch member may be turned, to shift the point of engagement of said catch member with said rotary member across the center or axis of such rotary member, with the effect that the forces of restitution of said compressed belt-engaging element become effective to disengage said latch members and open the buckle.

5. In a device of the class described that includes two buckle members, an elastic belt-engaging element, and a latch device for securing the buckle in closed position upon the end of a belt, with said belt-engaging element compressed against the body of such belt end; the invention herein described in which said latch device comprises a member mounted for rotary movement in one of said buckle members, and a catch member carried by the other of said buckle members, said catch member making, when the buckle is closed, over-center contact with said rotary member, with the effect that the forces of restitution of the compressed belt-engaging element react through the buckle members with latch-locking effect upon said latch members, and a trigger for turning said rotary latch member to effect the relative movement of said latch members and the shifting of the over-center point of contact therebetween, whereby said forces of restitution become effective to disengage the latch members and open the buckle.

6. A belt buckle comprising two buckle members united for relative movement between open and closed positions, and a latch device for se-

curing said members in closed position, said latch device including a bar mounted in one of said buckle members for axial rotation within a limited range, a spring exerting stress on said bar tending to maintain the bar in a predetermined position in its range of rotary movement, a catch pivotally mounted in the other of said buckle members, yielding means urging said catch into engagement with the side of said bar at a point lying over and to one side of the center or axis of the bar, and a trigger for rotating said bar against spring tension, to effect the relative movement of said latch members and the shifting of the over-center point of contact of the catch with the bar to the opposite side of said center or axis, whereby the catch may be disengaged from the bar and the buckle opened.

7. A belt buckle comprising two buckle members united for relative movement between open and closed positions, and a latch device for securing said members in closed position, said latch device including a bar mounted in one of said buckle members for axial rotation within a limited range, a spring exerting stress on said bar tending to maintain the bar in a predetermined position in its range of rotary movement, a pair of catch members pivotally mounted in spaced-apart relation in the other of said buckle members, said catch members arranged to engage the bar at its two ends severally, the catch members engaging the side of the bar, when the buckle is closed, at points lying over and to one side of the center or axis of the bar, and a trigger for rotating the bar, to effect the relative movement of said latch members and the shifting of said over-center points of contact from the said side of said axis to the opposite side, whereby the catches may be disengaged from the bar and the buckle opened.

8. In a device of the class described that includes in structure two buckle members, a latch device for securing said buckle members in clamped position upon the body of a belt, one of said buckle members carrying an element that frictionally engages the belt when the buckle is secured in said clamped position; the invention herein described in which the buckle member last mentioned includes a recess in which said belt-engaging element is positioned and peripherally supported, said element comprising a body of readily compressible material which when the buckle is open projects from said recess, and which when the buckle is closed is compressed against the body of the belt and into position substantially within said recess, the closed buckle structure including between the body of the engaged belt and the periphery of said recess a clearance into which a portion of the body of said compressed belt-engaging element is adapted, when the engaged belt tends to slip in the buckle, to become wedged, said wedged portion of the compressed belt-engaging element affording augmented security of the belt in the buckle.

9. In a belt buckle that includes in structure two clamping members, a friction member, and means for securing said clamping members in closed position, with said friction member clamped upon the surface of a belt; the invention herein described in which said friction member comprises a body of readily compressible material in the form of a semispherical cushion-like element, said semispherical element forming (when the buckle is closed upon the end of a belt) a compressed relatively thin friction-disk that engages and secures said belt end.

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