

PERSONALIZED SEAT BELT

TECHNICAL FIELD

[0001] This application relates to a seat belt, and more particularly to a personalized seat belt.

BACKGROUND

[0002] Air travel has become an indispensable mode of transportation in today's fast-paced world, bridging people across continents and cultures. However, alongside this convenience comes a persistent issue of turbulence that threatens the safety and comfort of passengers onboard.

[0003] Turbulence, whether encountered unexpectedly or during predictable phases of flight, can induce anxiety and discomfort among passengers. For individuals utilizing the lavatory facilities such as the toilet bowl during such periods, the risk of injury due to sudden jolts and movements is heightened, and this is an area of concern as the lavatory is not traditionally considered as part of an aircraft's turbulent environment.

SUMMARY

[0004] According to an aspect, disclosed herein is a personalized seat belt. In various embodiments, the seat belt comprises an elongated belt body, the belt body defining a first end and an opposing second end, a first coupling member coupled to the first end, the first coupling member being detachably coupleable with a first coupling point of the toilet, and a second coupling member coupled to the second end, the second coupling member being detachably coupleable with a second coupling point of the toilet, wherein the first coupling point and the second coupling point are disposed on opposing sides of a toilet seat in the toilet.

[0005] In some embodiments, the belt body comprises an adjustable length. Preferably, the belt body further comprises a resilient member, wherein the resilient member applies a restoring force to the belt body responsive to a change in a length of the belt body. Preferably, each of the first coupling member and the second coupling member is in a quick release engagement with the respective first coupling point and second coupling point. Preferably, the quick release engagement is releasable responsive to a single hand motion.

[0006] In some embodiments, the belt body further comprises a first belt segment; a second belt segment; and a segment coupler disposed between the first belt segment and the second belt segment, wherein the segment coupler provides a detachable attachment between the first belt segment and the second belt segment. Preferably, the segment coupler provides a quick release engagement between the first belt segment and the second belt segment.

[0007] According to another aspect, the present invention provides a toilet system. In various embodiments, the system comprises a toilet fixture coupleable to a seat belt. The toilet fixture further comprises a first coupling point and a second coupling point wherein the first coupling point and the second coupling point are disposed on opposing sides of a toilet seat. The seat belt comprises an elongated belt body which defines a first end and an opposing second end. A first coupling member is coupled to the first end and the first coupling member being detachably coupleable with the first coupling point. A second coupling member coupled to the second end and the second coupling member being detachably coupleable with the second coupling point.

[0008] In some embodiments, the toilet fixture is detachably coupleable to the toilet seat. Preferably, the belt body comprises an adjustable length. Preferably, the belt body further comprises a resilient member, wherein the resilient member applies a restoring force to the belt body responsive to a change in a length of the belt body. Preferably, each of the first coupling member and the second coupling member is in a quick release engagement with the respective

first coupling point and second coupling point. Preferably, the quick release engagement is releasable responsive to a single hand motion.

[0009] In some embodiments, the belt body further comprises a first belt segment, a second belt segment, and a segment coupler disposed between the first belt segment and the second belt segment, wherein the segment coupler provides a detachable attachment between the first belt segment and the second belt segment. Preferably, the segment coupler provides a quick release engagement between the first belt segment and the second belt segment.

[0010] According to another aspect, disclosed herein a vehicle comprising the toilet system as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Various embodiments of the present disclosure are described below with reference to the following drawings:

[0012] FIG. 1 is a partial cross-sectional view showing the internal layout of an aircraft according to embodiments of the present disclosure;

[0013] FIG. 2 shows a perspective view of a toilet system and a personalized seat belt in application according to various embodiments;

[0014] FIG. 3 shows a front view of the toilet system and the personalized seat belt of FIG. 2;

[0015] FIG. 4 shows a perspective view of a coupling member of a personalized seat belt according to various embodiments;

[0016] FIGs. 5A and 5B show respective perspective views of a coupling member of another personalized seat belt according to various embodiments;

[0017] FIGs. 6A and 6B show respective perspective views of a coupling member of yet another personalized seat belt according to various embodiments;

[0018] FIG. 7 shows a perspective view of a toilet system and a personalized seat belt according to various embodiments;

[0019] FIGs. 8A and 8B show perspective views of a personalized seat belt and a toilet fixture according to various embodiments;

[0020] FIGs. 9A and 9B show respective perspective views of a personalized seat belt in different operating modes according to various embodiments;

[0021] FIGs. 10A and 10B show respective perspective views of various embodiments of a personalized seat belt; and

[0022] FIG. 11 illustrates a perspective view of a personalized seat belt in a folded state according to various embodiments.

DETAILED DESCRIPTION

[0023] The following detailed description is made with reference to the accompanying drawings, showing details and embodiments of the present disclosure for the purposes of illustration. Features that are described in the context of an embodiment may correspondingly be applicable to the same or similar features in the other embodiments, even if not explicitly described in these other embodiments. Additions and/or combinations and/or alternatives as described for a feature in the context of an embodiment may correspondingly be applicable to the same or similar feature in the other embodiments.

[0024] In the context of various embodiments, the articles “a”, “an” and “the” as used with regard to a feature or element include a reference to one or more of the features or elements.

[0025] In the context of various embodiments, the term “about” or “approximately” as applied to a numeric value encompasses the exact value and a reasonable variance as generally understood in the relevant technical field, e.g., within 10% of the specified value.

[0026] As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0027] In an aspect of the present disclosure, FIG. 1 illustrates an airplane 50 which includes a toilet system 90. According to various embodiments, the toilet system 90 may include walls defining a premise of the toilet system 90 and a toilet bowl for usage. FIGs. 2 and 3 illustrate a toilet system 90 according to various embodiments. The toilet system 90 may include a wall or supporting structure 70 and a toilet bowl 80 fixed to the wall 70. The toilet bowl 80 may define a toilet seat 82. In some examples, the toilet bowl 80 may be integrally formed with the toilet seat 82. In other examples, the toilet seat 82 may be a separate seat coupled to the toilet bowl 80 via a hinge.

[0028] FIG. 2 illustrates a user 60 seated on the toilet seat 82. According to various embodiments, the toilet system 90 may further include a toilet fixture 130. The toilet fixture 130 may be fixedly coupled to a structure in the toilet system 90, such as a toilet bowl 80 or a wall 70. The toilet fixture 130 may comprise a first coupling point 131 and a second coupling point 132. The first coupling point 131 and the second coupling point 132 may be disposed on opposing sides of the toilet bowl 80 or the toilet seat. In other words, the first coupling point 131 and the second coupling point 132 may be located on lateral sides of the toilet bowl 80 or toilet seat.

[0029] In some embodiments, the first coupling point 131 and the second coupling point 132 may be fixed to opposing lateral sides of the toilet bowl 80 (e.g. FIG. 2). In other embodiments, the first coupling point 131 and the second coupling point 132 may be fixed to the wall 70 or other supporting structures of the toilet system 90, on opposing lateral sides of the toilet bowl 80 or toilet seat (e.g. FIG. 3). The lateral opposing sides of the toilet bowl 80 may be defined by a width direction 84 of the toilet bowl 80 as shown in FIGs. 2 and 3.

[0030] A seat belt 100 coupleable to the toilet bowl 80 may be provided to secure the user to the toilet seat 82. The seat belt 100 may extend along the width direction 84 of the toilet bowl 80 to prevent unintended movement for the user 60 during turbulence. In addition, the seat belt 100 may act as a fall prevention device for children and/or elderly during use of the lavatory. According to various embodiments, the seat belt 100 may be detachably coupleable to the toilet fixture 130. The seat belt 100 may be fixed to the toilet fixture 130 to secure the user 60 to the toilet seat 82 during usage, and removed from the toilet fixture 130 after usage. For hygiene considerations, the seat belt 100 may be a personalized seat belt 100 for personalized usage. The seat belt 100 may be a portable seat belt usable or coupleable with another toilet systems 90 with a similar toilet fixture 130.

[0031] According to various embodiments, the seat belt 100 may include an elongated belt body 120. The belt body 120 defines a first end 120a and an opposing second end 120b. The belt body 120 may include a first coupling member 111 coupled or fixed to the first end 120a. The belt body 120 may include a second coupling member 112 coupled or fixed to the second end 120b. According to various embodiments, the first coupling member 111 may be detachably coupleable with the first coupling point 131 of the toilet fixture 130. The second coupling member 112 may be detachably coupleable with the second coupling point 132 of the toilet fixture 130.

[0032] According to various embodiments, the coupling members 111/112 may have a corresponding coupling structure with the coupling points 131/132. In some embodiments, the first coupling member 111 and the second coupling member 112 may have a similar structure or may be similar connectors. In addition, the first coupling point 131 and the second coupling point 132 may be have a similar structure or may be similar connectors. As an example, the first coupling point 131 and the second coupling point 132 may be “female connectors”, while the first coupling member 111 and the second coupling member 112 may be “male connectors”.

Therefore, each of the coupling members 111/112 of the seat belt 100 may be coupled to any one of the coupling points 131/132. This enables a quick and convenient way of fastening the seat belt 100 to the toilet fixture 130.

[0033] In other embodiments, the first coupling member 111 and the second coupling point 132 may have a similar structure (e.g. “female connectors”), while the second coupling member 112 and the first coupling point 131 may have a similar structure (e.g. “male connectors”). In this way, the first coupling member 111 may only be coupled to the first coupling point 131, and the second coupling member 112 may only be coupled to the second coupling point 132. Therefore, the seat belt 100 may only be coupled to the toilet fixture 130 in a single configuration or orientation. This may be advantageous for implementations where an orientation of the seat belt 100 affects the use. For example, the seat belt may include a padding on an inner surface for providing better conformity to the user 70.

[0034] In various embodiments, each of the first coupling member 111 and the second coupling member 121 may be in a quick release engagement with the respective first coupling point 131 and second coupling point 132. The term “quick release engagement” may be defined as an engagement detachable by the user of the belt with relatively ease, for example by using his or her hands. Further, there is no need for specific tool(s) to be used to release the quick release engagement. For example, the quick release engagement may be a quick release buckle or catch. In various embodiments, the first coupling member 111 may be released from the first coupling point 131 based on a single hand motion. Similarly, the second coupling member 121 may be released from the second coupling point 132 based on a single hand motion. For example, the coupling member 121/122 may be released from the coupling points 131/132 using a single thumb action or a finger action.

[0035] According to various embodiments, the belt body 120 may comprise an adjustable length. For example, the belt body 120 may be provided with a length adjuster clip. The belt

body 120 may be personalized to a fitting width and range of adjustable lengths depending on the unique physique of the user 60. In addition, the material used to fabricate the belt body 120 may be chosen correspondingly to the attachment strength computed based on the weight of the user 60.

[0036] During operation, the user 60 wraps the belt body 120 around the user's 60 femur or thigh, and engages the coupling members 111/112 to the respective coupling points 131/132. In an event of turbulence, an erratic change in altitude may subject the end-user 60 to vertical and/or horizontal load forces. The belt body 120 being held by the coupling points 131/132 acts to prevent the user 60 from being thrust away from the toilet bowl 80 due to the sudden impulse force(s). The belt body 120 may assist in spreading the load forces experienced across the end-user's 60 pelvis and femur, which are some of the largest muscles in the human body, allowing the user to be secured and held down.

[0037] Spring Lock engagement

[0038] According to embodiments as illustrated in FIG. 4, each of the coupling member 111/112 and the respective coupling points 131/132 may be in a spring lock engagement 1101. The spring lock engagement 1101 may include a spring-loaded tab 1101a, a male receptacle 1101b (e.g. coupling members 111/112), and a female receptacle 1101c (e.g. coupling points 131/132). Prior to forming the spring lock engagement 1101, the user 60 aligns and inserts the male receptacle 1101b into the female receptacle 1101c. The spring-loaded tab 1101a within the male receptacle 1101b snaps into place on the female receptacle 1101c to form a detachable coupling therebetween. At this stage, a spring lock engagement 1101 is formed and locked. In order to disengage the spring lock engagement 1101, the user 60 lifts the spring-loaded tab 1101a via a single hand motion to release the spring lock engagement 1101, thereby pulling apart the male receptacle 1101b from the female receptacle 1101c to release the spring lock engagement 1101 via a single hand action.

[0039] Cam Lock engagement

[0040] According to other embodiments as illustrated in FIG. 5A and 5B, each of the coupling member 111/112 and the respective coupling points 131/132 may be in a cam lock engagement 1102. Each of the cam lock engagement 1102 may comprise a cam clutch 1102a, a coupling fixture 1102b and a cam latch 1102c. As shown in FIG. 5A, as a first step, the cam clutch 1102a is moved towards the coupling fixture 1102b in alignment with the coupling fixture 1102b. Thereafter, the user 60 flips or rotates the cam latch 1102c from an unlocked position 1102c to a locked position 1102d, locking the cam clutch 1102a to the cam latch 1102c of the cam lock engagement 1102. In order to release the cam lock engagement 1102, the user 60 releases on the cam latch 1102d in the locked position, flipping the cam latch 1102d back to the unlocked position 1102c to release the cam lock engagement 1102 via a single hand action.

[0041] Twist Lock engagement

[0042] According to other embodiments as illustrated in FIG. 6A and 6B, each of the coupling member 111/112 and the respective coupling points 131/132 may be in a twist lock engagement 1103. The twist lock engagement 1103 comprises a male pin 1103a formed with a rotatable/swivel male pin head 1103d, and a female slot 1103e. As shown in FIG. 6A, as a first step, the user 60 aligns the male pin 1103a axially relative to the female slot 1103e along a centre line 1103c, which is mutual to both the male pin 1103a and the female slot 1103e. Thereafter, the male pin 1103a is inserted into the female slot 1103e moving along the centre line 1103c. Upon the male pin head 1103d emerges above the female slot 1103e or protrudes from the female slot 1103e along the centre line 1103c, the male pin head 1103d is twisted, e.g. 90 degrees anti-clockwise, into a locked position/orientation 1103b of the twist lock engagement 1103. To release the twist lock engagement 1103, the user 60 reverses the twisting motion, and twist the male pin head 1103d by 90 degrees clockwise, reverting into the original unlocked position of 1103a to release the twist lock engagement 1103 via a single hand action.

[0043] FIGs. 7, 8A and 8B illustrate a seat belt 200 according to various embodiments. The seat belt 200 may include an elongated belt body 220. The elongated belt body 220 may define a first end 220a and an opposing second end 220b. The first end 220a may be coupled to a first coupling member 211, and the second end 220b may be coupled to a second coupling member 212. Similarly to previous embodiments, the first coupling member 211 may be detachably coupleable with a first coupling point 231 of a toilet fixture 230 and the second coupling member 212 may be detachably coupleable with a second coupling point 232 of the toilet fixture 230.

[0044] According to various embodiments, the toilet fixture 230 may further include a first support 233 and a second support 234. Each of the first support 233 and the second support 234 may be coupled to a toilet bowl 80 or a supporting structure 70 of the toilet system 90. The first coupling point 231 may be coupled to the first support 233, and the second coupling point 232 may be coupled to the second support 234. The first support 241 and the second support 242 may be detachably attachable to existing toilet bowls 80 or toilet seats 82 (see FIG. 7) allowing a quick and economical way of modifying existing toilet systems in airplanes, to implement the proposed toilet system. In some implementations, the first support 233 and the second support 234 may be integrally formed into a single structure which is detachably attachable to the toilet bowl 80 or the supporting structure of the toilet system 90.

[0045] In various embodiments, the belt body 220 may include a first belt segment 222 and a second belt segment 223. In addition, a segment coupler 224 may be disposed between the first belt segment 222 and the second belt segment 223. The segment coupler 224 may provide a detachable coupling attachment between the first belt segment 222 and the second belt segment 223. The segment coupler 224 may include a first segment coupling member 225 and a second segment coupling member 226. In some embodiments, the segment coupler 224 may provide a quick release engagement between the first belt segment 222 and the second belt

segment 223. In times of emergency, the segment coupler 224 which may be located generally at a middle sagittal plane of the user 60, provides a relatively easy and quick way to release the user 60 from the toilet seat.

[0046] In one scenario illustrated in FIG. 9A, during an emergency, the first segment coupling member 225a and the second segment coupling member 226a may be quickly disengaged allowing the user 60 to rise or move away from the toilet bowl 80/toilet seat 82 while keeping the seat belt 200 coupled to the toilet fixture 230. In another scenario illustrated in FIG. 9B, upon using the lavatory, the respective coupling member 211/212 are disengaged from the respective coupling points 231/232 to be removed from the toilet fixture 230, while the first segment coupling member 225b and the second segment coupling member 226b remained in engagement.

[0047] According to various embodiments as illustrated in FIG. 10A, a personalized seat belt 300 may be used by children or handicapped personnel. In such embodiments, the segment coupler 324 may be an assisted segment coupler 324 which includes a belt clip 325 and a belt loop 326. In contrast to the quick release engagement for the segment coupler according to previous embodiments, the assisted segment coupler 324 features a two-handed release operation in preventing accidental releases and facilitates aid provision by parents or caregivers during operation. Aid providers will access to hook and unhook the belt clip 325 from the belt loop 326, while being able to adjust the first belt segment 322 and the second belt segment 323 to a suitable length for the user.

[0048] In some embodiments, multiple toilet fixtures 330 or more than two coupling points 331/332/333/334 may be provided in the toilet system. As a non-exhaustive example, there may be two coupling points 331/332 coupled to the toilet bowl, and another two coupling points 333/334 coupled to the supporting structure or wall of the toilet system. This allows aid providers to secure themselves to the supporting structure via another personalized safety belt

while or after attending to the children or handicapped personnel. In addition, more than two coupling points 331/332/333/334 allow the user choices in selecting the most suitable / convenient coupling points to attach the seat belt 300.

[0049] In various embodiments, as shown in FIG. 10B, the seat belt 400 comprises a belt body 420 and one or more resilient members 430, such as rubber blocks. The resilient members 430, may be disposed on opposing sides of the belt body 420, to apply a restoring force to the belt body 420 responsive to a change in a length of the belt body 420. The belt body 420 may be generally inextensible or has a relatively constant length while the resilient members 430 provides a “stretch limit” or “elastic limit” to the seat belt 400.

[0050] FIG. 11 illustrates a personalized seat belt 500 according to various embodiments. The seat belt 500 may comprise a flexible belt body 520 such that the seat belt 500 is foldable for portability and/or storage. While the above embodiments were described as a toilet system on an airplane, it would be apparent that the premise is not limiting and the proposed toilet system may be adapted to other vehicles and/or vessels with an on-board toilet system.

[0051] All examples described herein, whether of methods, materials, or products, are presented for the purpose of illustration and to aid understanding and are not intended to be limiting or exhaustive. Modifications may be made by one of ordinary skill in the art without departing from the scope of the invention as claimed.

CLAIMS

1. A personalized seat belt, comprising:
 - an elongated belt body, the belt body defining a first end and an opposing second end;
 - a first coupling member coupled to the first end, the first coupling member being detachably coupleable with a first coupling point of a toilet; and
 - a second coupling member coupled to the second end, the second coupling member being detachably coupleable with a second coupling point of the toilet,
 - wherein the first coupling point and the second coupling point are disposed on opposing sides of a toilet seat in the toilet.
2. The seat belt as recited in claim 1, wherein the belt body comprises an adjustable length.
3. The seat belt as recited in any one of claims 1 to 2, wherein the belt body further comprises a resilient member, wherein the resilient member applies a restoring force to the belt body responsive to a change in a length of the belt body.
4. The seat belt as recited in any one of claims 1 to 3, wherein each of the first coupling member and the second coupling member is in a quick release engagement with the respective first coupling point and second coupling point.
5. The seat belt as recited in claim 4, wherein the quick release engagement is releasable responsive to a single hand motion.

6. The seat belt as recited in any one of claims 1 to 5, wherein the belt body further comprises a first belt segment; a second belt segment; and a segment coupler disposed between the first belt segment and the second belt segment, wherein the segment coupler provides a detachable attachment between the first belt segment and the second belt segment.
7. The seat belt as recited in claim 6, wherein the segment coupler provides a quick release engagement between the first belt segment and the second belt segment.
8. A toilet system, comprising:
 - a toilet fixture, the toilet fixture comprises a first coupling point and a second coupling point, wherein the first coupling point and the second coupling point are disposed on opposing sides of a toilet seat,
 - wherein the toilet fixture is coupleable to a seat belt, the seat belt comprising an elongated belt body defining a first end and an opposing second end; a first coupling member coupled to the first end, the first coupling member being detachably coupleable with the first coupling point; and a second coupling member coupled to the second end, the second coupling member being detachably coupleable with the second coupling point.
9. The toilet system as recited in claim 8, wherein the toilet fixture is detachably coupleable to the toilet seat.
10. The toilet system as recited in any one of claims 8 to 9, wherein the belt body comprises an adjustable length.

11. The toilet system as recited in any one of claims 8 to 10, wherein the belt body further comprises a resilient member, wherein the resilient member applies a restoring force to the belt body responsive to a change in a length of the belt body.
12. The toilet system as recited in any one of claims 8 to 11, wherein each of the first coupling member and the second coupling member is in a quick release engagement with the respective first coupling point and second coupling point.
13. The toilet system as recited in claim 12, wherein the quick release engagement is releasable responsive to a single hand motion.
14. The toilet system as recited in any one of claims 8 to 13, wherein the belt body further comprises a first belt segment; a second belt segment; and a segment coupler disposed between the first belt segment and the second belt segment, wherein the segment coupler provides a detachable attachment between the first belt segment and the second belt segment.
15. The toilet system as recited in claim 14, wherein the segment coupler provides a quick release engagement between the first belt segment and the second belt segment.
16. A vehicle comprising the toilet system as recited in any one of claims 8 to 15.