CONNECTOR

BACKGROUND OF THE INVENTION

[0001] Various occupations place people in precarious positions at relatively dangerous heights thereby creating a need for fall-arresting or fall protection safety apparatus. Among other things, such apparatus usually include a safety line interconnected between a support structure and a person working in proximity to the support structure. The safety line is typically secured to a full-body safety harness worn by the worker. A connector may be used to interconnect the safety line and the full-body safety harness. Obviously, it is important that the connector be reliable and able to withstand the forces of a fall. In addition, it is preferred that the connector be user friendly.

[0002] For the reasons stated above and for other reasons stated below, which will become apparent to those skilled in the art upon reading and understanding the present specification, there is a need in the art for a connector that is reliable and user friendly.

BRIEF SUMMARY OF THE INVENTION

[0003] The above-mentioned problems associated with prior devices are addressed by embodiments of the present invention and will be understood by reading and understanding the present specification. The following summary is made by way of example and not by way of limitation. It is merely provided to aid the reader in understanding some of the aspects of the invention.

[0004] In one embodiment, a connector comprises a base, a gate, and a locking mechanism. The base forms an opening. The gate is slidably operatively connected to the base and spans the opening. The locking member has an engaging position and a releasing position. The engaging position secures the gate to the base, and the releasing position allows the gate to be moved relative to the base.

~~[0005] In one embodiment, a connector comprises a base and a gate. The base includes a first end and a second end forming an opening. The first end includes a first receiving portion, a first locking portion, and a first locking mechanism. The first receiving portion includes a first receiving portion bore. The first locking portion is operatively connected to the first receiving portion and includes a first locking portion bore in fluid communication with the first~~

~~receiving portion bore. The first locking mechanism is positioned within the first locking portion bore and has an engaging position and a releasing position. The first locking mechanism extends at least partially into the first receiving portion bore in the engaging position. The gate is slidably operatively connected to the second end and has a closed position and an open position. The gate spans the opening and a portion of the gate extends through the first receiving portion bore in the closed position. The gate includes a first engaging portion proximate the first receiving portion bore in the closed position. The first locking mechanism extends at least partially into the first engaging portion when the gate is in the closed position and the first locking mechanism is in the first engaging position to secure the gate to the base. The first locking mechanism is positioned out of the first engaging portion when the first locking mechanism is in the releasing position to allow the gate to be moved relative to the base.~~

[0005] According to an aspect of the present invention, there is provided a connector, comprising: a base including a first end and a second end forming an opening; a first receiving portion; a first locking portion; a first locking mechanism, the first receiving portion including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and having an engaging position and a releasing position, a first biasing member biasing the first locking mechanism in the engaging position; the first locking mechanism having a first flanged portion extending at least partially into the first receiving portion bore in the engaging position, the first flanged portion configured and arranged to move longitudinally within the first locking portion bore when the first locking mechanism moves between the engaging position and the releasing position; and a gate slidably operatively connected to the second end, the gate having a closed position and an open position, the gate spanning the opening and a portion of the gate extending through the first receiving portion bore in the closed position, the gate including a first engaging portion proximate the first receiving portion bore in the closed position, the first flanged portion extending at least partially into the first engaging portion when the gate is in the closed position and the first locking mechanism is in the engaging position to secure the gate to the base, the first flanged portion positioned out of the first engaging portion and positioned in the first locking portion bore when the first locking mechanism is in the releasing position to allow the gate to be moved relative to the base.

~~[0006] In one embodiment, a connector comprises a base, a gate, and a locking member. The base includes a first end and a second end forming an opening. The gate is slidably operatively connected to the first end and the second end and is configured and arranged to span the opening. The locking member has an engaging position and a releasing position. The engaging position secures the gate to the base. The releasing position allows the gate to be moved relative to the base. The locking member comprises a first locking member and a second locking member. The first locking member is proximate the first end and the second locking member is proximate the second end. Both the first locking mechanism and the second locking mechanism are positioned in the releasing positions to move the gate relative to the base.~~

[0006] According to another aspect of the present invention, there is provided a connector, comprising: a base including a first end and a second end forming an opening; a gate having a shaft slidably operatively connected to the second end and configured and arranged to span the opening; and a locking member having an engaging position and a releasing position, the locking member being configured and arranged to move in a direction perpendicular to the gate to move between the engaging position and the releasing position, the locking member including a base portion and a flanged portion, the base portion having a smaller diameter than the flanged portion, the flanged portion configured and arranged to engage the shaft of the gate in the engaging position and secure the gate relative to the base, the base portion being positioned proximate the shaft of the gate in the releasing position and the smaller diameter of the base portion allowing the gate to be moved relative to the base.

[0007] According to another aspect of the present invention, there is provided a connector, comprising: a base including a bar portion, a first receiving portion, a first locking portion, a first locking mechanism, a second receiving portion, a second locking portion, and a second locking mechanism, the first and second locking mechanisms each having an engaging position and a releasing position, first and second biasing members biasing the respective first and second locking mechanisms in the engaging position, the first receiving portion being operatively connected to a first end of the bar portion and including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and having a first flanged portion extending at least partially into the first receiving portion bore in the engaging position, the second receiving portion being

operatively connected to a second end of the bar portion and including a second receiving portion bore, the second locking portion being operatively connected to the second receiving portion and including a second locking portion bore in fluid communication with the second receiving portion bore, the second locking mechanism being positioned within the second locking portion bore and having a second flanged portion extending at least partially into the second receiving portion bore in the engaging position, a first opening being formed by the first receiving portion and the second receiving portion, the first receiving portion bore being aligned with the second receiving portion bore, the first and second flanged portions configured and arranged to move longitudinally within the respective first and second locking portion bores when moving between the engaging positions and the releasing positions; a gate including a head and a shaft, the head being operatively connected to one end of the shaft, the shaft including a distal end opposite the head, the shaft including a first engaging portion proximate the distal end and a second engaging portion proximate the head; and wherein the first and second receiving portion bores are configured and arranged to receive the shaft, the first flanged portion being configured and arranged to engage the first engaging portion in the engaging position and the second flanged portion being configured and arranged to engage the second engaging portion in the engaging position, and wherein both the first and second locking mechanisms are positioned in the releasing positions to move the gate relative to the base.

~~[0007] In one embodiment, a connector comprises a base and a gate. The base includes a bar portion, a first receiving portion, a first locking portion, a first locking mechanism, a second receiving portion, a second locking portion, and a second locking mechanism. The first receiving portion is operatively connected to a first end of the bar portion and includes a first receiving portion bore. The first locking portion is operatively connected to the first receiving portion and includes a first locking portion bore in fluid communication with the first receiving portion bore. The first locking mechanism is positioned within the first locking portion bore and extends at least partially into the first receiving portion bore. The second receiving portion is operatively connected to a second end of the bar portion and includes a second receiving~~

~~portion bore. The second locking portion is operatively connected to the second receiving portion and includes a second locking portion bore in fluid communication with the second receiving portion bore. The second locking mechanism is positioned within the second locking portion bore and extends at least partially into the second receiving portion bore. A first opening is formed by the first receiving portion and the second receiving portion. The first receiving portion bore is aligned with the second receiving portion bore. The first and second locking mechanisms each have an engaging position and a releasing position. The gate includes a head and a shaft. The head is operatively connected to one end of the shaft, and the shaft includes a distal end opposite the head. The shaft also includes a first engaging portion proximate the distal end and a second engaging portion proximate the head. The first and second receiving portion bores are configured and arranged to receive the shaft, the first locking mechanism is configured and arranged to engage the first engaging portion in the engaging position and the second locking mechanism is configured and arranged to engage the second engaging portion in the engaging position, and both the first and second locking mechanisms are positioned in the releasing positions to move the gate relative to the base.~~

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The present invention can be more easily understood, and further advantages and uses thereof can be more readily apparent, when considered in view of the detailed description and the following Figures in which:

[0009] Figure 1 is an exploded front perspective view of a connector constructed in accordance with the principles of the present invention;

[0010] Figure 2 is a front view of the connector shown in Figure 1;

[0011] Figure 3A is a cross-section view of the connector taken along the lines 3-3 in Figure 2 in an engaging position;

[0012] Figure 3B is a cross-section view of the connector shown in Figure 3A in a releasing position;

[0013] Figure 4 is a front perspective view of a base of the connector;

[0014] Figure 5 is a front view of the base shown in Figure 4;

CLAIMS

1. A connector, comprising:

a base including a first end and a second end forming an opening, the first end including a first receiving portion, a first locking portion, and a first locking mechanism, the first receiving portion including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and having an engaging position and a releasing position, the first locking mechanism extending at least partially into the first receiving portion bore in the engaging position; and

a gate slidably operatively connected to the second end, the gate having a closed position and an open position, the gate spanning the opening and a portion of the gate extending through the first receiving portion bore in the closed position, the gate including a first engaging portion proximate the first receiving portion bore in the closed position, the first locking mechanism extending at least partially into the first engaging portion when the gate is in the closed position and the first locking mechanism is in the first engaging position to secure the gate to the base, the first locking mechanism positioned out of the first engaging portion when the first locking mechanism is in the releasing position to allow the gate to be moved relative to the base.

2. The connector of claim 1, further comprising a slot extending longitudinally along a portion of the gate and a pin operatively connected to the second end of the base extending into the slot.

3. The connector of claim 1, wherein the first locking mechanism comprises a biasing member, an engaging member, and a fastener, the fastener operatively connecting the biasing member and the engaging member to the first locking portion, the biasing member biasing the engaging member in the engaging position.

4. The connector of claim 1, further comprising a notch proximate a distal end of the gate and a ramp portion interconnecting the notch and the first engaging portion, the notch and the ramp portion assisting in sliding the distal end of the shaft past the first locking mechanism when the gate is moved from the open position to the closed position.

5. The connector of claim 1, further comprising the second end including a second receiving portion, a second locking portion, and a second locking mechanism, the second receiving portion including a second receiving portion bore, the second locking portion being operatively connected to the second receiving portion and including a second locking portion bore in fluid communication with the second receiving portion bore, the second locking mechanism being positioned within the second locking portion bore and having an engaging position and a releasing position, the second locking mechanism extending at least partially into the second receiving portion bore in the engaging position, the gate including a second notch proximate the second receiving portion bore in the closed position, the second locking mechanism extending at least partially into the second notch when the gate is in the closed position and the second locking mechanism is in the engaging position to secure the gate to the base, the second locking mechanism positioned out of the notch when the second locking mechanism is in the releasing position, both of the first and second locking mechanisms are positioned in the releasing positions to allow the gate to be moved relative to the base.

6. The connector of claim 5, further comprising a first extension portion including a first ring portion with a first aperture and a second extension portion including a second ring portion with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

7. The connector of claim 6, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

8. The connector of claim 7, wherein a safety harness is operatively connected to the bar portion and a safety device is operatively connected to the gate proximate the first opening.

9. The connector of claim 7, wherein a safety harness is operatively connected to the bar portion, a first safety device is operatively connected to the gate proximate the second opening, and a second safety device is operatively connected to the gate proximate the third opening.

10. A connector, comprising:

a base including a first end and a second end forming an opening;

a gate slidably operatively connected to the first end and the second end and configured and arranged to span the opening; and

a locking member having an engaging position and a releasing position, the engaging position securing the gate to the base, the releasing position allowing the gate to be moved relative to the base, the locking member comprising a first locking member and a second locking member, the first locking member being proximate the first end and the second locking member being proximate the second end, and wherein both the first locking mechanism and the second locking mechanism are positioned in the releasing positions to move the gate relative to the base.

11. The connector of claim 10, wherein each of the first and second locking mechanisms comprises a biasing member, an engaging member, and a fastener, the fastener operatively connecting the biasing member and the engaging member to the respective locking portion, the biasing member biasing the engaging member in the engaging position.

12. The connector of claim 10, further comprising a first receiving portion bore in the first end, a second receiving portion bore in the second end, a first extension portion including a first ring portion with a first aperture, and a second extension portion including a second ring portion with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

13. The connector of claim 12, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

14. A connector, comprising:

a base including a bar portion, a first receiving portion, a first locking portion, a first locking mechanism, a second receiving portion, a second locking portion, and a second locking mechanism, the first receiving portion being operatively connected to a first end of the bar portion and including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and extending at least partially into the first receiving portion bore, the second receiving portion being operatively connected to a second end of the bar portion and including a second receiving portion bore, the second locking portion being operatively connected to the second receiving portion and including a second

locking portion bore in fluid communication with the second receiving portion bore, the second locking mechanism being positioned within the second locking portion bore and extending at least partially into the second receiving portion bore, a first opening being formed by the first receiving portion and the second receiving portion, the first receiving portion bore being aligned with the second receiving portion bore, the first and second locking mechanisms each having an engaging position and a releasing position;

a gate including a head and a shaft, the head being operatively connected to one end of the shaft, the shaft including a distal end opposite the head, the shaft including a first engaging portion proximate the distal end and a second engaging portion proximate the head; and

wherein the first and second receiving portion bores are configured and arranged to receive the shaft, the first locking mechanism being configured and arranged to engage the first engaging portion in the engaging position and the second locking mechanism being configured and arranged to engage the second engaging portion in the engaging position, and wherein both the first and second locking mechanisms are positioned in the releasing positions to move the gate relative to the base.

15. The connector of claim 14, further comprising:

a slot extending longitudinally along a portion of the shaft;

a lateral bore in the second receiving portion; and

a retaining pin extending through the lateral bore and into the slot, the retaining pin acting as a stop to prevent the gate from being completely removed from the base.

16. The connector of claim 14, wherein the first locking portion bore is perpendicular to the first receiving portion bore and the second locking portion bore is perpendicular to the second receiving portion bore.

17. The connector of claim 14, wherein the first and second locking mechanisms each comprise a biasing member, an engaging member, and a fastener, the fastener operatively connecting the biasing member and the engaging member to the respective locking portion, the biasing member biasing the engaging member in the engaging position.

18. The connector of claim 14, further comprising a first extension portion including a first ring portion with a first aperture and a second extension portion including a second ring portion with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

19. The connector of claim 18, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

20. The connector of claim 19, wherein a safety harness is operatively connected to the bar portion and a safety device is operatively connected to the gate proximate the first opening.

21. The connector of claim 19, wherein a safety harness is operatively connected to the bar portion, a first safety device is operatively connected to the gate proximate the second opening, and a second safety device is operatively connected to the gate proximate the third opening.

22. The connector of claim 14, further comprising a notch proximate the distal end of the shaft and a ramp portion interconnecting the notch and the first engaging portion, the notch and the ramp portion assisting in sliding the distal end of the shaft past the first locking mechanism.

CLAIMS

1. A connector, comprising:

a base including a first end and a second end forming an opening;

a first receiving portion;

a first locking portion;

a first locking mechanism, the first receiving portion including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and having an engaging position and a releasing position, a first biasing member biasing the first locking mechanism in the engaging position; the first locking mechanism having a first flanged portion extending at least partially into the first receiving portion bore in the engaging position, the first flanged portion configured and arranged to move longitudinally within the first locking portion bore when the first locking mechanism moves between the engaging position and the releasing position; and

a gate slidably operatively connected to the second end, the gate having a closed position and an open position, the gate spanning the opening and a portion of the gate extending through the first receiving portion bore in the closed position, the gate including a first engaging portion proximate the first receiving portion bore in the closed position, the first flanged portion extending at least partially into the first engaging portion when the gate is in the closed position and the first locking mechanism is in the engaging position to secure the gate to the base, the first flanged portion positioned out of the first engaging portion and positioned in the first locking portion bore when the first locking mechanism is in the releasing position to allow the gate to be moved relative to the base.

2. The connector of claim 1, further comprising a slot extending longitudinally along a portion of the gate and a pin operatively connected to the second end of the base extending into the slot.

3. The connector of claim 1, wherein the first locking mechanism comprises the biasing member, an engaging member, and a fastener, the fastener operatively connecting the biasing member and the engaging member to the first locking portion, the biasing member biasing the engaging member in the engaging position, the engaging member including the first flanged portion.

4. The connector of claim 1, further comprising a notch proximate a distal end of the gate and a ramp portion interconnecting the notch and the first engaging portion, the notch and the ramp portion assisting in sliding the distal end of the shaft past the first locking mechanism when the gate is moved from the open position to the closed position.

5. The connector of claim 1, further comprising the second end including a second receiving portion, a second locking portion, and a second locking mechanism, the second receiving portion including a second receiving portion bore, the second locking portion being operatively connected to the second receiving portion and including a second locking portion bore in fluid communication with the second receiving portion bore, the second locking mechanism being positioned within the second locking portion bore and having an engaging position and a releasing position, a second biasing member biasing the second locking mechanism in the engaging position, the second locking mechanism having a second flanged portion extending at least partially into the second receiving portion bore in the engaging position, the second flanged portion configured and arranged to move longitudinally within the second locking portion bore when the second locking mechanism moves between the engaging position and the releasing position, the gate including a second notch proximate the second receiving portion bore in the closed position, the second flanged portion extending at least partially into the second notch when the gate is in the closed position and the second locking mechanism is in the engaging position to secure the gate to the base, the second flanged portion positioned out of the notch and positioned in the second locking portion bore when the second locking mechanism is in the releasing position, both of the first and second locking mechanisms are positioned in the releasing positions to allow the gate to be moved relative to the base.

6. The connector of claim 5, further comprising a first extension portion including a first ring portion with a first aperture and a second extension portion including a second ring portion

with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

7. The connector of claim 6, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

8. The connector of claim 7, wherein the bar portion is configured and arranged to be operatively connected to a safety harness and the gate is configured and arranged to be operatively connected to a safety device proximate the first opening.

9. The connector of claim 7, wherein the bar portion is configured and arranged to be operatively connected to a safety harness, the gate is configured and arranged to be operatively connected to a first safety device proximate the second opening, and the gate is configured and arranged to be operatively connected to a second safety device proximate the third opening.

10. The connector of claim 1, wherein the first end includes the first receiving portion the first locking portion, and the first locking mechanism.

11. The connector of claim 1, wherein the first receiving portion is operatively connected to the base.

12. The connector of claim 12, wherein the first receiving portion and the base are integral.

13. A connector, comprising:

a base including a first end and a second end forming an opening;

a gate having a shaft slidably operatively connected to the second end and configured and arranged to span the opening; and

a locking member having an engaging position and a releasing position, the locking member being configured and arranged to move in a direction perpendicular to the gate to move

between the engaging position and the releasing position, the locking member including a base portion and a flanged portion, the base portion having a smaller diameter than the flanged portion, the flanged portion configured and arranged to engage the shaft of the gate in the engaging position and secure the gate relative to the base, the base portion being positioned proximate the shaft of the gate in the releasing position and the smaller diameter of the base portion allowing the gate to be moved relative to the base.

14. The connector of claim 13, wherein the locking member further comprises a biasing member, an engaging member, and a fastener, the fastener operatively connecting the biasing member and the engaging member to the locking member, the biasing member biasing the engaging member in the engaging position, the engaging member including the first flanged portion.

15. The connector of claim 13, further comprising a first receiving portion bore in the first end, a second receiving portion bore in the second end, a first extension portion including a first ring portion with a first aperture, and a second extension portion including a second ring portion with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

16. The connector of claim 15, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

17. The connector of claim 13, wherein the locking member comprises a first locking member and a second locking member, the first locking member being proximate the first end and the second locking member being proximate the second end, and wherein both the first locking mechanism and the second locking mechanism are positioned in the releasing positions to move the gate relative to the base.

18. The connector of claim 13, wherein the gate is configured and arranged to move relative to the base in a first direction, and the locking member is configured and arranged to move in a second direction, the second direction being perpendicular to the first direction.

19. A connector, comprising:

a base including a bar portion, a first receiving portion, a first locking portion, a first locking mechanism, a second receiving portion, a second locking portion, and a second locking mechanism, the first and second locking mechanisms each having an engaging position and a releasing position, first and second biasing members biasing the respective first and second locking mechanisms in the engaging position, the first receiving portion being operatively connected to a first end of the bar portion and including a first receiving portion bore, the first locking portion being operatively connected to the first receiving portion and including a first locking portion bore in fluid communication with the first receiving portion bore, the first locking mechanism being positioned within the first locking portion bore and having a first flanged portion extending at least partially into the first receiving portion bore in the engaging position, the second receiving portion being operatively connected to a second end of the bar portion and including a second receiving portion bore, the second locking portion being operatively connected to the second receiving portion and including a second locking portion bore in fluid communication with the second receiving portion bore, the second locking mechanism being positioned within the second locking portion bore and having a second flanged portion extending at least partially into the second receiving portion bore in the engaging position, a first opening being formed by the first receiving portion and the second receiving portion, the first receiving portion bore being aligned with the second receiving portion bore, the first and second flanged portions configured and arranged to move longitudinally within the respective first and second locking portion bores when moving between the engaging positions and the releasing positions;

a gate including a head and a shaft, the head being operatively connected to one end of the shaft, the shaft including a distal end opposite the head, the shaft including a first engaging portion proximate the distal end and a second engaging portion proximate the head; and

wherein the first and second receiving portion bores are configured and arranged to receive the shaft, the first flanged portion being configured and arranged to engage the first

engaging portion in the engaging position and the second flanged portion being configured and arranged to engage the second engaging portion in the engaging position, and wherein both the first and second locking mechanisms are positioned in the releasing positions to move the gate relative to the base.

20. The connector of claim 19, further comprising:

a slot extending longitudinally along a portion of the shaft;

a lateral bore in the second receiving portion; and

a retaining pin extending through the lateral bore and into the slot, the retaining pin acting as a stop to prevent the gate from being completely removed from the base.

21. The connector of claim 19, wherein the first locking portion bore is perpendicular to the first receiving portion bore and the second locking portion bore is perpendicular to the second receiving portion bore.

22. The connector of claim 19, wherein the first and second locking mechanisms each comprise an engaging member and a fastener, the fastener operatively connecting the respective biasing member and the engaging member to the respective locking portion, the engaging member including the respective flanged portion.

23. The connector of claim 19, further comprising a first extension portion including a first ring portion with a first aperture and a second extension portion including a second ring portion with a second aperture, the first and second apertures being aligned with the first and second receiving portion bores.

24. The connector of claim 23, wherein a first opening is formed by the first extension portion and the second extension portion, a second opening is formed by the first receiving portion and the first extension portion, and a third opening is formed by the second extension portion and the second receiving portion.

25. The connector of claim 24, wherein the bar portion is configured and arranged to be operatively connected to a safety harness and the gate is configured and arranged to be operatively connected to a safety device proximate the first opening.

26. The connector of claim 24, wherein the bar portion is configured and arranged to be operatively connected to a safety harness, the gate is configured and arranged to be operatively connected to a first safety device proximate the second opening, and the gate is configured and arranged to be operatively connected to a second safety device proximate the third opening.

27. The connector of claim 19, further comprising a notch proximate the distal end of the shaft and a ramp portion interconnecting the notch and the first engaging portion, the notch and the ramp portion assisting in sliding the distal end of the shaft past the first locking mechanism.