CLAIMS

1. A pinned connection comprising:

a first connection element defining an aperture, at least a portion of the aperture being threaded;

a second connection element defining a hole;

a pin extending into the aperture and the hole; and

an insert located within the aperture and adapted to contact the pin, at least a portion of the insert having a threaded surface that engages the threaded surface of the aperture.

2. The pinned connection recited in claim 1, wherein the threads of the aperture and the insert are formed on corresponding tapered surfaces.

3. The pinned connection recited in claim 1, wherein the insert overlies an end of the pin and prevents removal of the pin from the pinned connection through the aperture.

4. The pinned connection recited in claim 1, wherein the insert defines a bushing and surrounds a portion of the pin.

5. The pinned connection recited in claim 1, further including a bushing located within the aperture, the bushing defining an opening that extends around the pin.

6. The pinned connection recited in claim 5, wherein a central axis of the pin is offset from a center of the bushing.

7. The pinned connection recited in claim 1, wherein the insert defines a cavity that receives the pin.

8. The pinned connection recited in claim 7, wherein at least a portion of the cavity tapers inward and an end portion of the pin located within the cavity has a corresponding taper.

9. The pinned connection recited in claim 7, wherein an overlay forms at least a portion of a surface of the cavity, the overlay being composed of a wear-resistant material.

10. The pinned connection recited in claim 1, further including a lock, wherein the first connection element includes a locking formation to engage the lock, and wherein the lock is adapted to contact the insert to prevent removal of the insert from the first connection element.

11. The pinned connection recited in claim 1 wherein the first connection element includes a pair of spaced apart arms, one of the arms including the first aperture and the other arm including a second aperture aligned with the first aperture, wherein the second connection element is positioned between the arms so that the hole aligns with the first and second apertures, and wherein the pin is received into the first aperture, the second aperture, and the hole.

12. The pinned connection recited in claim 11, wherein at least a portion of the second aperture is threaded and threadedly engages a second one of the inserts, and wherein the threaded surfaces of the apertures and the threaded surfaces of the inserts have corresponding frustroconical configurations.

13. The pinned connection of claim 12 including a lock, wherein the first connection element includes a locking formation on each of the arms, and wherein the lock is received into each of the locking formations to inhibit removal of the inserts from the apertures.

14. The pinned connection recited in claim 13 wherein each of the inserts opposes an end of the pin to prevent removal of the pin past the insert.

15. The pinned connection recited in claim 14 wherein each of the inserts includes an opening that receives a portion of the pin.

16. The pinned connection recited in claim 12 wherein each of the inserts includes an opening that receives a portion of the pin.

17. The pinned connection recited in claim 16, wherein an overlay of wear resistant material forms at least a portion of a surface of the opening.

18. The pinned connection recited in claim 16, wherein a surface of each of the openings in the inserts receiving the pin defines a tapered area, and wherein the pin has opposite ends each formed with a corresponding taper.

19. A connection system for a pinned connection, the connection system comprising:

a connection element having a pair of arms each including an aperture with an inner surface that includes threads, the surface of the aperture having a frustroconical configuration at least along the threads;

a retainer located within each of the apertures, each said retainer having an outer surface, an opposite inner surface, and a side surface that tapers inward from the outer surface to the inner surface to define a frustroconical configuration, the side surface having threads that engage the threads of the respective aperture;

a pin having two ends and a central area located between the ends, the ends extending into the apertures and being opposed by the inner surface of the retainer; and

a bushing located within each of the apertures, each said bushing defining an opening that extends around one of the ends of the pin.

20. The connection system recited in claim 19, wherein the connection element defines an indentation located adjacent to each of the apertures, and the connection system further includes a lock located within each of the indentations, a portion of the lock extending over the outer surface of the retainer to prevent removal of the retainers from the respective aperture.

21. A connection system for a pinned connection, the connection system comprising:

a connection element having a pair of arms each including an aperture with a surface that includes threads, the surface of the aperture having a frustroconical configuration at least along the threads;

a bushing located within each of the apertures, each said bushing having an outer surface, an opposite inner surface, and a side surface that tapers inward from the outer surface to the inner surface to define a frustroconical configuration, the side surface having threads that engage the threads of the respective aperture, and the inner surface defining an opening that extends toward the outer surface; and

a pin having two ends and a central area located between the ends, the ends extending into the openings in the bushings.

22. The connection system recited in claim 21, wherein each said opening and each said end of the pin are tapered.

23. The connection system recited in claim 21, wherein an overlay of wear resistant material forms at least a portion of a surface of the opening.

24. The connection system recited in claim 21, wherein the connection element defines at least one indentation on each arm located adjacent to the aperture, and the first surface of the bushing defines a groove, the connection system further including a lock located within the indentation of each of arms and within the groove of each of the bushings.

25. A dragline excavating system having a plurality of components joined through pinned connections, at least one of the pinned connections comprising:

a first connection element defining an aperture, at least a portion of the aperture being threaded;

a second connection element defining a hole;

a pin extending into the aperture and the hole; and

an insert located within the aperture and adapted to contact the pin, at least a portion of the insert having a threaded surface that engages the threaded surface of the aperture.

26. The dragline excavating system recited in claim 25, wherein the threads of the aperture and the insert are formed on corresponding tapered surfaces.

27. A bushing for a pinned connection having an opening for receiving a pin joining two connection elements together and an outer surface adapted to engage and be received into an aperture in one of the connection elements, at least a portion of the outer surface defining threads to engage corresponding threads in the aperture to hold the bushing in the aperture.

28. The bushing recited in claim 27, wherein the portion of the outer surface defining the threads has a frustroconical configuration.

29. The bushing recited in claim 28, wherein at least a portion of the opening is tapered.

30. The bushing recited in claim 28, wherein the opening is provided with an overlay.

31. A retainer for a pinned connection having a first connection element including a pair of arms each with an aperture, a second connection element that fits between the arms and has a hole that aligns with the aperture, and a pin received in the hole and each of the apertures, the retainer comprising an inner surface to oppose an end of the pin and prevent removal of the pin past the retainer, and opposite outer surface including a tool engaging formation, and a peripheral side surface having a configuration that tapers from the outer surface to the inner surface and including threads for engaging corresponding threads in the aperture.