

What is claimed is:

1. A coupling for joining pipe elements, said coupling comprising:

first and second segments positioned end to end surrounding a central space for receiving said pipe elements;

a spring assembly joining a first end of said first segment to a first end of said second segment, said spring assembly biasing said segments away from one another;

an adjustable attachment assembly joining a second end of said first segment to a second end of said second segment, said adjustable attachment assembly adapted to draw said first and second segments toward one another and into engagement with said pipe elements.

2. The coupling according to claim 1, wherein said spring assembly comprises:

a first boss projecting from said first end of said first segment;

a second boss projecting from said first end of said second segment and positioned adjacent to said first boss;

a first fulcrum positioned on said first boss and contacting said second boss, said segments pivoting about said first fulcrum;

a link extending between and capturing said first and second bosses.

3. The coupling according to claim 2, further comprising a second fulcrum positioned on said second boss, said second fulcrum contacting said first fulcrum.

4. The coupling according to claim 3, further comprising:

a first land positioned contiguous with said first fulcrum on said first boss;

a second land positioned contiguous with said second fulcrum on said second boss, said first and second lands being oriented angularly with respect to a plane defining an interface between said first and second segments.

5. The coupling according to claim 2, further comprising:

a first head projecting from said first boss;

a second head projecting from said second boss, said link engaging said first and second heads for retaining said link to said bosses.

6. The coupling according to claim 5, wherein said link comprises a ring encircling said first and second bosses.

7. The coupling according to claim 1, wherein said adjustable attachment assembly comprises:

a first lug attached to said second end of said first segment;

a second lug attached to said second end of said second segment and positioned in facing relation with said first lug, each said lug defining a respective hole;

a fastener extending between said first and second lugs, said fastener being received within said respective holes, said fastener being adjustable for drawing said segments toward one another against said biasing of said spring assembly.

8. The coupling according to claim 1, wherein each of said first and second segments comprises:

first and second channels positioned on opposite sides of said segments, each of said channels extending between said ends of said segments and having a first floor and a second floor facing said central space, said first floor having a greater radius of curvature than said second floor;

first and second retainers positioned respectively in said first and second channels, each of said retainers comprising a band having oppositely disposed ends, a

plurality of teeth being positioned along one edge of said band and projecting toward said central space, at least one tab being positioned along an opposite edge of said band, said band overlying said first floor, said at least one tab overlying said second floor when said retainers are positioned within said channels.

9. The coupling according to claim 8, comprising a plurality of said tabs.

10. The coupling according to claim 8, further comprising:

a third channel positioned between said first and second channels in each of said segments, said third channels extending between said ends of said segments and facing said central space.

11. The coupling according to claim 8, wherein said teeth are oriented angularly with respect to a line extending radially from an axis arranged coaxially with said central space.

12. The coupling according to claim 8, wherein said at least one tab is oriented perpendicularly to a line extending radially from an axis arranged coaxially with said central space.

13. The coupling according to claim 8, wherein said at least one tab is offset from said band toward an axis arranged coaxially with said central space.

14. The coupling according to claim 10, wherein said at least one tab projects toward said third channel.

15. The coupling according to claim 8, further comprising a first aperture in at least one of said segments.

16. The coupling according to claim 15, wherein said first aperture is aligned with said first channel and provides a line of sight toward said central space.

17. The coupling according to claim 15, wherein said first aperture is positioned between said first and second segments.

18. The coupling according to claim 17, wherein said first aperture comprises a trough positioned at an interface between said first and second segments.
19. The coupling according to claim 15, further comprising a second aperture in at least one of said segments.
20. The coupling according to claim 19, wherein said second aperture is aligned with said second channel and provides a line of sight toward said central space.
21. The coupling according to claim 19, wherein said second aperture is positioned between said first and second segments.
22. The coupling according to claim 21, wherein said second aperture comprises a trough positioned at an interface between said two segments.
23. The coupling according to claim 10, further comprising:
- a ring seal positioned within said third channels, said ring seal having an inner surface sized to receive said pipe elements and an outer surface sized to support said segments in spaced apart relation sufficient to permit insertion of said pipe elements into said central space while said segments are attached to one another.
24. The coupling according to claim 23, wherein said retainer bands are sized to cooperate with said ring seals to support said housing portions in said spaced apart relation.
25. The coupling according to claim 1, wherein each of said first and second segments comprises:
- first and second shoulders positioned on opposite sides of each of said segments, said shoulders extending lengthwise along said segments and projecting toward said central space, said shoulders defining a channel therebetween;
- a first arcuate surface positioned on said first shoulder;
- a second arcuate surface positioned on said second shoulder, said arcuate surfaces facing said central space.

26. The coupling according to claim 25, further comprising:

a plurality of projections positioned on each of said first and second arcuate surfaces, said projections projecting toward said central space.

27. The coupling according to claim 25, further comprising:

a ring seal positioned within said channel, said ring seal having an inner surface sized to receive said pipe elements and an outer surface sized to support said segments in spaced apart relation sufficient to permit insertion of said pipe elements into said central space while said segments are attached to one another.

28. In combination, a preassembled coupling and a first pipe element, said coupling for joining a second pipe element to said first pipe element, said coupling comprising:

first and second segments positioned end to end surrounding a central space for receiving said pipe elements;

first and second shoulders positioned on opposite sides of each of said segments, said shoulders extending lengthwise along said segments and projecting toward said central space;

a first arcuate surface positioned on said first shoulder;

a second arcuate surface positioned on said second shoulder, said arcuate surfaces facing said central space;

a spring assembly joining a first end of said first segment to a first end of said second segment, said spring assembly biasing said segments away from one another;

an adjustable attachment assembly joining a second end of said first segment to a second end of said second segment, said adjustable attachment assembly adapted to draw said first and second segments toward one another and into engagement with said pipe elements;

said first pipe element comprising a rim projecting outwardly from said first pipe element and extending circumferentially, said rim being positioned in spaced relation to an end of said first pipe element, said rim engaging said first shoulder and being captured within said central space.

29. The combination according to claim 28, wherein said rim is defined by a circumferential groove in said first pipe element.

30. The combination according to claim 28, wherein said rim is defined by a circumferential bead which projects radially outwardly from said first pipe element.

31. The combination according to claim 28, wherein said spring assembly comprises:

a first boss projecting from said first end of said first segment;

a second boss projecting from said first end of said second segment and positioned adjacent to said first boss;

a first fulcrum positioned on said first boss and contacting said second boss, said segments pivoting about said first fulcrum;

a link extending between and capturing said first and second bosses.

32. The combination according to claim 31, further comprising a second fulcrum positioned on said second boss, said second fulcrum contacting said first fulcrum.

33. The combination according to claim 32, further comprising:

a first land positioned contiguous with said first fulcrum on said first boss;

a second land positioned contiguous with said second fulcrum on said second boss, said first and second lands being oriented angularly with respect to a plane defining an interface between said first and second segments.

34. The combination according to claim 31, further comprising:

a first head projecting from said first boss;

a second head projecting from said second boss, said link engaging said first and second heads for retaining said link to said bosses.

35. The combination according to claim 34, wherein said link comprises a ring encircling said first and second bosses.

36. The combination according to claim 28, wherein said adjustable attachment assembly comprises:

a first lug attached to said second end of said first segment;

a second lug attached to said second end of said second segment and positioned in facing relation with said first lug, each said lug defining a respective hole;

a fastener extending between said first and second lugs, said fastener being received within said respective holes, said fastener being adjustable for drawing said segments toward one another against said biasing of said spring assembly.

37. The combination according to claim 28, further comprising:

a channel positioned between said first and second shoulders in each of said segments, said channels extending between said ends of said segments and facing said central space.

38. The combination according to claim 37, further comprising:

a ring seal positioned within said channels, said ring seal having an inner surface sized to receive said pipe elements and an outer surface sized to support said segments in spaced apart relation sufficient to permit insertion of said second pipe element into said central space while said segments are attached to one another and said first pipe element is captured within said central space.

39. The combination according to claim 28, further comprising:

a plurality of projections positioned on each of said first and second arcuate surfaces, said projections projecting toward said central space.

40. The combination according to claim 28, further comprising at least one aperture in at least one of said segments.

41. The combination according to claim 40, wherein said at least one aperture is positioned between said first and second segments.

42. The combination according to claim 41, wherein said at least one aperture comprises a trough positioned at an interface between said first and second segments.

43. The combination according to claim 29, wherein said first arcuate surface has a first radius of curvature and said second arcuate surface has a second radius of curvature, said second radius of curvature being less than said first radius of curvature.

44. A method of assembling the combination coupling and pipe element according to claim 28, said method comprising:

positioning said first pipe element with said rim engaged with said first shoulder of said first segment;

engaging said first end of said first segment with said first end of said second segment to form said spring assembly;

supporting said first and second segments in spaced apart relation sufficient to permit insertion of said second pipe element into said central space while capturing said first pipe element within said central space;

attaching said second end of said first segment to said second end of said second segment using said adjustable attachment assembly.

45. The method according to claim 44, further comprising:

engaging said first pipe element with a ring seal;

positioning said ring seal within a channel defined by said first and second shoulders of said first segment.

46. The method according to claim 44, wherein supporting said first and second segments in spaced apart relation sufficient to permit insertion of said second pipe element into said central space while capturing said first pipe element within said central space comprises support said segments on a ring seal positioned within a channel positioned between said first and second shoulders in each of said segments.

47. The method according to claim 44, wherein engaging said first end of said first segment with said first end of said second segment to form said spring assembly comprises:

joining a first boss projecting from said first end of said first segment with a second boss projecting from a first end of said second segment using a link, and

contacting said second boss with a fulcrum positioned on said first boss.

48. The method according to claim 47, wherein joining said first boss projecting from said first end of said first segment with a second boss projecting from said first end of said second segment using said link comprises inserting said projections within a ring such that said ring surrounds said bosses.

49. The method according to claim 44, wherein attaching said second end of said first segment to said second end of said second segment using said adjustable attachment assembly comprises attaching a first lug mounted on said second end of said first segment to a second lug mounted on said second end of said second segment using a fastener extending between said first and second lugs.

50. A method, using the combination according to claim 38, for joining said second pipe element to said first pipe element, said method comprising:

with said segments attached to one another in spaced apart relation and with said rim of said first pipe element captured within said central space, inserting said second pipe element into said central space;

engaging said second pipe element with said ring seal;

drawing said segments toward one another using said adjustable attachment assembly.

51. The method according to claim 50, further comprising engaging said first and second arcuate surfaces with said first and second pipe elements respectively upon drawing said segments toward one another.

52. The method according to claim 50, further comprising engaging projections on said first and second arcuate surfaces with said first and second pipe elements respectively upon drawing said segments toward one another.

53. The method according to claim 50, wherein said drawing said segments toward one another using said adjustable attachment assembly comprises:

tightening a fastener extending between first and second lugs, said first lug being attached to said second end of said first segment, said second lug being attached to said second end of said second segment and positioned in facing relation with said first lug, said fastener being adjustable for drawing said segments toward one another against said biasing of said spring assembly.

54. The method according to claim 50, further comprising:

observing, through an aperture in at least one of said segments, whether or not said second pipe element is present within said central space;

adjusting a positions of said second pipe element within said central space if said second pipe element is not present within said central space; and

drawing said segments toward one another once said second pipe element is observed to be present within said central space.