What is claimed is:

1. A pipe element having an outer diameter and at least one end, said pipe element comprising:

a shoulder positioned at said end, said shoulder extending circumferentially around said pipe element and having an outwardly facing surface, said outwardly facing surface having an outer diameter greater than said outer diameter of said pipe element excluding said shoulder;

a groove positioned adjacent to said shoulder, said groove extending circumferentially around said pipe element, said groove being defined by a first side surface positioned contiguous with said shoulder, a second side surface positioned in spaced apart relation to said first side surface, and a floor surface extending between said first and second side surfaces, said floor surface having an outer diameter less than said outer diameter of said pipe element excluding said groove.

2. The pipe element according to Claim 1, further comprising a bead positioned contiguous with said groove, said bead extending circumferentially around and projecting radially outwardly from said pipe element and having an apex with an outer diameter greater than said outer diameter of said pipe element excluding said bead.

3. The pipe element according to Claim 2, wherein said outer diameter of said apex is less than said outer diameter of said outwardly facing surface of said shoulder.

4. The pipe element according to Claim 1, wherein said first side surface is oriented substantially perpendicularly to a longitudinal axis of said pipe element.

5. The pipe element according to Claim 1, wherein said first side surface is oriented angularly relatively to a longitudinal axis of said pipe element.

6. The pipe element according to Claim 5, wherein said first side surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

7. The pipe element according to Claim 1, wherein said second side surface is oriented angularly with respect to said longitudinal axis of said pipe element.

8. The pipe element according to Claim 7, wherein said second side surface has an orientation angle measured relatively to said longitudinal axis from about 40° to about 70°.

9. The pipe element according to Claim 7, wherein said second side surface has an orientation angle measured relatively to said longitudinal axis from about 45° to about 65°.

10. The pipe element according to Claim 7, wherein said second side surface has an orientation angle measured relatively to said longitudinal axis of about 55°.

11. The pipe element according to Claim 1, wherein said shoulder further comprises an outwardly facing curved surface positioned contiguous with said first side surface, said outwardly facing curved surface extending circumferentially around said pipe element and having a center of curvature on an axis oriented perpendicularly to a longitudinal axis of said pipe element.

12. The pipe element according to Claim 1, wherein said pipe element has an inner diameter, and said groove has an inner diameter approximately equal to said inner diameter of said pipe element.

13. A pipe element having an outer diameter and first and second ends, said pipe element comprising:

first and second shoulders positioned respectively at said first and second ends, each of said first and second shoulders extending circumferentially around said pipe element and having an outwardly facing surface, each of said outwardly facing surfaces having an outer diameter greater than said outer diameter of said pipe element excluding said first and second shoulders;

first and second grooves positioned adjacent, respectively, to said first and second shoulders, each of said first and second grooves extending circumferentially around said pipe element, each of said first and second grooves being defined, respectively, by a first side surface positioned contiguous with one of said first and second shoulders, a second side

surface positioned in spaced apart relation to said first side surface, and a floor surface extending between said first and second side surfaces, said floor surface of each of said first and second grooves having a respective outer diameter less than said outer diameter of said pipe element excluding said grooves.

14. The pipe element according to Claim 13, further comprising first and second beads positioned contiguous, respectively, with said first and second grooves, each of said first and second beads extending circumferentially around and projecting radially outwardly from said pipe element, each of said first and second beads having a respective apex with an outer diameter greater than said outer diameter of said pipe element excluding said first and second beads.

15. The pipe element according to Claim 14, wherein said outer diameters of each of said apices of said first and second beads is less than said outer diameters of said outwardly facing surfaces of said first and second shoulders.

16. The pipe element according to Claim 13, wherein said first side surface of each of said first and second grooves is oriented substantially perpendicularly to a longitudinal axis of said pipe element.

17. The pipe element according to Claim 13, wherein said first side surface is oriented angularly relatively to a longitudinal axis of said pipe element.

18. The pipe element according to Claim 17, wherein said first side surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

19. The pipe element according to Claim 13, wherein said second side surface of each of said first and second grooves is oriented angularly with respect to said longitudinal axis of said pipe element.

20. The pipe element according to Claim 19, wherein said second side surface of each of said first and second grooves is oriented at an angle relatively to said longitudinal axis from about 40° to about 70°.

21. The pipe element according to Claim 19, wherein said second side surface of each of said first and second grooves is oriented at an angle relatively to said longitudinal axis from about 45° to about 65°.

22. The pipe element according to Claim 19, wherein said second side surface of each of said first and second grooves is oriented at an angle relatively to said longitudinal axis of about 55°.

23. The pipe element according to Claim 13, wherein each of said first and second shoulders further comprises an outwardly facing curved surface positioned contiguous with a respective one of said first side surfaces of said first and second grooves, each of said outwardly facing curved surfaces extending circumferentially around said pipe element and having a center of curvature on respective axes oriented perpendicularly to a longitudinal axis of said pipe element.

24. The pipe element according to Claim 13, wherein said first and second ends are oppositely disposed from one another.

25. In combination, a coupling and at least one pipe element, said pipe element having an outer diameter and at least one end, wherein:

said coupling comprises:

at least one segment surrounding a central space for receiving said end of said pipe element, said at least one segment having an arcuate surface for engaging said pipe element received within said central space; and

said pipe element comprises:

a shoulder positioned at said end, said shoulder extending circumferentially around said pipe element and having an outwardly facing surface, said outwardly facing surface having an outer diameter greater than said outer diameter of said pipe element excluding said shoulder;

a groove positioned adjacent to said shoulder, said groove extending circumferentially around said pipe element, said groove being defined by a first side surface positioned contiguous with said shoulder, a second side surface positioned in spaced apart relation to said first side surface, and a floor surface extending between said first and second side surfaces, said floor surface having an outer diameter less than said outer

diameter of said pipe element excluding said groove, said arcuate surfaces of said segments being received within said groove.

26. The combination according to Claim 25, wherein said pipe element further comprises a bead positioned contiguous with said groove, said bead extending circumferentially around and projecting radially outwardly from said pipe element and having an apex with an outer diameter greater than said outer diameter of said pipe element excluding said bead.

27. The combination according to Claim 26, wherein said outer diameter of said apex is less than said outer diameter of said outwardly facing surface of said shoulder.

28. The combination according to Claim 25, wherein said first side surface is oriented substantially perpendicularly to a longitudinal axis of said pipe element.

29. The combination according to Claim 25, wherein said first side surface is oriented angularly relatively to a longitudinal axis of said pipe element.

30. The combination according to Claim 29, wherein said first side surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

31. The combination according to Claim 25, wherein said second side surface is oriented angularly with respect to said longitudinal axis of said pipe element.

32. The combination according to Claim 31, wherein said second side surface is oriented at an angle relatively to said longitudinal axis from about 40° to about 70°.

33. The combination according to Claim 31, wherein said second side surface is oriented at an angle relatively to said longitudinal axis from about 45° to about 65°.

34. The combination according to Claim 31, wherein said second side surface is oriented at an angle relatively to said longitudinal axis of about 55°.

35. The combination according to Claim 25, wherein said shoulder further comprises an outwardly facing curved surface positioned contiguous with said first side surface, said outwardly facing curved surface extending circumferentially around said pipe element and having a center of curvature on an axis oriented perpendicularly to a longitudinal axis of said pipe element.

36. The combination according to Claim 25, wherein said coupling comprises a plurality of segments attached to one another end to end surrounding said central space, each of said arcuate surfaces of each of said segments comprising:

a first lateral surface in facing relation with said first side surface of said groove;

a second lateral surface in facing relation with said second side surface of said groove;

a radial surface in facing relation with said floor surface of said groove.

37. The combination according to Claim 36, wherein said first lateral surface is oriented substantially perpendicular to a longitudinal axis of said pipe element.

38. The combination according to Claim 36, wherein said first lateral surface is oriented angularly relatively to a longitudinal axis of said pipe element.

39. The combination according to Claim 38, wherein said first lateral surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

40. The combination according to Claim 36, wherein said second lateral surface is oriented angularly with respect to said longitudinal axis of said pipe element.

41. The combination according to Claim 40, wherein said second lateral surface is oriented at an angle equal to an angle at which said second

side surface is oriented with respect to said longitudinal axis of said pipe element.

42. The combination according to Claim 40, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis from about 40° to about 70°.

43. The combination according to Claim 40, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis from about 45° to about 65°.

44. The combination according to Claim 40, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis of about 55°.

45. The combination according to Claim 36, wherein said coupling comprises two of said segments, said segments being attached to one another using a hinge.

46. The combination according to Claim 36, wherein said coupling comprises two of said segments, said segments being attached to one another end to end using fasteners positioned at opposite ends of said segments.

47. The combination according to Claim 36, wherein said first lateral surface is in contact with said first side surface of said groove.

48. The combination according to Claim 47, wherein said second lateral surface is in contact with said second side surface of said groove.

49. In combination, first and second rollers for imparting a shape to a sidewall of a pipe element, wherein said first roller comprises:

a first segment having a first outer diameter;

a second segment positioned contiguous with said first segment and having a second outer diameter smaller than said first outer diameter;

a third segment positioned contiguous with said second segment and having a third outer diameter larger than said second outer diameter; and

wherein said second roller comprises:

a fourth segment having a fourth outer diameter;

a fifth segment positioned contiguous with said fourth segment and having a fifth outer diameter greater than said fourth outer diameter;

a sixth segment positioned contiguous with said fifth segment and having an sixth outer diameter less than said fifth outer diameter; and

a seventh segment positioned contiguous with said sixth segment and having a seventh outer diameter approximately equal to said fifth outer diameter.

50. The combination according to Claim 49, wherein said fifth segment comprises:

a first annular surface positioned adjacent to said fourth segment;

a second annular surface positioned adjacent to said sixth segment and oriented angularly with respect to said second axis.

51. The combination according to Claim 50, wherein said first annular surface is oriented angularly relatively to a longitudinal axis of said pipe element.

52. The combination according to Claim 51, wherein said first annular surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

53. The combination according to Claim 50, wherein said second annular surface is oriented at an angle relatively to said second axis from about 40° to about 70°.

54. The combination according to Claim 50, wherein said second annular surface is oriented at an angle relatively to said second axis from about 45° to about 65°.

55. The combination according to Claim 50, wherein said second annular surface is oriented at an angle relatively to said second axis of about 55°.

56. The combination according to Claim 49, used on a device for cold working an end of a pipe element so as to impart said shape to said sidewall, said device comprising:

a support frame;

said first roller being mounted on said support frame and being rotatable about a first axis, said first roller being adapted to engage an inner surface of said pipe element;

means for rotating said first roller about said first axis;

said second roller being mounted on said support frame and being rotatable about a second axis oriented substantially parallel to said first axis, said second roller being movable toward and away from said first roller and being adapted to engage an outer surface of said pipe element;

means for moving said second roller relatively to said first roller for compressing said sidewall therebetween while said rollers rotate, said rollers being arranged relatively to one another on said support frame such that:

said fourth segment is aligned with said first segment;

said fifth segment is aligned with said second segment;

said sixth segment is aligned with said third segment; and

said seventh segment is aligned with said fourth segment and at least a portion of said fifth segment.

57. The combination according to Claim 50, wherein said first roller further comprises:

An eighth segment positioned contiguous with said third segment and having an eighth outer diameter smaller than said second outer diameter; and

a ninth segment positioned contiguous with said eighth segment and having an eighth outer diameter approximately equal to said second outer diameter.

58. The combination according to Claim 56, wherein said rotating means comprises an electric motor and said moving means comprises a hydraulic actuator.

59. A method of imparting said shape to said sidewall of said pipe element having an inner surface and an outer surface by using the combination of first and second rollers according to Claim 56, said method comprising:

contacting said inner surface at a first point on said first segment of said first roller;

contacting said outer surface at a third point on said fifth segment of said second roller;

rotating one of said first and second rollers thereby causing the other of said first and second rollers and said pipe element to rotate, said first roller circumferentially traversing said inner surface, said second roller circumferentially traversing said outer surface;

moving one of said first and second rollers toward the other of said first and second rollers and deforming said sidewall of said pipe element through contact between said inner surface and said first and third segments of said first roller and contact between said outer surface and said fifth and seventh segments of said second roller;

continue moving one of said first and second rollers toward the other of said first and second rollers and compressing said sidewall of said pipe element between said first segment of said first roller and said fourth segment of said second roller;

continue moving one of said first and second rollers toward the other of said first and second rollers and compressing said sidewall of said pipe element between said second segment of said first roller and said fifth segment of said second roller;

continue moving one of said first and second rollers toward the other of said first and second rollers and compressing said sidewall of said pipe element between said third segment of said first roller and said fifth and seventh segments of said second roller.

60. The method according to Claim 59, further comprising compressing said sidewall of said pipe element between said second segment of said first roller and said fifth segment of said second roller so as to form a portion of said pipe element between said second and fifth segments of said rollers having an inner diameter approximately equal to an inner diameter of said pipe element not between said first and second rollers.

61. A method of forming a circumferential shoulder and groove in a pipe element, said method comprising:

capturing an end of said pipe element in a die;

inserting a tool within said pipe element;

revolving said tool in an orbit about a longitudinal axis of said pipe element;

increasing the diameter of said orbit while revolving said tool so as to force said tool against an inner surface of said pipe element;

conforming said pipe element to said die so as to form said circumferential shoulder therein, said shoulder having a larger outer diameter than the outer diameter of the remainder of said pipe element;

forcing said tool against said inner surface of said pipe element while revolving said tool in said orbit of increasing diameter causing a portion of said tube adjacent to said shoulder to move radially inwardly away from

said die thereby forming said circumferential groove, said groove having a smaller outer diameter than the outer diameter of the remainder of said pipe element.

62. The method according to Claim 61, further comprising:

conforming said pipe element to said die so as to form a circumferential bead therein, said bead having an apex with a larger outer diameter than the outer diameter of the remainder of said pipe element.

63. A method of forming a circumferential bead and groove in a pipe element, said method comprising:

capturing an end of said pipe element in a die;

inserting a tool within said pipe element;

revolving said tool in an orbit about a longitudinal axis of said pipe element;

increasing the diameter of said orbit while revolving said tool so as to force said tool against an inner surface of said pipe element;

conforming said pipe element to said die so as to form said circumferential bead therein, said bead having an apex having larger outer diameter than the outer diameter of the remainder of said pipe element;

forcing said tool against said inner surface of said pipe element while revolving said tool in said orbit of increasing diameter causing a portion

of said tube adjacent to said bead to move radially inwardly away from said die thereby forming said groove, said groove having a smaller outer diameter than the outer diameter of the remainder of said pipe element.

64. The method according to Claim 63, further comprising:

conforming said pipe element to said die so as to form a circumferential shoulder therein, said shoulder having a larger outer diameter than the outer diameter of the remainder of said pipe element.

65. A method of forming a circumferential shoulder, groove and bead in a pipe element, said method comprising:

capturing an end of said pipe element in a die;

inserting a tool within said pipe element;

revolving said tool in an orbit about a longitudinal axis of said pipe element;

increasing the diameter of said orbit while revolving said tool so as to force said tool against an inner surface of said pipe element;

conforming said pipe element to said die so as to form a circumferential shoulder therein, said shoulder having a larger outer diameter than the outer diameter of the remainder of said pipe element;

conforming said pipe element to said die so as to form a circumferential bead therein, said bead having an apex with a larger outer diameter than the outer diameter of the remainder of said pipe element;

forcing said tool against said inner surface of said pipe element while revolving said tool in said orbit of increasing diameter causing a portion of said tube between said shoulder and said bead to move radially inwardly away from said die thereby forming said groove, said groove having a smaller outer diameter than the outer diameter of the remainder of said pipe element.

What is claimed is:

1. In combination, a coupling and at least one pipe element, said pipe element having an outer diameter and at least one end, wherein:

said pipe element comprises:

a shoulder positioned at said at least one end, said shoulder extending circumferentially around said pipe element and having an outwardly facing surface, said outwardly facing surface having an outer diameter greater than said outer diameter of said pipe element excluding said shoulder;

a groove positioned adjacent to said shoulder, said groove extending circumferentially around said pipe element, said groove being defined by a first side surface positioned contiguous with said shoulder, a second side surface positioned in spaced apart relation to said first side surface, and a floor surface extending between said first and second side surfaces, said floor surface having an outer diameter less than said outer diameter of said pipe element excluding said groove; said first side surface being oriented substantially perpendicularly to a longitudinal axis of said pipe element; and wherein

said coupling comprises:

a plurality of segments attached to one another end to end surrounding a central space, each of said segments having an arcuate surface received within said groove, said arcuate surfaces of each of said segments comprising:

a first lateral surface in facing relation with said first side surface of said groove;

a second lateral surface in facing relation with said second side surface of said groove;

a radial surface in facing relation with said floor surface of said groove; and wherein

said pipe element further comprises a bead positioned contiguous with said groove, said bead extending circumferentially around and projecting radially outwardly from said pipe element and having an apex with an outer diameter greater than said outer diameter of said pipe element excluding said bead.

2. The combination according to claim 1, wherein said outer diameter of said apex is less than said outer diameter of said outwardly facing surface of said shoulder.

3. The combination according to claim 1, wherein said second side surface is oriented angularly with respect to said longitudinal axis of said pipe element.

4. The combination according to claim 3, wherein said second side surface is oriented at an angle relatively to said longitudinal axis from about 40° to about 70°.

5. The combination according to claim 3, wherein said second side surface is oriented at an angle relatively to said longitudinal axis from about 45° to about 65°.

6. The combination according to claim 3, wherein said second side surface is oriented at an angle relatively to said longitudinal axis of about 55°.

7. The combination according to claim 1, wherein said shoulder further comprises an outwardly facing curved surface positioned contiguous with said first side surface, said outwardly facing curved surface extending circumferentially around said pipe element and having a center of curvature on an axis oriented perpendicularly to a longitudinal axis of said pipe element.

8. The combination according to claim 1, wherein said first lateral surface is oriented substantially perpendicular to a longitudinal axis of said pipe element.

9. The combination according to claim 1, wherein said first lateral surface is oriented angularly relatively to a longitudinal axis of said pipe element.

10. The combination according to claim 9, wherein said first lateral surface has an orientation angle measured relatively to said longitudinal axis from about 80° to about 85°.

11. The combination according to claim 1, wherein said second lateral surface is oriented angularly with respect to said longitudinal axis of said pipe element.

12. The combination according to claim 11, wherein said second lateral surface is oriented at an angle equal to an angle at which said second side surface is oriented with respect to said longitudinal axis of said pipe element.

13. The combination according to claim 11, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis from about 40° to about 70°.

14. The combination according to claim 11, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis from about 45° to about 65°.

15. The combination according to claim 11, wherein said second lateral surface of each of said arcuate surfaces is oriented at an angle relatively to said longitudinal axis of about 55°.

16. The combination according to claim 1, wherein said coupling comprises two of said segments, said segments being attached to one another using a hinge.

17. The combination according to claim 1, wherein said coupling comprises two of said segments, said segments being attached to one another end to end using fasteners positioned at opposite ends of said segments.

18. The combination according to claim 1, wherein said first lateral surface is in contact with said first side surface of said groove.

19. The combination according to claim 18, wherein said second lateral surface is in contact with said second side surface of said groove.