CLAIMS
What is claimed is:

1. A seal, comprising:

an outer ring surrounding an axis oriented coaxially with said outer ring, said outer ring having an outer surface facing away from said axis;

first and second ramp surfaces formed on said outer surface and positioned adjacent to one another on said outer surface, said first and second ramp surfaces being contiguous along a first apex extending parallel to said axis and projecting outwardly from said outer surface, said first and second ramp surfaces being angularly oriented with respect to a first line extending radially from said axis to said first apex;

third and fourth ramp surfaces positioned adjacent to one another on said outer surface, said third and fourth ramp surfaces being contiguous along a second apex extending parallel to said axis and projecting outwardly from said outer surface, said third and fourth ramp surfaces being angularly oriented with respect to a second line extending radially from said axis to said second apex, wherein said first and second apexes are diametrically opposite to one another;

a lobe extending circumferentially around a first side of said outer ring, said lobe having an outer surface facing away from said axis and a sealing surface facing toward said axis; and

fifth and sixth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said fifth and sixth ramp surfaces being contiguous along a third apex projecting from said outer surface of said lobe, said fifth and sixth ramp surfaces being angularly oriented with respect to a third line extending radially from said axis to said third apex.

2. The seal according to claim 1, wherein said first and third apexes are aligned with one another.

3. The seal according to claim 1, further comprising seventh and eighth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said seventh and eighth ramp surfaces being contiguous along a fourth apex extending parallel to said axis and projecting from said outer surface of said lobe, said seventh and eighth ramp surfaces being angularly oriented with respect to a fourth line extending radially from said axis to said fourth apex.

4. The seal according to claim 3, wherein said second and fourth apexes are aligned with one another.

5. The seal according to claim 3, further comprising:

a rim extending circumferentially around a side of said outer ring opposite said lobe, said rim having an outer surface facing away from said axis and offset from said outer surface of said outer ring;

ninth and tenth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said ninth and tenth ramp surfaces being contiguous along a fifth apex projecting from said outer surface of said rim, said ninth and tenth ramp surfaces being angularly oriented with respect to a fifth line extending radially from said axis to said fifth apex.

6. The seal according to claim 5, further comprising eleventh and twelfth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said eleventh and twelfth ramp surfaces being contiguous along a sixth apex projecting from said outer surface of said rim, said eleventh and twelfth ramp surfaces being angularly oriented with respect to a sixth line extending radially from said axis to said sixth apex.

7. The seal according to claim 6, wherein said fifth and sixth apexes are diametrically opposite one another.

8. The seal according to claim 7, wherein said fifth apex is aligned with said first apex and said sixth apex is aligned with said second apex.

9. The seal according to claim 1, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached between said outer ring and said lobe and defining oppositely facing surfaces oriented perpendicular to said axis.

10. The seal according to claim 1, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached to said lobe and defining oppositely facing surfaces oriented perpendicular to said axis.

11. A seal, comprising:

an outer ring surrounding an axis oriented coaxially with said outer ring, said outer ring having an outer surface facing away from said axis;

first and second ramp surfaces formed on said outer surface and positioned adjacent to one another on said outer surface, said first and second ramp surfaces being contiguous along a first apex extending parallel to said axis and projecting outwardly from said outer surface, said first and second ramp surfaces being angularly oriented with respect to a first line extending radially from said axis to said first apex;

third and fourth ramp surfaces positioned adjacent to one another on said outer surface, said third and fourth ramp surfaces being contiguous along a second apex projecting outwardly from said outer surface, said third and fourth ramp surfaces being angularly oriented with respect to a second line extending radially from said axis to said second apex; and

wherein said first and second apexes are diametrically opposite to one another;

a lobe extending circumferentially around a first side of said outer ring, said lobe having an outer surface facing away from said axis and a sealing surface facing toward said axis; and

fifth and sixth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said fifth and sixth ramp surfaces being contiguous along a third apex projecting from said outer surface of said lobe, said fifth and sixth ramp surfaces being angularly oriented with respect to a third line extending radially from said axis to said third apex.

12. The seal according to claim 11, further comprising:

seventh and eighth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said seventh and eighth ramp surfaces being contiguous along a fourth apex projecting from said outer surface of said lobe, said seventh and eighth ramp surfaces being angularly oriented with respect to a fourth line extending radially from said axis to said fourth apex.

13. The seal according to claim 12, wherein said first and third apexes are aligned with one another and said second and fourth apexes are aligned with one another.

14. The seal according to claim 12, further comprising:

a rim extending circumferentially around a side of said outer ring opposite said lobe, said rim having an outer surface facing away from said axis and offset from said outer surface of said outer ring;

ninth and tenth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said ninth and tenth ramp surfaces being contiguous along a fifth apex projecting from said outer surface of said rim, said ninth and tenth ramp surfaces being angularly oriented with respect to a fifth line extending radially from said axis to said fifth apex; eleventh and twelfth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said eleventh and twelfth ramp surfaces being contiguous along a sixth

apex projecting from said outer surface of said rim, said eleventh and twelfth ramp surfaces being angularly oriented with respect to a sixth line extending radially from said axis to said sixth apex; wherein

said fifth and sixth apexes are diametrically opposite one another.

15. The seal according to claim 14, wherein said third and fifth apexes are aligned with said first apex and said fourth and sixth apexes are aligned with said second apex.

16. The seal according to claim 12, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached between said outer ring and said lobe and defining oppositely facing surfaces oriented perpendicular to said axis.

17. The seal according to claim 12, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached to said lobe and defining oppositely facing surfaces oriented perpendicular to said axis.

18. In combination, a seal and a coupling for joining pipe elements, said seal comprising:

an outer ring surrounding an axis oriented coaxially with said outer ring, said outer ring having an outer surface facing away from said axis;

first and second ramp surfaces formed on said outer surface and positioned adjacent to one another on said outer surface, said first and second ramp surfaces being contiguous along a first apex extending parallel to said axis and projecting outwardly from said outer surface, said first and second ramp surfaces being angularly oriented with respect to a first line extending radially from said axis to said first apex;

third and fourth ramp surfaces positioned adjacent to one another on said outer surface, said third and fourth ramp surfaces being contiguous along a second apex projecting outwardly from said outer surface, said third and fourth ramp surfaces being angularly oriented with respect to a second line extending radially from said axis to said second apex, said first and second apexes being diametrically opposite to one another;

a lobe extending circumferentially around a first side of said outer ring, said lobe having an outer surface facing away from said axis and a sealing surface facing toward said axis for engagement with one of said pipe elements;

fifth and sixth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said fifth and sixth ramp surfaces being contiguous along a third apex projecting from said outer surface of said lobe, said fifth and sixth ramp surfaces being angularly oriented with respect to a third line extending radially from said axis to said third apex; and

said coupling comprising:

a plurality of segments attached to one another end to end surrounding said seal, each said segment having attachment members located at opposite ends, each said segment having arcuate surfaces positioned on opposite sides thereof for engagement with said pipe elements.

19. The combination according to claim 18, wherein said attachment members comprise lugs extending outwardly from opposite ends of each said segment, each said lug defining a hole for receiving a fastener.

20. The combination according to claim 18, wherein said arcuate surfaces project from said segments radially toward said axis.

21. The combination according to claim 18, further comprising:

seventh and eighth ramp surfaces positioned adjacent to one another on said outer surface of said lobe, said seventh and eighth ramp surfaces being contiguous along a fourth apex projecting from said outer surface of said lobe, said seventh and eighth ramp surfaces being angularly oriented with respect to a fourth line extending radially from said axis to said fourth apex.

22. The combination according to claim 21, wherein said first and third apexes are aligned with one another and said second and fourth apexes are aligned with one another.

23. The combination according to claim 21, further comprising:

a rim extending circumferentially around a side of said outer ring opposite said lobe, said rim having an outer surface facing away from said axis and offset from said outer surface of said outer ring;

ninth and tenth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said ninth and tenth ramp surfaces being contiguous along a fifth apex projecting from said outer surface of said rim, said ninth and tenth ramp surfaces being angularly oriented with respect to a fifth line extending radially from said axis to said fifth apex; eleventh and twelfth ramp surfaces positioned adjacent to one another on said outer surface of said rim, said eleventh and twelfth ramp surfaces being contiguous along a sixth apex projecting from said outer surface of said rim, said eleventh and twelfth ramp surfaces being angularly oriented with respect to a sixth line extending radially from said axis to said sixth apex; wherein

said fifth and sixth apexes are diametrically opposite one another.

24. The combination according to claim 23, wherein said third and fifth apexes are aligned with said first apex and said fourth and sixth apexes are aligned with said second apex.

25. The combination according to claim 23, further comprising:

a valve body positioned between said ring and said axis;

a valve closing member positioned within said valve body, said valve closing member being movable between a closed position and an open position; and

a valve stem attached to said valve closing member and extending through one of said segments.

26. The combination according to claim 25, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached between said outer ring and said lobe and defining oppositely facing surfaces oriented perpendicular to said axis, one of said oppositely facing surfaces being engageable with an end of one of said pipe elements, the other of said oppositely facing surfaces being engageable with said valve body.

27. The combination according to claim 25, further comprising an inner ring positioned between said outer ring and said axis, said inner ring being attached to said lobe and defining oppositely facing surfaces oriented perpendicular to said axis, one of said oppositely facing surfaces being engageable with an end of one of said pipe elements, the other of said oppositely facing surfaces being engageable with said valve body.

28. The combination according to claim 18, wherein said plurality of segments comprises no more than two said segments, each of said segments comprising:

a back wall extending between said opposite ends, said back wall having an inner surface facing said axis;

first and second angularly oriented surfaces positioned on said inner surface of said back wall at opposite ends of said segments.