rotation. The first shaft is received within the aperture of the first lug, the second shaft is received within the aperture of the second lug. First and second bearings are mounted on the valve housing diametrically opposite to one another. The first and second bearings respectively define first and second passages through the valve housing. The first and second passages are aligned with the axis of rotation. The first bearing receives the first shaft, the second bearing receives the second shaft. Each shaft has a diameter at a first end larger than a diameter at a second end. The first end of the first shaft engages and is retained within the valve housing by the first lug, the first end of the second shaft engages and is retained within the valve housing by the second lug.

In one example embodiment the first bearing comprises a first bonnet extending from the valve housing. Further by way of example, the second bearing comprises a second bonnet extending from the valve housing.

In an example embodiment, at least a portion of one of the shafts is tapered. In a specific example, at least one of the shafts is step-wise tapered from the first end to the second end. An example valve further comprises a first seal positioned between the first bearing and the first shaft. Further by way of example, a second seal is positioned between the second bearing and the second shaft.

In an example embodiment a first end of at least one of the shafts comprises a male spline. In an example, at least one of the lugs comprises a female spline. The male spline engages the female spline to secure the at least one shaft to the at least one lug. In a particular example embodiment the first end of the at least one shaft is tapered.

In an example embodiment a valve further comprises a plurality of segments attached to one another end to end surrounding the housing and forming a coupling for joining the pipe elements. Each in this example segment has attachment members located at opposite ends. Each segment has arcuate surfaces positioned on opposite sides thereof for engagement with the pipe elements.

In an example embodiment the attachment members comprise attachment lugs extending outwardly from opposite ends of each segment. Each attachment lug

defines a hole for receiving a fastener. By way of example, the arcuate surfaces project from the segments radially toward an axis aligned coaxially with the bore.

In a specific example embodiment the plurality of segments comprises no more than two segments. By way of further example, at least one of the bonnets extends through an opening in one of the segments. In a specific example embodiment the valve closing member comprises a disk.

The invention further encompasses a valve coupling for joining pipe elements and controlling flow therethrough. In an example embodiment the valve coupling comprises a plurality of segments attached to one another end to end surrounding a central space. A valve housing is captured between the segments and surrounds and defines a bore. A valve closing member is mounted within the bore. The valve closing member is rotatable about an axis of rotation between an open position permitting flow through the bore and a closed position preventing flow through the bore. First and second lugs are mounted in spaced relation to one another on the valve closing member. The lugs define apertures aligned with the axis of rotation. First and second shafts extend in opposite directions along the axis of rotation. The first shaft is received within the aperture of the first lug, the second shaft is received within the aperture of the second lug. First and second bearings are mounted on the valve housing diametrically opposite to one another. The first and second bearings respectively define first and second passages through the valve housing. The first and second passages are aligned with the axis of rotation. The first bearing receives the first shaft, the second bearing receives the second shaft. Each shaft has a diameter at a first end larger than a diameter at a second end. The first end of the first shaft engages and is retained within the valve housing by the first lug, the first end of the second shaft engages and is retained within the valve housing by the second lug.

In one example embodiment the first bearing comprises a first bonnet extending from the valve housing. By way of further example, the second bearing comprises a second bonnet extending from the valve housing. In an example embodiment, at least one of the bonnets extends through an opening in one of the segments. In an example embodiment, at least a portion of at least one of the shafts is

tapered. Further by way of example, at least one of the shafts is step-wise tapered from the first end to the second end.

In an example embodiment, a first seal is positioned between the first bearing and the first shaft. Further by way of example, a second seal is positioned between the second bearing and the second shaft. In a specific example embodiment, a first end of at least one of the shafts comprises a male spline. Further by way of example, at least one of the lugs comprises a female spline. The male spline engages the female spline to secure the at least one shaft to the at least one lug. In a particular example embodiment, the first end of the at least one shaft is tapered.

An example valve coupling further comprises attachment members located at opposite ends of each the segment. Arcuate surfaces are positioned on opposite sides of each the segment for engagement with the pipe elements. By way of example, the attachment members comprise attachment lugs extending outwardly from opposite ends of each segment. Each attachment lug defines a hole for receiving a fastener.

In one example embodiment, the arcuate surfaces project from the segments radially toward an axis aligned coaxially with the bore. In a specific example, the plurality of segments comprises no more than two the segments. In a particular example embodiment the valve closing member comprises a disk.

The invention also encompasses a method of assembling a valve having a housing defining a bore in which a valve closing member is rotatably mounted on first and second shafts. In one example embodiment the method comprises:

positioning the valve closing member within the bore so as to align first and second lugs mounted on the valve closing member with respective first and second bearings in the housing;

positioning the first shaft between the lugs;

inserting the first shaft through the first lug and into the first bearing;

retaining said first shaft within said housing using said first lug;

positioning the second shaft between the lugs;

inserting the second shaft through the second lug and into the second bearing

retaining said second shaft within said housing using said second lug.

An example embodiment further comprises:

positioning the housing within a first segment of a coupling;

attaching a second segment to the first segment so as to surround the housing.

Brief Description of the Drawings

Figure 1 is an isometric view of an example embodiment of a valve coupling according to the invention shown in a pre-assembled state;

Figure 2 is a cross sectional view of the valve coupling shown in Figure 1;

Figure 2A is an isometric view of a component of the valve coupling shown in Figure 1;

Figure 3 is a longitudinal sectional view of the valve coupling shown in Figure 1 in the state as used to form a pipe joint;

Figure 4 is a cross sectional view of the valve coupling shown in Figure 3;

Figures 5 and 6 illustrate use of the valve coupling shown in Figure 1 to connect pipe elements in end to end relation;

Figure 7 is an isometric view of the valve coupling shown in Figure 1 in the state as used to form a pipe joint;

Figures 8 and 9 are longitudinal sectional views of components of the valve coupling;

Figure 8A is a longitudinal sectional view of a portion of the valve coupling on an enlarged scale.

What is claimed is:

1. A valve for controlling flow through pipe elements, said valve comprising:

a valve housing surrounding and defining a bore;

a valve closing member mounted within said bore, said valve closing member being rotatable about an axis of rotation between an open position permitting flow through said bore and a closed position preventing flow through said bore;

first and second lugs mounted in spaced relation to one another on said valve closing member, said lugs defining respective apertures aligned with said axis of rotation;

first and second shafts extending in opposite directions along said axis of rotation, said first shaft being received within said aperture of said first lug, said second shaft being received within said aperture of said second lug;

first and second bearings mounted on said valve housing diametrically opposite to one another, said first and second bearings respectively defining first and second passages through said valve housing, said first and second passages being aligned with said axis of rotation, said first bearing receiving said first shaft, said second bearing receiving said second shaft; wherein

each said shaft has a diameter at a first end larger than a diameter at a second end, said first end of said first shaft engaging and being retained within said valve housing by said first lug, said first end of said second shaft engaging and being retained within said valve housing by said second lug.

2. The valve according to claim 1, wherein said first bearing comprises a first bonnet extending from said valve housing.

3. The valve according to claim 2, wherein said second bearing comprises a second bonnet extending from said valve housing.

4. The valve according to claim 1, wherein at least a portion of one of said shafts is tapered.

14. The valve according to claim 10, wherein said first bearing comprises a first bonnet, said second bearing comprises a second bonnet, at least one of said first and second bonnets extends through an opening in one of said segments.

15. The valve according to claim 1, wherein said valve closing member comprises a disk.

16. A valve coupling for joining pipe elements and controlling flow therethrough, said valve coupling comprising:

a plurality of segments attached to one another end to end surrounding a central space;

a valve housing captured between said segments and surrounding and defining a bore;

a valve closing member mounted within said bore, said valve closing member being rotatable about an axis of rotation between an open position permitting flow through said bore and a closed position preventing flow through said bore;

first and second lugs mounted in spaced relation to one another on said valve closing member, said lugs defining apertures aligned with said axis of rotation;

first and second shafts extending in opposite directions along said axis of rotation, said first shaft being received within said aperture of said first lug, said second shaft being received within said aperture of said second lug;

first and second bearings mounted on said valve housing diametrically opposite to one another, said first and second bearings respectively defining first and second passages through said valve housing, said first and second passages being aligned with said axis of rotation, said first bearing receiving said first shaft, said second bearing receiving said second shaft; wherein

each said shaft has a diameter at a first end larger than a diameter at a second end, said first end of said first shaft engaging and being retained within said valve housing by said first lug, said first end of said second shaft engaging and being retained within said valve housing by said second lug.

27. The valve coupling according to claim 26, wherein said attachment members comprise attachment lugs extending outwardly from opposite ends of each said segment, each said attachment lug defining a hole for receiving a fastener.

28. The valve coupling according to claim 26, wherein said arcuate surfaces project from said segments radially toward an axis aligned coaxially with said bore.

29. The valve coupling according to claim 16, wherein said plurality of segments comprises no more than two said segments.

30. The valve according to claim 16, wherein said valve closing member comprises a disk.

31. A method of assembling a valve having a housing defining a bore in which a valve closing member is rotatably mounted on first and second shafts, said method comprising:

positioning said valve closing member within said bore so as to align first and second lugs mounted on said valve closing member with respective first and second bearings in said housing;

positioning said first shaft between said lugs;

inserting said first shaft through said first lug and into said first bearing;

retaining said first shaft within said housing using said first lug;

positioning said second shaft between said lugs;

inserting said second shaft through said second lug and into said second bearing; and

retaining said second shaft within said housing using said second lug.

32. The method according to claim 31, further comprising:

positioning said housing within a first segment of a coupling;

attaching a second segment to said first segment so as to surround said housing.