WHAT IS CLAIMED IS:

1. A rotary valve comprising a stator and a rotor mounted to said stator for rotation about an axis,

said stator having (i) a plurality of pairs of component ports, each pair consisting of a first component port and a second component port opposing each other across said axis, said first component ports collectively arranged in an arc of a first circle centered on said axis and said second component ports collectively arranged in an arc of a second circle centered on said axis, and (ii) a valve inlet port and a valve outlet port opposing each other across said axis, said valve inlet and valve outlet ports both positioned inside said first and second circles;

said rotor having first and second elongate recesses having no fluid communication with each other, said first recess comprising an arc of a third circle that is centered on said axis and is equidistant from said axis with said valve inlet port, said second recess comprising an arc of a fourth circle that is centered on said axis and is equidistant from said axis with said valve outlet port, each of said first and second recesses further comprising a first arm extending from said arc to a first terminus at said first circle of component ports in said stator and a second arm extending from said arc to a second terminus at said second circle of component ports in said stator,

wherein said first termini are separated along said first circle of component ports by an angular spacing that is less than the angular spacing between adjacent first component ports of said stator, and said second termini are separated along said second circle of component ports by an angular spacing that is less than the angular spacing between adjacent second component ports of said stator.

2. The rotary valve of claim 1 wherein said arc of said first circle is less than half the circumference of said first circle, and said arc of said second circle is less than half the circumference of said second circle.

3. The rotary valve of claim 1 wherein said arc of said third circle is less than half the circumference of said third circle, and said arc of said fourth circle is less than half the circumference of said fourth circle.

4. The rotary valve of claim 1 wherein said first circle and said second circle coincide such that all of said component ports are arranged in a common circle.

5. The rotary valve of claim 1 wherein said third circle and said fourth circle coincide such that said arc of said third circle and said arc of said fourth circle are arcs of a common circle.

6. The rotary valve of claim 1 wherein said plurality of pairs of component ports consists of from two pairs to ten pairs.

7. The rotary valve of claim 1 wherein said plurality of pairs of component ports consists of from four pairs to eight pairs.

8. The rotary valve of claim 1 wherein said first component ports of said stator are spaced apart by equal annular spacings, and said angular spacing of said first termini is approximately one-half of said angular spacing between said first component ports.

9. The rotary valve of claim 1 wherein no ports or recesses are either positioned at or traverse said axis.

10. A method for passing fluid through a flow-through component in first and second directions in succession in which said second direction is the reverse of said first direction, said method comprising:

(a) with said flow-through component having first and second ends connected to first and second component ports, respectively, of a selected pair of component ports in said rotary valve, and with said rotary valve in a first rotary position whereby a first flow path is formed from said valve inlet port through said first elongate recess to said first component port, and a second flow path is formed from said second component port through said second elongate recess to said valve outlet port, feeding a first fluid into said rotary valve through said valve inlet port and discharging effluent from said first fluid from said rotary valve through said valve outlet port, thereby causing said fluid to pass through said flow-through component in a forward direction,

(b) rotating said rotor of said rotary valve to a second rotary position wherein a third flow path is formed from said valve inlet port through said first elongate recess to

said second component port, and a fourth flow path is formed from said first component port through said second elongate recess to said valve outlet port, and

(c) feeding a second fluid into said rotary valve through said valve inlet port and discharging effluent from said second fluid from said rotary valve through said valve outlet port, thereby causing said fluid to pass through said flow-through component in a reverse direction.

11. The method of claim **10** wherein said arc of said first circle is less than half the circumference of said first circle, and said arc of said second circle is less than half the circumference of said second circle.

12. The method of claim **10** wherein said arc of said third circle is less than half the circumference of said third circle, and said arc of said fourth circle is less than half the circumference of said fourth circle.

13. The method of claim **10** wherein said first circle and said second circle coincide such that all of said component ports are arranged in a common circle

14. The method of claim **10** wherein said third circle and said fourth circle coincide such that said arc of said third circle and said arc of said fourth circle are arcs of a common circle.

15. The method of claim **10** wherein said plurality of pairs of component ports consists of from two pairs to ten pairs.

16. The method of claim **10** wherein said plurality of pairs of component ports consists of from four pairs to eight pairs.

17. The method of claim **10** wherein said first component ports of said stator are spaced apart by equal annular spacings, and said angular spacing of said first termini is approximately one-half of said angular spacing between said first component ports.

18. The method of claim **10** wherein no ports or recesses are either positioned at or traverse said axis.

What is claimed is:

1. A rotary valve comprising a stator and a rotor mounted to said stator for rotation about an axis, said stator having (i) a plurality of pairs of component ports, each pair consisting of a first component port and a second component port opposing each other across said axis, said first component ports collectively arranged in an arc of a first circle centered on said axis and said second component ports collectively arranged in an arc of a second circle centered on said axis, and (ii) a valve inlet port and a valve outlet port opposing each other across said axis, said valve inlet and valve outlet ports both positioned inside said first and second circles; said rotor having first and second elongate recesses having no fluid communication with each other, said first recess comprising an arc of a third circle that is centered on said axis and is equidistant from said axis with said valve inlet port, said second recess comprising an arc of a fourth circle that is centered on said axis and is equidistant from said axis with said valve outlet port, each of said first and second recesses further comprising a first arm extending from said arc to a first terminus at said first circle of component ports in said stator and a second arm extending from said arc to a second terminus at said second circle of component ports in said stator, wherein said first termini are separated along said first circle of component ports by an angular spacing that is less than the angular spacing between adjacent first component ports of said stator, and said second termini are separated along said second circle of component ports by an angular spacing that is less than the angular spacing between adjacent second component ports of said stator.

2. The rotary valve of claim 1 wherein said arc of said first circle is less than half the circumference of said first circle, and said arc of said second circle is less than half the circumference of said second circle.

3. The rotary valve of claim 1 wherein said arc of said third circle is less than half the circumference of said third circle, and said arc of said fourth circle is less than half the circumference of said fourth circle.

4. The rotary valve of claim 1 wherein said first circle and said second circle coincide such that all of said component ports are arranged in a common circle.

5. The rotary valve of claim 1 wherein said third circle and said fourth circle coincide such that said arc of said third circle and said arc of said fourth circle are arcs of a common circle.

6. The rotary valve of claim 1 wherein said plurality of pairs of component ports consists of from two pairs to ten pairs.

7. The rotary valve of claim 1 wherein said plurality of pairs of component ports consists of from four pairs to eight pairs.

8. The rotary valve of claim 1 wherein said first component ports of said stator are spaced apart by equal annular spacings, and said angular spacing of said first termini is approximately one-half of said angular spacing between said first component ports.

9. The rotary valve of claim 1 wherein no ports or recesses are either positioned at or traverse said axis.

10. A method for passing fluid through a flow-through component connected to the rotary valve of claim 1 in first and second directions in succession said second direction being the reverse of said first direction, said method comprising:

(a) with said flow-through component having first and second ends connected to first and second component ports, respectively, of a selected pair of component ports in said rotary valve, and with said rotary valve in a first rotary position whereby a first flow path is formed from said valve inlet port through said first elongate recess to said first component port, and a second flow path is formed from said second component port through said second elongate recess to said valve outlet port, feeding a first fluid into said rotary valve through said valve inlet port and discharging effluent from said first fluid from said rotary valve through said valve outlet port, thereby causing said first fluid to pass through said flow-through component in a forward direction,

(b) rotating said rotor of said rotary valve to a second rotary position wherein a third flow path is formed from said valve inlet port through said first elongate recess to said second component port, and a fourth flow path is formed from said first component port through said second elongate recess to said valve outlet port, and (c) feeding a second fluid into said rotary valve through said valve inlet port and discharging effluent from said second fluid from said rotary valve through said valve outlet port, thereby causing said second fluid to pass through said flow-through component in a reverse direction.

11. The method of claim 10 wherein said arc of said first circle is less than half the circumference of said first circle, and said arc of said second circle is less than half the circumference of said second circle.

12. The method of claim 10 wherein said arc of said third circle is less than half the circumference of said third circle, and said arc of said fourth circle is less than half the circumference of said fourth circle.

13. The method of claim 10 wherein said first circle and said second circle coincide such that all of said component ports are arranged in a common circle.

14. The method of claim 10 wherein said third circle and said fourth circle coincide such that said arc of said third circle and said arc of said fourth circle are arcs of a common circle.

15. The method of claim 10 wherein said plurality of pairs of component ports consists of from two pairs to ten pairs.

16. The method of claim 10 wherein said plurality of pairs of component ports consists of from four pairs to eight pairs.

17. The method of claim 10 wherein said first component ports of said stator are spaced apart by equal annular spacings, and said angular spacing of said first termini is approximately one-half of said angular spacing between said first component ports.

18. The method of claim 10 wherein no ports or recesses are either positioned at or traverse said axis.