WHAT IS CLAIMED IS:

1. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising:

a first flow passage; and

a first set of one or more branch passages which intersect the first flow passage, whereby a proportion of the fluid composition diverted from the first flow passage to the first set of branch passages varies based on at least one of a) viscosity of the fluid composition, and b) velocity of the fluid composition in the first flow passage.

2. The system of claim 1, wherein the proportion increases in response to increased viscosity of the fluid composition.

3. The system of claim 1, wherein the proportion increases in response to decreased velocity of the fluid composition in the first flow passage.

4. The system of claim 1, wherein the first set of branch passages direct the fluid composition to a first control passage of a flow path selection device, and wherein the flow path selection device selects which of multiple flow paths a majority of fluid flows through from the device, based at least partially on the proportion of the fluid composition diverted to the first control passage.

5. The system of claim 4, further comprising a second flow passage, and a second set of one or more branch passages which intersect the second flow passage, whereby a proportion of the fluid composition diverted from the second flow passage to the second set of branch passages increases with increased viscosity of the fluid composition, and increases with decreased velocity of the fluid composition in the second flow passage.

6. The system of claim 5, wherein the second flow passage directs the fluid composition to a second control passage of the flow path selection device, and wherein the flow path selection device selects which of the multiple flow paths the majority of fluid flows through from the device, based on a ratio of flow rates of the fluid composition through the first and second control passages.

7. The system of claim 6, wherein the ratio of the flow rates through the first and second control passages varies with respect to a ratio of desired fluid to undesired fluid in the fluid composition.

8. The system of claim 4, further comprising a second flow passage, wherein the second flow passage directs the fluid composition to a second control passage of the flow path selection device, and wherein the flow path selection device selects which of the multiple flow paths the majority of fluid flows through from the device, based on a ratio of flow rates of the fluid composition through the first and second control passages.

9. The system of claim 1, wherein the first set of branch passages includes multiple branch passages spaced apart along the first flow passage.

10. The system of claim 9, further comprising a chamber at each of multiple intersections between the first flow passage and the branch passages.

11. The system of claim 10, wherein each of the chambers has a fluid volume, and wherein the volumes decrease in a direction of flow of the fluid composition through the first flow passage.

12. The system of claim 9, wherein a flow area of the first flow passage increases at each of multiple intersections between the first flow passage and the first set of branch passages.

13. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising:

a flow path selection device that selects which of multiple flow paths a majority of fluid flows through from the device, based on a ratio of desired fluid to undesired fluid in the fluid composition.

14. The system of claim 13, wherein the flow path selection device includes a first control port, and wherein a flow rate of the fluid composition through the first control port affects which of the multiple flow paths the majority of fluid flows through from the device.

15. The system of claim 14, wherein the flow rate of the fluid composition through the first control port varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

16. The system of claim 14, wherein the flow path selection device further includes a second control port, and wherein the flow path selection device selects which of multiple flow paths the majority of fluid flows through from the device, based on a ratio of the flow rates of the fluid composition through the first and second control ports.

17. The system of claim 16, wherein the ratio of the flow rates through the first and second control ports varies with respect to the ratio of desired fluid to undesired fluid in the fluid composition.

18. The system of claim 14, wherein the fluid composition flows to the first control port via at least one control passage which connects to a flow passage through which the fluid composition flows, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

19. The system of claim 18, wherein a proportion of the fluid composition which flows from the flow passage to the control passage increases when a viscosity of the fluid composition increases.

20. The system of claim 18, wherein a proportion of the fluid composition which flows from the flow passage to the control passage decreases when a velocity of the fluid composition in the flow passage increases.

21. The system of claim 14, wherein the flow path selection device includes a second control port, wherein a flow rate of the fluid composition through the second control port affects which of the multiple flow paths the majority of fluid flows through from the device, wherein the fluid composition flows to the second control port via at least one control passage through which the fluid composition flows, wherein the control passage connects to at least one flow passage, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

22. The system of claim 21, wherein a proportion of the fluid composition which flows from the flow passage to the control passage decreases when a viscosity of the fluid composition increases.

23. The system of claim 21, wherein a proportion of the fluid composition which flows from the flow passage to the control passage increases when a velocity of the fluid composition in the flow passage increases.

24. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising:

a flow chamber, and

wherein a majority of the fluid composition enters the chamber in a direction which changes based on a ratio of desired fluid to undesired fluid in the fluid composition.

25. The system of claim 24, wherein the fluid composition more directly flows through the chamber to an outlet of the chamber in response to an increase in the ratio.

26. The system of claim 24, wherein the majority of the fluid composition enters the chamber via one of multiple inlets, and wherein the one of the multiple inlets is selected based on the ratio.

27. The system of claim 26, wherein a first one of the multiple inlets directs the fluid composition to flow more directly toward an outlet of the chamber as compared to a second one of the multiple inlets.

28. The system of claim 27, wherein the first inlet directs the fluid composition to flow more radially relative to the outlet as compared to the second inlet.

29. The system of claim 27, wherein the second inlet directs the fluid composition to spiral more about the outlet as compared to the first inlet.

30. The system of claim 24, wherein the chamber is generally cylindrical-shaped, and wherein the fluid composition spirals more within the chamber as the ratio decreases.

31. The system of claim 24, further comprising a flow path selection device that selects which of multiple flow paths the majority of the fluid composition flows through from the device, based on the ratio of desired fluid to undesired fluid in the fluid composition.

32. The system of claim 31, wherein the flow path selection device includes a first control port, and wherein a flow rate of the fluid composition through the first control port affects which of the multiple flow paths the majority of the fluid composition flows through.

33. The system of claim 32, wherein the flow rate of the fluid composition through the first control port varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

34. The system of claim 32, wherein the flow path selection device further includes a second control port, and wherein a ratio of the flow rates of the fluid composition through the first and second control ports affects which of the multiple flow paths the majority of fluid composition flows through from the device.

35. The system of claim 34, wherein the ratio of the flow rates through the first and second control ports varies with respect to the ratio of desired fluid to undesired fluid in the fluid composition.

36. The system of claim 32, wherein the fluid composition flows to the first control port via at least one control passage which connects to a flow passage through which the fluid composition flows, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

37. The system of claim 32, wherein the flow path selection device includes a second control port, wherein a flow rate of the fluid composition through the second control port affects which of the multiple flow paths the majority of the fluid composition flows through from the device, wherein the fluid composition flows to the second control port via at least one control passage through which the fluid composition flows, wherein the control passage connects to at least one flow passage, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

38. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising:

a flow chamber, and

wherein a majority of the fluid composition enters the chamber in a direction which changes based on a velocity of the fluid composition.

39. The system of claim 38, wherein the fluid composition more directly flows through the chamber to an outlet of the chamber in response to a decrease in the velocity.

40. The system of claim 38, wherein the majority of the fluid composition enters the chamber via one of multiple inlets, and wherein the one of the multiple inlets is selected based on the velocity.

41. The system of claim 40, wherein a first one of the multiple inlets directs the fluid composition to flow more directly toward an outlet of the chamber as compared to a second one of the multiple inlets.

42. The system of claim 41, wherein the first inlet directs the fluid composition to flow more radially relative to the outlet as compared to the second inlet.

43. The system of claim 41, wherein the second inlet directs the fluid composition to spiral more about the outlet as compared to the first inlet.

44. The system of claim 38, wherein the chamber is generally cylindrical-shaped, and wherein the fluid

composition spirals more within the chamber as the velocity increases.

45. The system of claim 38, further comprising a flow path selection device that selects which of multiple flow paths the majority of the fluid composition flows through from the device, based on the velocity of the fluid composition.

46. A variable flow resistance system for use in a subterranean well, the variable flow resistance system comprising:

a flow chamber having an outlet, and at least first and second inlets, wherein a fluid composition which enters the flow chamber via the second inlet opposes flow of the fluid composition which enters the flow chamber via the first inlet, whereby a resistance to flow of the fluid composition through the flow chamber varies with a ratio of flows through the first and second inlets.

47. The system of claim 46, wherein a resistance to flow of the fluid composition through the flow chamber decreases as flow through the first and second inlets becomes more equal.

48. The system of claim 47, wherein flow through the first and second inlets becomes more equal as a viscosity of the fluid composition increases.

49. The system of claim 47, wherein flow through the first and second inlets becomes more equal as a velocity of the fluid composition decreases.

50. The system of claim 47, wherein flow through the first and second inlets becomes more equal as a density of the fluid composition decreases.

51. The system of claim 47, wherein flow through the first and second inlets becomes more equal as a ratio of desired fluid to undesired fluid in the fluid composition increases.

52. The system of claim 46, wherein a resistance to flow of the fluid composition through the flow chamber increases as flow through the first and second inlets becomes less equal.

53. The system of claim 46, wherein the fluid composition flows to the first inlet via a first flow passage which is oriented generally tangential to the flow chamber, and wherein the fluid composition flows to the second inlet via a second flow passage which is oriented generally tangential to the flow chamber.

54. The system of claim 53, wherein the second passage receives the fluid composition from a branch of the first flow passage.

What is claimed is:

1. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising: a first flow passage; and a first set of one or more branch passages which intersect the first flow passage, whereby a proportion of the fluid composition diverted from the first flow passage to the first set of branch passages varies based on at least one of a) viscosity of the fluid composition in the first flow passage, and b) velocity of the fluid composition in the first flow passage, wherein the first set of branch passages directs the fluid composition to a first control passage of a flow path selection device, and wherein the flow path selection device selects which of multiple flow paths a majority of fluid flows through from the device, based at least partially on the proportion of the fluid composition diverted to the first control passage, and wherein the flow path selection device variably resists flow of the fluid composition in at least one direction between an interior of a tubular string and an earth formation intersected by the subterranean well.

2. The system of claim 1, further comprising a second flow passage, and a second set of one or more branch passages which intersect the second flow passage, whereby a proportion of the fluid composition diverted from the second flow passage to the second set of branch passages increases with increased viscosity of the fluid composition, and increases with decreased velocity of the fluid composition in the second flow passage.

3. The system of claim 2, wherein the second flow passage directs the fluid composition to a second control passage of the flow path selection device, and wherein the flow path selection device selects which of the multiple flow paths the majority of fluid flows through from the device, based on a ratio of flow rates of the fluid composition through the first and second control passages.

4. The system of claim 3, wherein the ratio of the flow rates through the first and second control passages varies with respect to a ratio of desired fluid to undesired fluid in the fluid composition.

5. The system of claim 1, further comprising a second flow passage, wherein the second flow passage directs the fluid composition to a second control passage of the flow path selection device, and wherein the flow path selection device selects which of the multiple flow paths the majority of fluid flows through from the device, based on a ratio of flow rates of the fluid composition through the first and second control passages.

6. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising: a first flow passage; and a first set of one or more branch passages which intersect the first flow passage, whereby a proportion of the fluid composition diverted from the first flow passage to the first set of branch passages varies based on at least one of a) viscosity of the fluid composition in the first flow passage, and b) velocity of the fluid composition in the first flow passage, wherein the first set of branch passages includes multiple branch passages spaced apart along the first flow passage.

7. The system of claim 6, further comprising a chamber at each of multiple intersections between the first flow passage and the branch passages.

8. The system of claim 7, wherein each of the chambers has a fluid volume, and wherein the volumes decrease in a direction of flow of the fluid composition through the first flow passage.

9. The system of claim 6, wherein a flow area of the first flow passage increases at each of multiple intersections between the first flow passage and the first set of branch passages.

10. A system for variably resisting flow of a fluid composition in a subterranean well, the fluid composition having a ratio of desired fluid to undesired fluid, the system comprising: a flow path selection device that selects which of multiple flow paths a majority of the fluid composition flows through from the device, based on the ratio of desired fluid to undesired fluid in the fluid composition.

11. The system of claim 10, wherein the flow path selection device includes a first control port, and wherein a flow rate of the fluid composition through the first control port affects which of the multiple flow paths the majority of the fluid composition flows through from the device.

12. The system of claim 11, wherein the flow rate of the fluid composition through the first control port varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

13. The system of claim 11, wherein the flow path selection device further includes a second control port, and wherein the flow path selection device selects which of multiple flow paths the majority of the fluid composition flows through from the device, based on a ratio of the flow rates of the fluid composition through the first and second control ports.

14. The system of claim 13, wherein the ratio of the flow rates through the first and second control ports varies with respect to the ratio of desired fluid to undesired fluid in the fluid composition.

15. The system of claim 11, wherein the fluid composition flows to the first control port via at least one control passage which connects to a flow passage through which the fluid composition flows, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

16. The system of claim 15, wherein a proportion of the fluid composition which flows from the flow passage to the control passage increases when a viscosity of the fluid composition increases.

17. The system of claim 15, wherein a proportion of the fluid composition which flows from the flow passage to the control passage decreases when a velocity of the fluid composition in the flow passage increases.

18. The system of claim 11, wherein the flow path selection device includes a second control port, wherein a flow rate of the fluid composition through the second control port affects which of the multiple flow paths the majority of the fluid composition flows through from the device, wherein the fluid composition flows to the second control port via at least one control passage through which the fluid composition flows, wherein the control passage connects to at least one flow passage, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

19. The system of claim 18, wherein a proportion of the fluid composition which flows from the flow passage to the control passage decreases when a viscosity of the fluid composition increases.

20. The system of claim 18, wherein a proportion of the fluid composition which flows from the flow passage to the control passage increases when a velocity of the fluid composition in the flow passage increases.

21. A system for variably resisting flow of a fluid composition in a subterranean well, the fluid composition having a ratio of desired fluid to undesired fluid, the system comprising: a flow chamber, wherein a majority of the fluid composition enters the chamber in a direction which changes based on the ratio of desired fluid to undesired fluid in the fluid composition, and a flow path selection device that selects which of multiple flow paths the majority of the fluid composition flows through from the device, based on the ratio of desired fluid to undesired fluid in the fluid composition.

22. The system of claim 21, wherein the flow path selection device includes a first control port, and wherein a flow rate of the fluid composition through the first control port affects which of the multiple flow paths the majority of the fluid composition flows through.

23. The system of claim 22, wherein the flow rate of the fluid composition through the first control port varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

24. The system of claim 22, wherein the flow path selection device further includes a second control port, and wherein a ratio of the flow rates of the fluid composition through the first and second control ports affects which of the multiple flow paths the majority of fluid composition flows through from the device.

25. The system of claim 24, wherein the ratio of the flow rates through the first and second

control ports varies with respect to the ratio of desired fluid to undesired fluid in the fluid composition.

26. The system of claim 22, wherein the fluid composition flows to the first control port via at least one control passage which connects to a flow passage through which the fluid composition flows, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

27. The system of claim 22, wherein the flow path selection device includes a second control port, wherein a flow rate of the fluid composition through the second control port affects which of the multiple flow paths the majority of the fluid composition flows through from the device, wherein the fluid composition flows to the second control port via at least one control passage through which the fluid composition flows, wherein the control passage connects to at least one flow passage, and wherein a flow rate of the fluid composition from the flow passage to the control passage varies based on the ratio of desired fluid to undesired fluid in the fluid composition.

28. A system for variably resisting flow of a fluid composition in a subterranean well, the system comprising: a flow chamber, wherein a majority of the fluid composition enters the chamber in a direction which changes based on a velocity of the fluid composition, and a flow path selection device that selects which of multiple flow paths the majority of the fluid composition flows through from the device, based on the velocity of the fluid composition.