

WHAT IS CLAIMED IS:

1. A fluid discrimination system for use with a subterranean well, the system comprising:
 - 5 a fluid discriminator which selects through which of multiple outlet flow paths a fluid composition flows, the selection being based on at least one direction of flow of the fluid composition through the fluid discriminator, and the direction being dependent on at
10 least one fluid type in the fluid composition.
2. The system of claim 1, wherein the fluid discriminator selects a first outlet flow path in response an increase in a ratio of desired to undesired
15 fluid in the fluid composition, and wherein the fluid discriminator selects a second outlet flow path in response to a decrease in the ratio of desired to undesired fluid.
- 20 3. The system of claim 1, wherein the fluid discriminator selects a first outlet flow path in response to the direction of flow being more radial, and wherein the fluid discriminator selects a second outlet flow path in response to the direction of flow being
25 more rotational.
4. The system of claim 1, wherein the at least one direction comprises opposite directions.

5. The system of claim 1, wherein the at least one direction comprises first and second directions, and wherein the fluid discriminator selects a first outlet flow path in response to flow of the fluid composition more in the first direction, and wherein the fluid discriminator selects a second outlet flow path in response to flow of the fluid composition more in the second direction.

6. The system of claim 5, wherein the flow of the fluid composition in the first direction impinges on a structure; whereby the structure displaces and the first outlet flow path is selected.

7. The system of claim 6, wherein the flow of the fluid composition in the second direction impinges on the structure, whereby the structure displaces and the second outlet flow path is selected.

8. The system of claim 6, wherein the structure rotates in response to the impingement of the fluid composition on the structure.

9. The system of claim 5, wherein a fluid switch selects in which of the first and second directions the fluid composition flows, wherein the fluid switch directs the fluid composition to flow more in the first direction in response to an increase in a ratio of desired to undesired fluid, and wherein the fluid switch directs the fluid composition to flow more in the second

REPLACEMENT SHEET

30

direction in response to a decrease in the ratio of
desired to undesired fluid.

10. The system of claim 5, wherein the first
5 direction is radial.

11. The system of claim 5, wherein the second
direction is rotational.

12. A fluid discriminator for use with a subterranean well, the fluid discriminator comprising:

5 a structure which displaces in response to a flow of a fluid composition, whereby an outlet flow path of a majority of the fluid composition changes in response to a change in a ratio of fluids in the fluid composition.

13. The fluid discriminator of claim 12, wherein the structure is exposed to the flow of the fluid
10 composition in at least first and second directions, and wherein the outlet flow path changes in response to a change in a proportion of the fluid composition which flows in the first and second directions.

15 14. The fluid discriminator of claim 12, wherein the structure is more biased in a first direction by the flow of the fluid composition more in the first direction, and wherein the structure is more biased in a second direction by the flow of the fluid composition
20 more in the second direction.

15. The fluid discriminator of claim 14, wherein the first direction is opposite to the second direction.

25 16. The fluid discriminator of claim 14, wherein the first and second directions comprise at least one of the group including circumferential, axial, longitudinal, lateral, and radial directions.

17. The fluid discriminator of claim 12, further comprising a fluid switch which directs the flow of the fluid composition to at least first and second inlet flow paths.

5

18. The fluid discriminator of claim 17, wherein the structure is more biased in a first direction by the flow of the fluid composition more through the first inlet flow path, and wherein the structure is more
10 biased in a second direction by the flow of the fluid composition more through the second inlet flow path.

19. The fluid discriminator of claim 17, wherein the structure pivots, and thereby changes the outlet
15 flow path, in response to a change in a proportion of the fluid composition which flows through the first and second inlet flow paths.

20. The fluid discriminator of claim 17, wherein
20 the structure rotates, and thereby changes the outlet flow path, in response to a change in a proportion of the fluid composition which flows through the first and second inlet flow paths.

25 21. The fluid discriminator of claim 17, wherein the structure rotates, and thereby changes the outlet flow path, in response to a change in a ratio of desired to undesired fluids.

22. The fluid discriminator of claim 17, wherein the fluid switch comprises a blocking device which at least partially blocks the flow of the fluid composition through at least one of the first and second inlet flow
5 paths.

23. The fluid discriminator of claim 22, wherein the blocking device increasingly blocks one of the first and second inlet flow paths, in response to the flow of
10 the fluid composition toward the other of the first and second inlet flow paths.

24. The fluid discriminator of claim 22, wherein the fluid switch directs the flow of the fluid
15 composition toward one of the first and second inlet flow paths in response to the blocking device increasingly blocking the other of the first and second inlet flow paths.

25. A method of discriminating between fluids flowed in a subterranean well, the method comprising:

providing a fluid discriminator which selects through which of multiple outlet flow paths a fluid composition flows in the well, the selection being based on at least one direction of flow of the fluid composition through the fluid discriminator, and the direction being dependent on a ratio of the fluids in the fluid composition.

10

26. The method of claim 25, wherein the fluid discriminator selects a first outlet flow path in response an increase in the ratio of fluids, and wherein the fluid discriminator selects a second outlet flow path in response to a decrease in the ratio of fluids.

15

27. The method of claim 25, wherein the fluid discriminator selects a first outlet flow path in response to the direction of flow being more radial, and wherein the fluid discriminator selects a second outlet flow path in response to the direction of flow being more rotational.

20

28. The method of claim 25, wherein the at least one direction comprises opposite directions.

25

29. The method of claim 25, wherein the at least one direction comprises first and second directions, and wherein the fluid discriminator selects a first outlet

flow path in response to flow of the fluid composition more in the first direction, and wherein the fluid discriminator selects a second outlet flow path in response to flow of the fluid composition more in the
5 second direction.

30. The method of claim 29, wherein the flow of the fluid composition in the first direction impinges on a structure, whereby the structure displaces and the
10 first outlet flow path is selected.

31. The method of claim 30, wherein the flow of the fluid composition in the second direction impinges on the structure, whereby the structure displaces and
15 the second outlet flow path is selected.

32. The method of claim 30, wherein the structure rotates in response to the impingement of the fluid composition on the structure.
20

33. The method of claim 29, wherein a fluid switch selects in which of the first and second directions the fluid composition flows, wherein the fluid switch directs the fluid composition to flow more in the first
25 direction in response to an increase in the ratio of fluids, and wherein the fluid switch directs the fluid composition to flow more in the second direction in response to a decrease in the ratio of fluids.

REPLACEMENT SHEET

36

34. The method of claim 29, wherein the first
direction is radial.

35. The method of claim 29, wherein the second
5 direction is rotational.

CLAIMS

What is claimed is:

1. A fluid discrimination system for use with a subterranean well, the system comprising:
a fluid discriminator through which a fluid composition flows in the subterranean well;
and

the fluid discriminator selects through which of multiple outlet flow paths the fluid composition flows, the selection being based on at least one direction of flow of the fluid composition through the fluid discriminator, and the direction being dependent on a ratio of desired to undesired fluid in the fluid composition,

wherein the at least one direction comprises first and second directions,

wherein the fluid discriminator selects a first outlet flow path in response to flow of the fluid composition more in the first direction,

wherein the fluid discriminator selects a second outlet flow path in response to flow of the fluid composition more in the second direction, and

wherein rotational flow of the fluid composition in the first direction impinges on a structure, whereby the structure displaces and the first outlet flow path is selected.

2. The system of claim 1, wherein rotational flow of the fluid composition in the second direction impinges on the structure, whereby the structure displaces and the second outlet flow path is selected.

3. The system of claim 1, wherein the structure rotates in response to the impingement of the fluid composition on the structure.

4. A fluid discriminator for use with a subterranean well, the fluid discriminator comprising:

a structure which displaces in response to a rotational flow of a fluid composition in the subterranean well, whereby an outlet flow path of a majority of the fluid composition changes in response to a change in a ratio of fluids in the fluid composition; and

a fluid switch which directs the flow of the fluid composition to at least first and second inlet flow paths, wherein the rotational flow of the fluid composition impinges the structure, wherein the structure is displaced in response to the impingement, and wherein the outlet flow path changes in response to displacement of the structure.

5. The fluid discriminator of claim 4, wherein the structure is exposed to the flow of the fluid composition in at least first and second directions, and wherein the outlet flow path changes in response to a change in a proportion of the fluid composition which flows in the first and second directions.

6. The fluid discriminator of claim 4, wherein the structure is more biased in a first direction by the flow of the fluid composition more in the first direction, and wherein the structure is more biased in a second direction by the flow of the fluid composition more in the second direction.

7. The fluid discriminator of claim 6, wherein the first direction is opposite to the second direction.

8. The fluid discriminator of claim 6, wherein the first and second directions comprise at least one of the group including circumferential, axial, longitudinal, lateral, and radial directions.

9. The fluid discriminator of claim 4, wherein the structure is more biased in a first direction by the flow of the fluid composition more through the first inlet flow path, and wherein the structure is more biased in a second direction by the flow of the fluid composition more through the second inlet flow path.

10. The fluid discriminator of claim 4, wherein the structure pivots, and thereby changes the outlet flow path, in response to a change in a proportion of the fluid composition which flows through the first and second inlet flow paths.

11. The fluid discriminator of claim 4, wherein the structure rotates, and thereby changes the outlet flow path, in response to a change in a proportion of the fluid composition which flows through the first and second inlet flow paths.

12. The fluid discriminator of claim 4, wherein the structure rotates, and thereby changes the outlet flow path, in response to a change in a ratio of desired to undesired fluids.

13. The fluid discriminator of claim 4, wherein the fluid switch comprises a blocking device which at least partially blocks the flow of the fluid composition through at least one of the first and second inlet flow paths.

14. The fluid discriminator of claim 13, wherein the blocking device increasingly blocks one of the first and second inlet flow paths, in response to the flow of the fluid composition toward the other of the first and second inlet flow paths.

15. The fluid discriminator of claim 13, wherein the fluid switch directs the flow of the fluid composition toward one of the first and second inlet flow paths in response to the blocking device increasingly blocking the other of the first and second inlet flow paths.

16. A method of discriminating between fluids flowed in a subterranean well, the method comprising:

providing a fluid discriminator which selects through which of multiple outlet flow paths a fluid composition flows in the well, the selection being based on at least one direction of flow of the fluid composition through the fluid discriminator, and the direction being dependent on a ratio of the fluids in the fluid composition,

wherein the at least one direction comprises first and second directions,

wherein the fluid discriminator selects a first outlet flow path in response to flow of the fluid composition more in the first direction,

wherein the fluid discriminator selects a second outlet flow path in response to flow of the fluid composition more in the second direction, and

wherein rotational flow of the fluid composition in the first direction impinges on a structure, whereby the structure displaces and the first outlet flow path is selected.

17. The method of claim 16, wherein rotational flow of the fluid composition in the second direction impinges on the structure, whereby the structure displaces and the second outlet flow path is selected.

18. The method of claim 16, wherein the structure rotates in response to the impingement of the fluid composition on the structure.