

CLAIMS

1. A fluid flow control apparatus for use in an oilfield tubular positioned in a wellbore extending through a subterranean formation, the oilfield tubular for flowing fluid therethrough, the fluid having a density which changes over time, the apparatus comprising:
 - a tool housing;
 - a valve assembly having a valve housing with a plurality of valve inlets and at least one valve outlet;
 - a movable fluid diverter positioned in the tool housing, the fluid diverter actuated by change in the fluid diverter buoyancy in response to change in the fluid density, the fluid diverter moveable between the plurality of valve inlets to restrict fluid flow through at least one valve inlet in response to change in the fluid density;
 - wherein the valve assembly further comprises spaced apart first and second inlets, and wherein the diverter is operable to change a fluid flow ratio between the first and second inlets in response to fluid density change, the change in the fluid flow ratio is operable to actuate a valve member in the valve assembly.
2. The apparatus as in claim 1 wherein the fluid diverter is of a preselected density and is buoyant in a fluid of a preselected density.
3. The apparatus as in claim 1 wherein the fluid diverter is movable between a first and a second position, and wherein the fluid diverter is biased towards a first position by a biasing member.
4. The apparatus as in claim 3 wherein the biasing member is a spring mechanism.
5. The apparatus as in claim 3 wherein the fluid diverter has a density greater than the fluid density of operation of the apparatus, the biasing mechanism offsetting the fluid diverter density and allowing the diverter to be actuated by density change in the fluid.
6. The apparatus as in claim 1 wherein the movable fluid diverter pivots about a lateral axis.
7. The apparatus as in claim 1 wherein the valve assembly further comprises a valve chamber in fluid communication with the valve inlets and valve outlet, the valve chamber housing the valve member, the valve member movable between a closed position wherein fluid flow through the valve outlet is restricted and an open position wherein fluid flow through the valve outlet is less restricted.

8. The apparatus as in claim 7 wherein the valve member is a pivotable valve arm having one end proximate the valve outlet and operable to restrict flow through the outlet.
9. The apparatus as in claim 1 wherein the valve assembly further comprises venturi pressure converter.
10. The apparatus as in claim 9 wherein the venturi pressure converter communicates pressure to the valve member thereby actuating the valve member.
11. A fluid flow control apparatus for use in an oilfield tubular positioned in a wellbore extending through a subterranean formation, the oilfield tubular for flowing fluid therethrough, the fluid having a density which changes over time, the apparatus comprising:
 - a fluid diverter movable in response to changes in the density of the fluid; the fluid flow following a fluid flow path, wherein movement of the fluid diverter changes the fluid flow path; and
 - a valve assembly having a valve housing with a plurality of valve inlets and at least one valve outlet for restricting fluid flow, the valve assembly having an open and a closed position, wherein the change in the fluid flow path changes the position of the valve assembly; and
 - wherein the fluid diverter movable between the plurality of valve inlets to restrict fluid flow through at least one valve inlet;
 - wherein the valve assembly further comprises spaced apart first and second inlets, and wherein the diverter is operable to change the fluid flow ratio between the first and second inlets in response to fluid density change, the change in fluid flow ratio is operable to actuate a valve member in the valve assembly.
12. The apparatus as in claim 11 wherein the fluid diverter is of a preselected density and is buoyant in a fluid of a preselected density.
13. The apparatus as in claim 11 wherein the fluid diverter is biased towards a first position by a biasing member.
14. The apparatus as in claim 13 wherein the biasing member is a spring mechanism.
15. The apparatus as in claim 13 wherein the fluid diverter has a density greater than the fluid density during operation of the apparatus, the biasing mechanism offsetting the diverter density and allowing the diverter to be actuated by density change in the fluid.
16. The apparatus as in claim 11 wherein the fluid diverter is movable by pivoting about a pivot.

17. The apparatus as in claim 11 wherein the apparatus further comprises a housing, the fluid diverter movably mounted in the housing, the fluid flow path defined by fluid flow along the housing and adjacent the fluid diverter.