Claims

What is claimed is:

1. An equalizing subsurface valve for controlling fluid flow in a well conduit, comprising:

a body member having a longitudinal bore extending therethrough;

a valve actuator disposed for axial movement within the longitudinal bore;

a valve member mounted within the body member to control fluid flow through the longitudinal bore, the valve member having an upper surface, a lower surface, and a bore therethrough;

a generally radially disposed opening in the body member providing an equalization fluid flow passageway between the longitudinal bore above the valve member and the longitudinal bore below the valve member;

an equalizing device located at least partially within the equalization fluid flow passageway and configured to resist sand and debris effects on its operation, the equalizing device biased to a closed position;

wherein when the valve actuator is in a first position the valve member is in a closed position and the equalizing device restricts the flow of fluid through the equalization fluid flow passageway;

wherein when the valve actuator is in a second position the valve member remains in a closed position and the equalizing device is at least partially opened enabling the flow of fluid through the equalization fluid flow passageway;

wherein when the valve actuator is in a third position a portion of the valve actuator is positioned within the valve member bore, the valve member is in an open position enabling fluid flow through the longitudinal bore.

~~2. The equalizing subsurface valve of claim 1 wherein the equalizing device comprises a filter to resist sand and debris effects on its operation.~~

~~3. The equalizing subsurface valve of claim 1,~~ wherein the equalizing device further comprises a closure member that, when in a closed position, is in contact with an equalizing device seat comprising a portion of the body member, restricting the flow of fluid through the equalization fluid flow passageway~~.~~

~~4. The equalizing subsurface valve of claim 3 wherein the equalizing device seat comprises a portion of the body member.~~

~~5. The equalizing subsurface valve of claim 3 wherein a portion of the closure member extends within the longitudinal bore of the body member when the closure member is in the closed position.~~

~~6. The equalizing subsurface valve of claim 3 wherein the closure member is biased to the closed position.~~

~~7. The equalizing subsurface valve of claim 6 wherein the closure member is biased to the closed position with a spring mechanism.~~

~~8. The equalizing subsurface valve of claim 3 wherein when the valve actuator is in the second position the valve actuator is in contact with and exerts force on the closure member sufficient to overcome a closed position bias and place the closure member in an open position, enabling the flow of fluid through the equalization fluid flow passageway.~~

~~9. The equalizing subsurface valve of claim 3 wherein the equalizing device seat further comprises an elastomeric secondary seal.~~

~~10. The equalizing subsurface valve of claim 9 wherein the elastomeric secondary seal is cylindrical in shape to provide rigidity to the seal during equalization and to maintain proper orientation of the closure member.~~

~~11. The equalizing subsurface valve of claim 9 wherein the elastomeric secondary seal is sufficiently flexible to enable sand or debris to be crushed into the secondary seal and enable the closure member to close.~~

~~12. The equalizing subsurface valve of claim 4,~~ wherein the closure member comprises a plunger movable within a portion of the equalization fluid flow passageway, the plunger having a radial projection that seats upon contact with a body member ledge formed from a reduction in the diameter of the equalization fluid flow passageway, wherein the closure member further comprises a closure member port in the side of the closure member under the closure member radial projection that form a fluid path into an inner passageway within the closure member, the closure member port and inner passageway forming a portion of the equalization fluid flow passageway when the closure member is in an open position, and further wherein the closure member port does not form a portion of the equalization fluid flow passageway when the closure member is in the closed position.

~~13.~~ 2. The equalizing subsurface valve of claim ~~12~~1 wherein the equalizing device comprises a filter to resist sand and debris effects on its operation.

3. The equalizing subsurface valve of claim 1 wherein a portion of the closure member extends within the longitudinal bore of the body member when the closure member is in the closed position.

4. The equalizing subsurface valve of claim 1 wherein the closure member is biased to the closed position.

5. The equalizing subsurface valve of claim 4 wherein the closure member is biased to the closed position with a spring mechanism.

6. The equalizing subsurface valve of claim 1 wherein when the valve actuator is in the second position the valve actuator is in contact with and exerts force on the closure member sufficient to overcome a closed position bias and place the closure member in an open position, enabling the flow of fluid through the equalization fluid flow passageway.

7. The equalizing subsurface valve of claim 1 wherein the equalizing device seat further comprises an elastomeric secondary seal.

8. The equalizing subsurface valve of claim 7 wherein the elastomeric secondary seal is cylindrical in shape to provide rigidity to the seal during equalization and to maintain proper orientation of the closure member.

9. The equalizing subsurface valve of claim 7 wherein the elastomeric secondary seal is sufficiently flexible to enable sand or debris to be crushed into the secondary seal and enable the closure member to close.

10. The equalizing subsurface valve of claim 1 wherein the closure member radial projection has a contact surface and the body member ledge has a contact surface, wherein the closure member radial projection contact surface seats with the body member ledge contact surface restricting fluid flow between them when the closure member is in the closed position, forming a radial line of contact at a location where the fluid flowing through the equalization fluid flow passageway starts to pass across the closure member radial projection contact surface.

~~14. The equalizing subsurface valve of claim 12 wherein the closure member further comprises one or more port in the side of the closure member under the closure member radial projection that form a fluid path into an inner passageway within the closure member, the closure member ports and inner passageway forming a portion of the equalization fluid flow passageway when the closure member is in an open position.~~

~~15. The equalizing subsurface valve of claim 14 wherein the closure member port forms a seal with a body member edge.~~

~~16. The equalizing subsurface valve of claim 15 wherein when the closure member is in the closed position the closure member port forms a primary seal with the body member edge and the closure member radial projection is flexible and forms a secondary seal with the body member ledge.~~

~~17. The equalizing subsurface valve of claim 4 wherein the closure member comprises a plunger movable within a portion of the equalization fluid flow passageway, the plunger having a plurality of radial projections that seat upon contact with a body member ledge formed from a reduction in the diameter of the equalization fluid flow passageway.~~

~~18. The equalizing subsurface valve of claim 17 wherein the plurality of radial projections form multiple radial line contacts between the radial projections and the body member ledge.~~

~~19. The equalizing subsurface valve of claim 18 wherein the multiple radial line contacts exert pressure to crush sand or debris located between the plurality of radial projections and the body member ledge.~~

~~20.~~11. An equalizing subsurface valve for controlling fluid flow in a well conduit, comprising:

a body member having a longitudinal bore extending therethrough;

a valve actuator disposed for axial movement within the longitudinal bore;

a valve member mounted within the body member to control fluid flow through the longitudinal bore, the valve member having an upper surface, a lower surface, and a bore therethrough;

a generally radially disposed opening in the body member providing an equalization fluid flow passageway between the longitudinal bore above the valve member and the longitudinal bore below the valve member;

an equalizing device located at least partially within the equalization fluid flow passageway and configured to resist sand and debris effects on its operation, the equalizing device biased to a closed position;

wherein when the valve actuator is in a first position the valve member is in a closed position and the equalizing device restricts the flow of fluid through the equalization fluid flow passageway;

wherein when the valve actuator is in a second position the valve member remains in a closed position and the equalizing device is at least partially opened enabling the flow of fluid through the equalization fluid flow passageway;

wherein when the valve actuator is in a third position a portion of the valve actuator is positioned within the valve member bore, the valve member is in an open position enabling fluid flow through the longitudinal bore~~;~~

~~wherein the equalizing device comprises a filter to resist sand and debris effects on its operation;~~

, wherein the equalizing device further comprises a closure member that, when in a closed position, is in contact with an equalizing device seat~~, restricting the flow of fluid through the equalization fluid flow passageway;~~ comprising a portion of the body member, wherein the closure member comprises a plunger movable within a portion of the equalization fluid flow passageway, the plunger having a plurality of radial projections that seat upon contact with a body member ledge formed from a reduction in the diameter of the equalization fluid flow passageway.

~~wherein a portion of the closure member extends within the longitudinal bore of the body member when the closure member is in the closed position; and~~

~~wherein the closure member is biased to the closed position.~~