Variable Flow Resistance System for Use with a Subterranean Well

Background

[0001] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the presently described embodiments. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present embodiments. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0002] This disclosure relates generally to equipment utilized and operations performed in conjunction with a subterranean well and, in an example described below, more particularly provides a selectively variable flow restrictor.

[0003] In a hydrocarbon production well, it is many times beneficial to be able to regulate flow of fluids from an earth formation into a wellbore, from the wellbore into the formation, and within the wellbore. A variety of purposes may be served by such regulation, including prevention of water or gas coning, minimizing sand production, minimizing water and/or gas production, maximizing oil production, balancing production among zones, transmitting signals, etc.

[0004] Therefore, it will be appreciated that advancements in the art of variably restricting fluid flow in a well would be desirable in the circumstances mentioned above, and such advancements would also be beneficial in a wide variety of other circumstances.

Summary of Invention

[0004a] According to a first aspect of the present invention, there is provided a variable flow resistance system for use with a subterranean well, the system including: a first flow path to receive a fluid; a flow rate sensor to measure a

flow rate of the fluid received into the first flow path; and an actuator to control an inflow rate of the fluid received into the first flow path based upon the measured flow rate of the fluid.

[0004b] According to a second aspect of the present invention, there is provided a variable flow resistance system for use with a subterranean well, the system including: a first flow path to receive a fluid; a receiver to receive a control signal through flow rate fluctuations of the fluid received into the first flow path; and an actuator to control an inflow rate of the fluid received into the first flow path based upon the control signal received by the receiver.

[0004c] According to a third aspect of the present invention, there is provided a method of variably controlling flow resistance in a well, the method including: receiving a fluid into a first flow path; measuring a flow rate of the fluid received into the first flow path; and adjusting an inflow rate of the fluid received into the first flow path based upon the measured flow rate of the fluid.

Brief Description of the Drawings

[0005] Illustrative embodiments of the present disclosure are described in detail below with reference to the attached drawing figures, which are incorporated by reference herein and wherein: