Device and Apparatus

This invention relates, in particular, to a bore selector device and apparatus to direct tools into different bores in the well.

Access to a multi-bore bore subsea well often requires the use of a multi-bore riser extending from the well to the surface facility. Multi-bore risers add more expense to such a well installation.

An alternative is therefore to use a monobore subsea riser. To direct lowered tools into different bores of a well, devices were conventionally taken back to surface, reconfigured and re-run (round-tripped), which is a time consuming activity.

An improved option to avoid round-tripping the system is to provide a bore selector to direct access to the different bores in a multi-bore subsea well. For example, a bore selector can allow access to a production bore or an annulus bore. The bore selector enables access to the multiple bores whilst the equipment remains subsea.

However, the inventors of the present invention have noted that a limitation of existing bore selector technology is the need for specifically designed bore selectors to match the specific bore size and configuration of global subsea production systems. Due to the variety of bore sizes and configurations, bore selectors become system specific, thus limiting the number of opportunities to utilise the same bore selector.

US2015176353A discloses a ram type bore selector arrangement that uses a linkage mechanism to translate vertical piston movement to horizontal ram movement to elect the chosen bore and whilst generally satisfactory the inventors of the present invention have made improvements to mitigate some limitations of the art. For example, in a closed position, the present inventors have noted that the linkage mechanism can be susceptible to damage from tool string / dropped object impact to the rams, which may affect functionality.

In accordance with a first aspect of the present invention there is provided a bore selector device comprising:

a housing defining a bore extending therethrough the bore having a main longitudinal axis;

at least a first and a second actuator opposite each other, each moveable between respective retracted and extended positions in a direction perpendicular to the main longitudinal axis;

each actuator connected to a respective ram such that the rams are moveable between a retracted position and an extended position in a direction perpendicular to the main longitudinal axis;

wherein each actuator and attached ram is moveable in the same linear direction,

wherein the bore selector device comprises a maximum of a single bore between the rams and a lower flange connector adapted to connect to a bore spacer sub having at least two discrete bores.

Each ram may comprise a primary ram portion and a secondary ram portion, normally connected to the primary ram portion, the secondary portions extending from the respective primary portions generally towards the opposite actuator. At least one secondary portion may be a tongue. A groove may be provided in at least one of the primary portions, into which the tongue of the opposite ram engages when in the extended position.

The rams are normally shaped to direct items run into the well into one of two or more different directions.

In some embodiments, the primary and secondary ram portions may be formed as separate components, normally coupled together. In other embodiments, the primary and secondary ram portions may be formed as a single piece.

At least one primary ram portion can comprise a portion sloping in a first downwards direction. In the extended position, the primary ram portions may abut. They may together form a larger portion sloping in the first downwards direction, such as a funnel.

In use, the first downwards direction is usually towards an annulus bore of a well.

At least one secondary ram portion can comprise a portion sloping in a second, different, downwards direction. In the retracted position, at least one secondary portion may be positioned in the bore.

In use, the second downwards direction may be towards a production bore of a well.

At least one primary portion may define a through-passage at the first downwards direction. At least one secondary portion may define a through-passage towards the first downwards direction. Where only one primary and secondary portion define said through-passage, the defined passages are usually provided on opposite rams.

In the extended position, the through-passage of the primary and secondary portions normally align, thus maintaining a through passage.