Method and Apparatus For Deploying and Cementing Liners Across Challenging Well Profiles

Author block: A. Alotaibi, Saudi Aramco D&WO

Abstract

This paper will introduce a patent of method that will allow liners to be deployed and cemented across challenging well profiles while maintaining the ability to efficiently cement the pipe. The invention will explain the method of transmitting the load and torque from surface to the bottom of the liner. A combination of axial and rotational motion will be applied to overcome high friction and ledges across the well.

This method that will allow liners to be deployed and cemented across challenging well profiles by providing double motion on the bottom of the string while maintaining the ability to efficiently cement the pipe. The assembly consist of PAC valve connected to a power section. At the end of the power section there is an isolation valve connected to a spring where at the end there is a piston. The piston is connected to a power section of which there is a reamer shoe at the end of the assembly. The tool is connected at the bottom of the liner. Once the fluid is pumped and reaches the tool, the path starts with the PAC valve to the power section. As the fluid continue to flow, the power section will rotate. The isolation valve disk will rotate exposing different flow path diameters. As the flow changes from one diameter to another, the pulse motion will occur. The spring expansion after that is linked to the flowrate. If the flowrate is high, the piston will move forward allowing the flow to continue to the second power section causing the reamer shoe to rotate. The piston will continue opening and closing the flow path causing the axial motion to the string. “PAC Valve” has a dart seat below the ports. After reaching the required depth, a dart is dropped from surface and it will land on the dart seat. This will convert the system to a closed system. While applying pressure from surface (based on the shear pins value) the PAC valve will open allowing the fluid to be circulated through it with high rate. The liner will be cemented through the PAC valve. This method that will allow liners to be deployed and cemented across challenging well profiles by providing double motion on the bottom of the string while maintaining the ability to efficiently cement the pipe. Deploying long liners in deviated/horizontal wells with high friction can cause the pipe to buckle and stand against the weight transfer across the liner. Also, the ledges in the well can become a barrier to successful deployment of liners. Allowing the weight to be transferred to the bottom of the liner due to agitating the pipe can solve this issue. The bottom rotation of the liner can overcome any existing ledges.

The technical advantage is ability to rotate and push the liner at the same time while the flow of drilling mud is pumped in hole. The application was filed under serial No. 18/087,001 as an option to run liner in complex application with double motion does not exist in prior arts.