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THE HOLY GRAIL - QUEST FOR THE PERFECT CEMENT JOB

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INTRODUCTION AND HISTORICAL BACKGROUND

A patent was issued on 6-14-66 to Continental Oil Company covering a "Method and Apparatus For Improving The Bond Between A Well Conduit And Cement". This patent, (sic) invention, relates to improved completion of any type well and is directed to providing an improved cement bond between casing and wellbore to retain the casing in a permanent position during subsequent completion, production and workover operations.

As described in the patent, there are two parallel spaces in a well (Figure 1) where the characteristics of the cementing operation are critical; 1) the space designated as the interface between cement and the adjacent formation, and 2) the interface between cement and casing. The former space has been the subject of scientific research with the resulting use of scratchers, centralizers, reciprocation and rotation. However, apparently the latter space is more significant in controlling the effectiveness of any future operation in the well. This space must be prepared and treated on the surface.

The patent is directed to providing an improved cement bond between casing and cement, thus minimizing the possibility of fluid communication along the casing, into adjacent formations, during subsequent operations within the well.

It will be helpful to understand the different types of stresses which annular cement will be subjected to during operation of the well. Those stresses are compressive, tensile and shear. Compressive strength is the internal strength of the rigid mass of cement and compressive force will be exerted in pressurizing and depressurizing a leaching, storage or production well. Tensile strength is the resistance to parting exhibited when the cement is subjected to pulling forces encountered when removing stuck drillpipe, casing or packers. Shear strength is the resistance to parting of a cement mass exposed to at least two opposite component forces which will be imposed during drilling, reaming, and removing stuck packers or pipe.