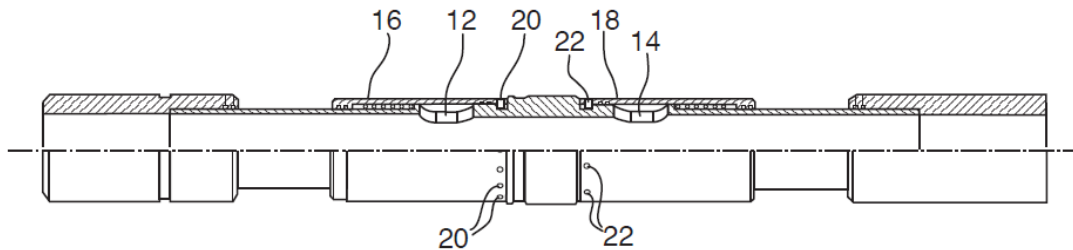


## Hydraulic FracPORT Tool

The Hydraulic FracPORT tool is a hydraulically activated flow port tool used in Packers Plus Energy Services Inc. stimulation system applications at the toe of the well. This tool has sleeves that open at a specific pressure allowing communication between the tool string and the annulus. The unique configuration of the Hydraulic FracPORT tool ensures full opening for effective stimulation of the toe.

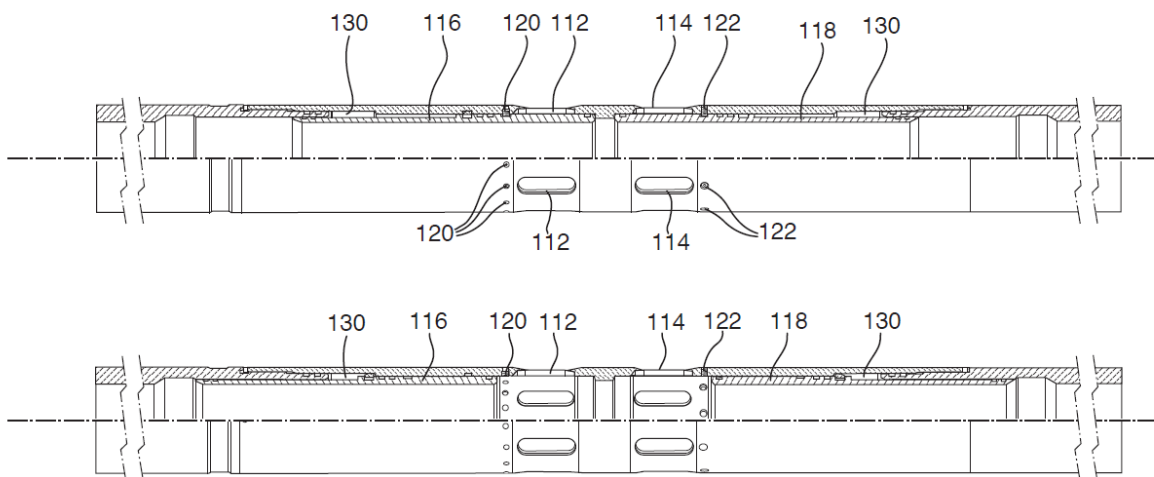
In particular, the Hydraulic FracPORT tool avoids a situation where, due to shear stock failures, jamming or other problems, the sleeve fails to open. Two sleeves are installed, each set to open at the same specific pressure but the two have different pressure release mechanisms ensuring that if one sleeve fails to open, the other is likely to open in any event, even in the event of a shear stock failure. Although shear screws are the most commonly used pressure release mechanism for the Hydraulic FracPORT tool, other pressure release mechanisms can be used such as, for example, shear rings, spring detents, collets, groove and dog interlocks, etc. The two sleeves can have two altogether different pressure release mechanisms such as, for example, a spring detent on one sleeve and a shear ring on the other. Alternately, similar mechanisms may be used provided they have at least one difference such as, for example, (i) material strengths (i.e. by selecting crystal form, weakened areas, etc), (ii) material of construction (i.e. polymer, brass, steel, etc.), (iii) supplier, (iv) biasing force of a biasing mechanism, etc.

A number of Hydraulic FracPORT tools have been developed including the one shown below in Fig.1. In the illustrated Hydraulic FracPORT tool of Fig. 1, sleeves 16 and 18 are similar in many ways. In particular, sleeves 16, 18 each cover a flow port 12, 14, respectively, and are set to open at a selected pressure as controlled by their respective screws 20, 22. However, screws 20 for sleeve 16 are different than screws 22 for sleeve 18.



**FIG. 1**

Another Hydraulic FracPORT tool with internally positioned sleeves, as shown in Fig. 2, is best for cemented operations. Again, sleeves 116 and 118 are identical in many ways, including their opening pressure. However, the screws 120 for sleeve 116 are different than screws 122 for sleeve 118. In cemented operations, the flow ports 112, 114 may be filled with plugs such as silicone or snap-in plugs to avoid cement infiltration that could hinder sleeve opening. Also, as shown here, an atmospheric chamber 130 may be used to drive open each sleeve, once shear is achieved. Debris cannot readily infiltrate behind the sleeves due to the seals of the atmospheric chambers.



**FIG. 2**

The Hydraulic FracPORT tools are patented. See, for example, US 7,753,130.