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(71) Applicant(s):
**Barker Hughes, a GE company, LLC**
**(Incorporated in USA - Texas)**
**Aldine Westfield, Houston, Texas, 77073,**
**United States of America**

(72) Inventor(s):
**Daniel Boyd Cooper**
**Matthew Thomas Raum**

(74) Agent and/or Address for Service:
**Dehns**
**St. Bride's House, 10 Salisbury Square, LONDON,**
**EC4Y 8JD, United Kingdom**

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INT CL **E21B, G01N, G01V, G02B**
Other: **eKOMPASS(KIPO internal)**

(54) Title of the Invention: **Multi-frequency acoustic interrogation for azimuthal orientation of downhole tools**
Abstract Title: **Multi-frequency acoustic interrogation for azimuthal orientation of downhole tools**

(57) An apparatus for detecting a location of an optical fiber having an acoustic sensor disposed subsurface to the earth includes an acoustic emitter configured to emit a first signal having a first frequency and a second signal having a second frequency that is higher than the first frequency, the first and second emitted acoustic signals being azimuthally rotated around the borehole and an optical interrogator configured to interrogate the optical fiber to receive an acoustic measurement that provides a corresponding first received signal and a corresponding second received signal. The apparatus also includes a processor configured to (i) frequency-multiply the first received signal to provide a third signal having a third frequency within a selected range of the second frequency, (ii) estimate a phase difference between the second received signal and the third signal, and (iii) correlate the phase difference to the location of the optical fiber.

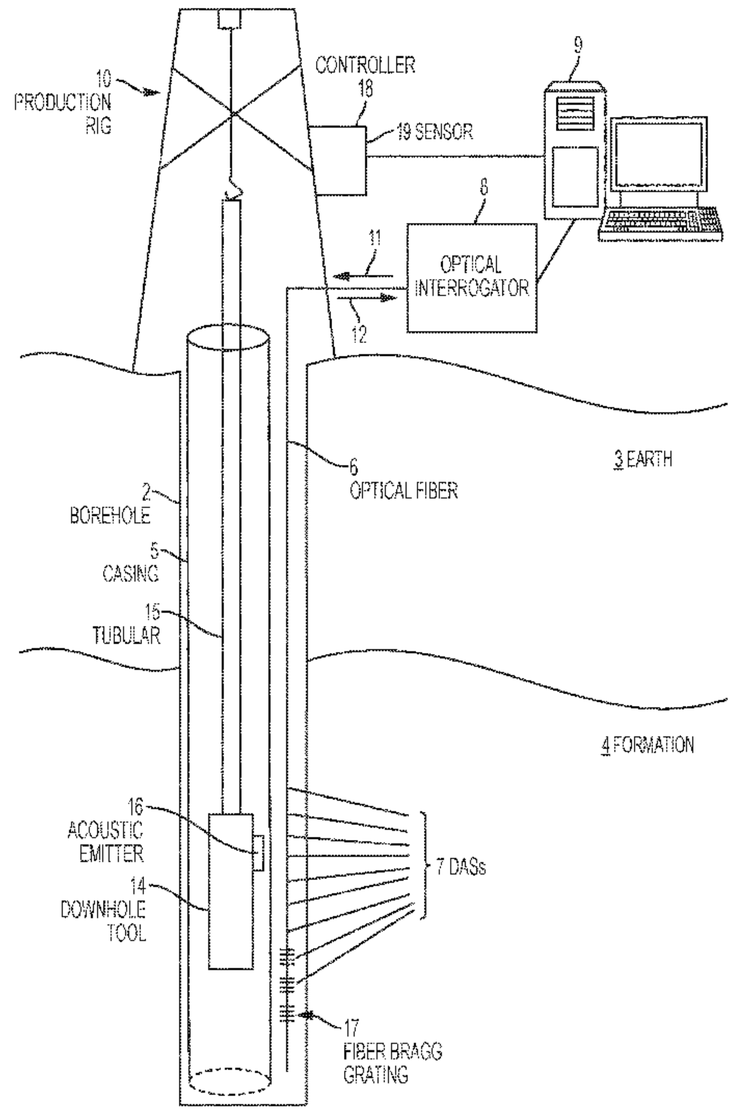


FIG. 1

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