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Hartley et al.

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[54] APPARATUS AND METHOD FOR HORIZONTAL WELL FRACTURE STIMULATION

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[75] Inventors: **Alan C. Hartley, Rocky Rapids; Russell S. J. Krasey, Calgary, both of Canada**

Primary Examiner—Hoang G. Dang
Attorney, Agent, or Firm—John Wade Carpenter

[73] Assignee: **Canadian Occidental Petroleum, Ltd., Calgary, Canada**

[57] ABSTRACT

[21] Appl. No.: **192,379**

An apparatus and method for perforating in deviated and horizontal wells. A firing pin and charge housing is integrally secured to a generally tubular body. The firing pin and charge housing has a structure defining at least one recess extending through the firing pin and charge housing and communicating with at least one tubular bore within the tubular body. The recess comprises at least one charge recess communicating with the at least one tubular bore. A firing pin is biasingly disposed in the recess and an explosive member is disposed in the charge recess. A detonator is positioned in the recess and is engaged to the explosive member for detonating the latter. A sleeve member is slidably disposed in the tubular bore and has at least one sleeve opening and a shear pin bound thereto and extending through the recess for engaging the firing pin. The sleeve member includes a sleeve seat for receiving a plug to slidably move the sleeve member and cause the shear pin to shear and to align the sleeve opening with the charge recess and cause the firing pin to contact the detonator and discharge the explosive member.

[22] Filed: **Feb. 7, 1994**

[51] Int. Cl.⁶ **E21B 43/117; E21B 43/12**

[52] U.S. Cl. **166/297; 166/50; 166/55.1; 175/4.56**

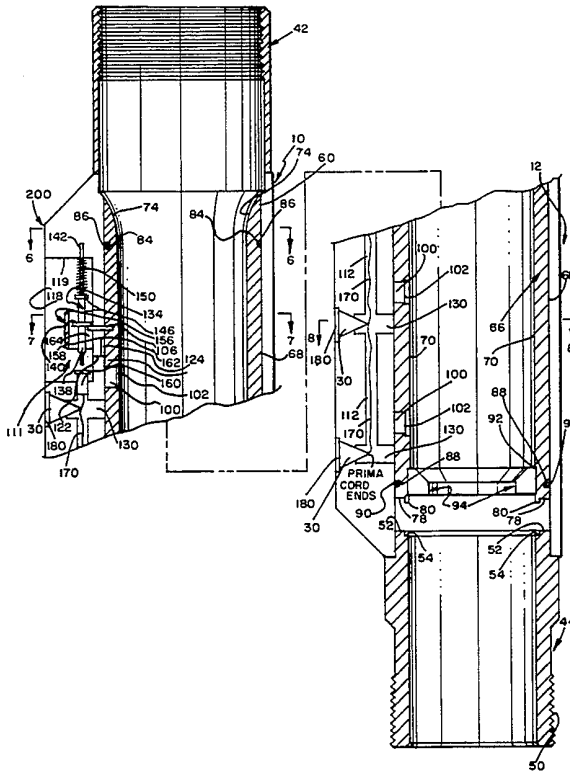
[58] Field of Search **166/297, 55.1, 50; 175/4.56**

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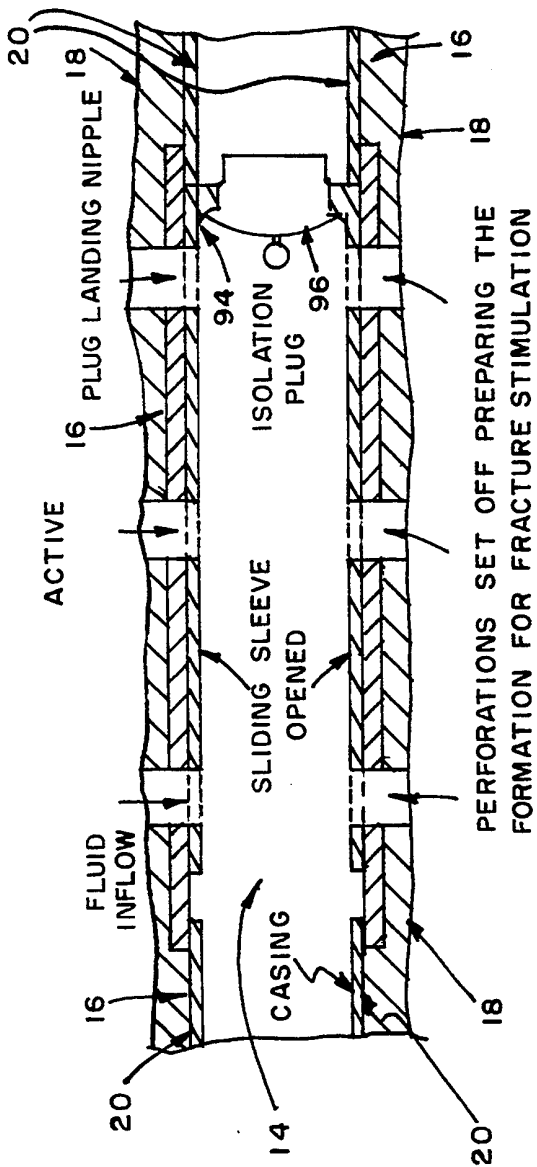
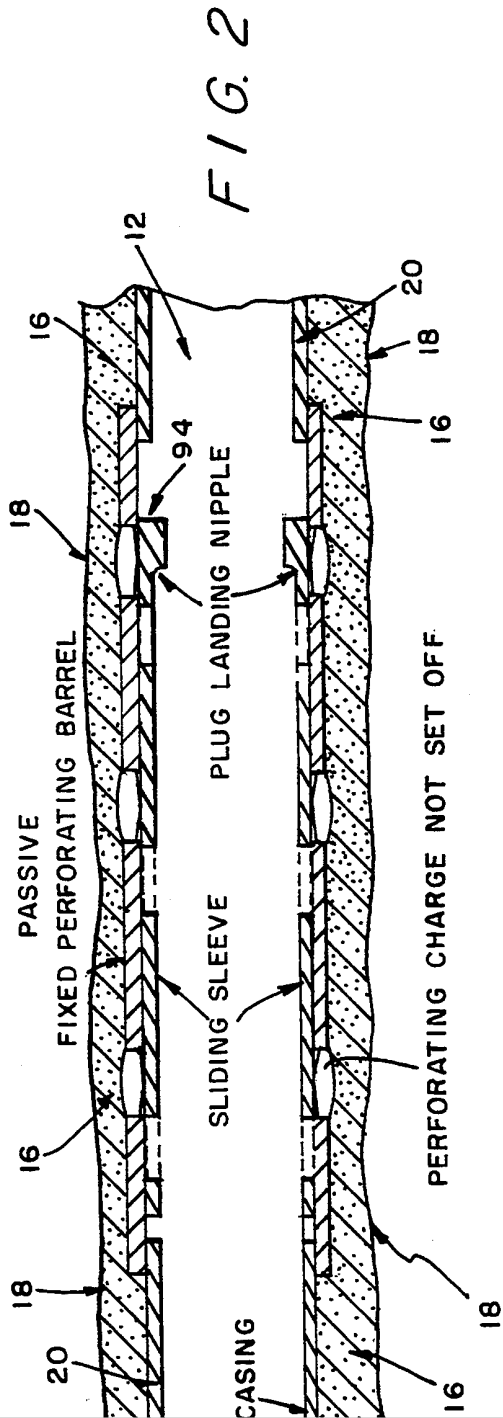
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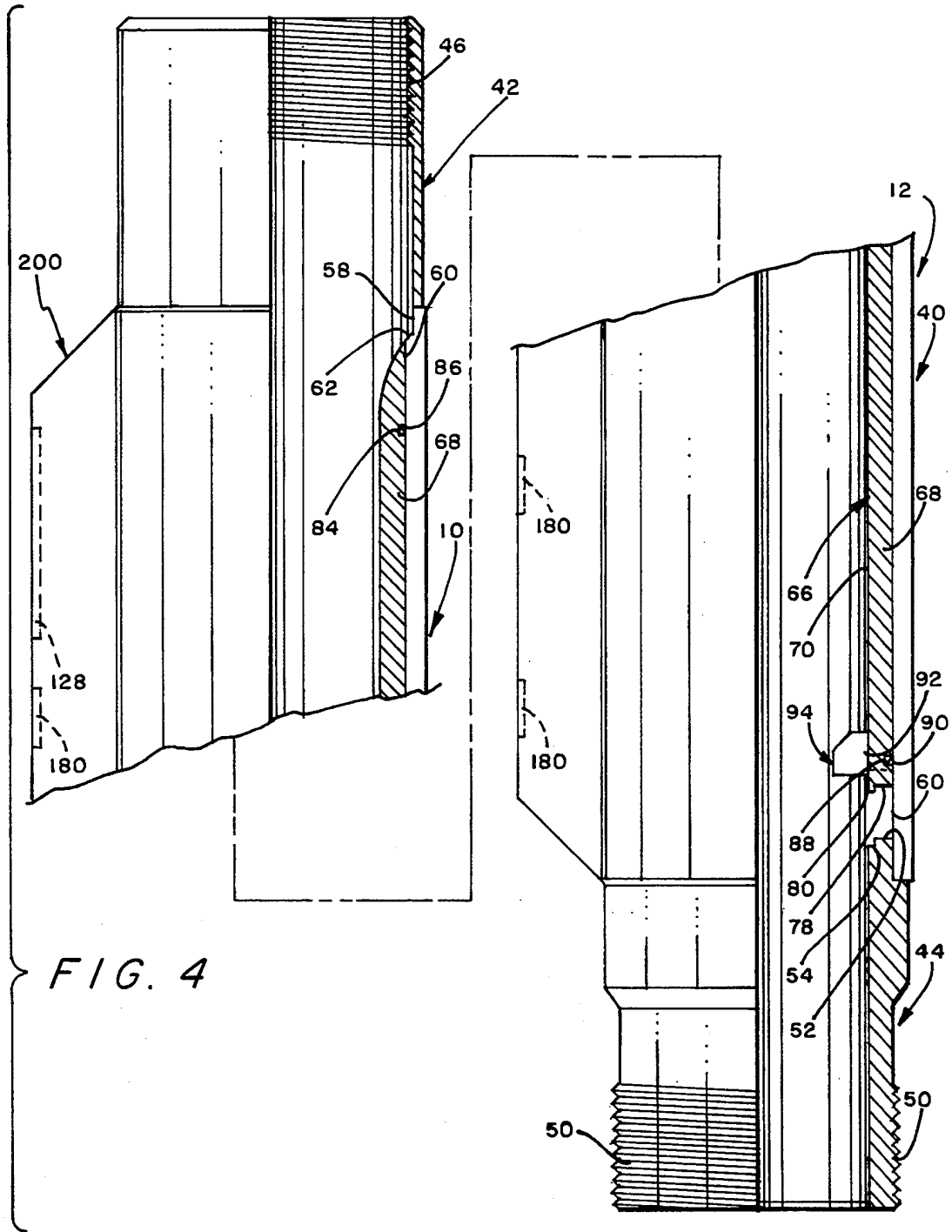
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22 Claims, 8 Drawing Sheets



BAKER HUGHES INCORPORATED
Exhibit 1004





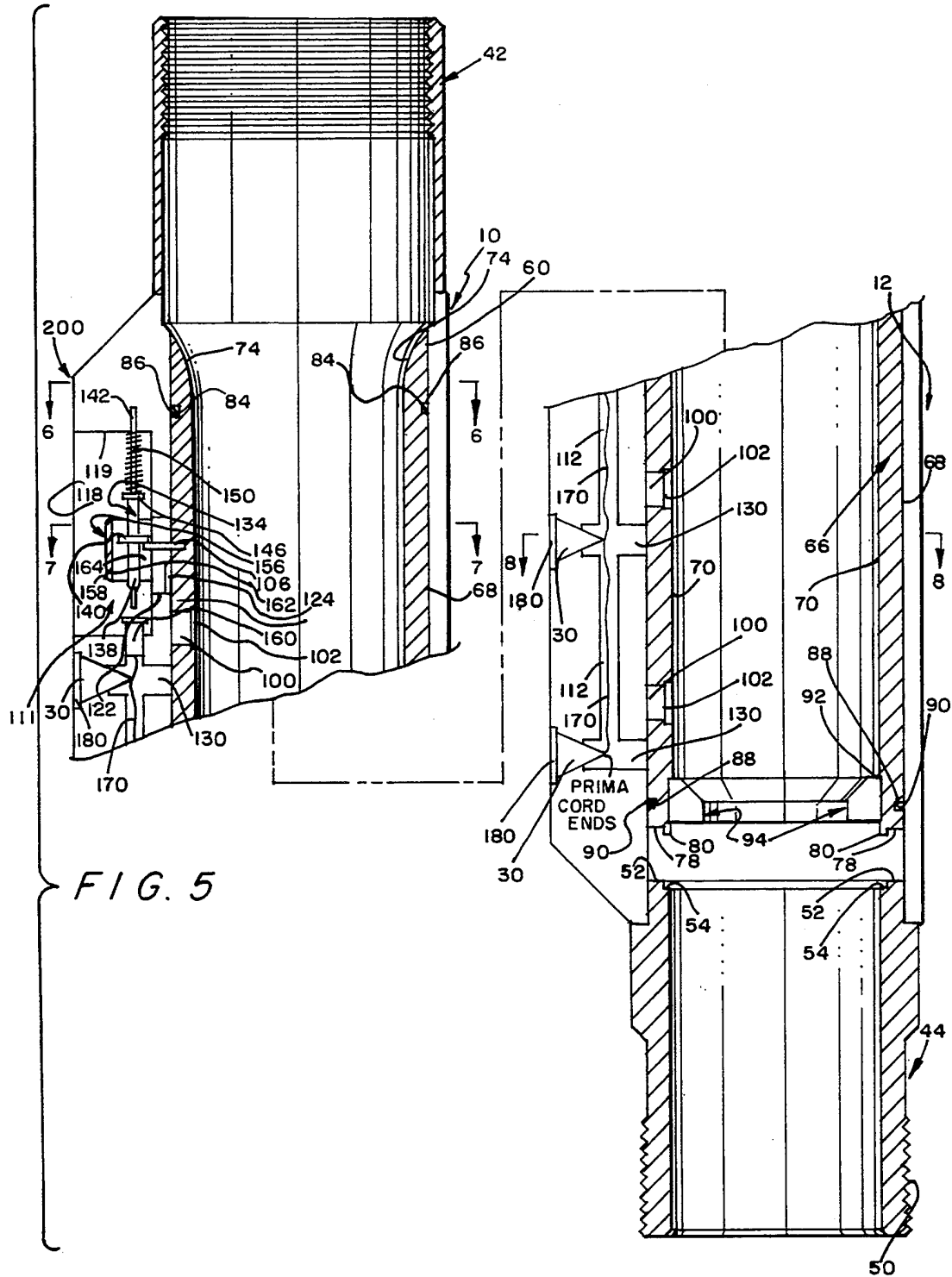


FIG. 5

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