

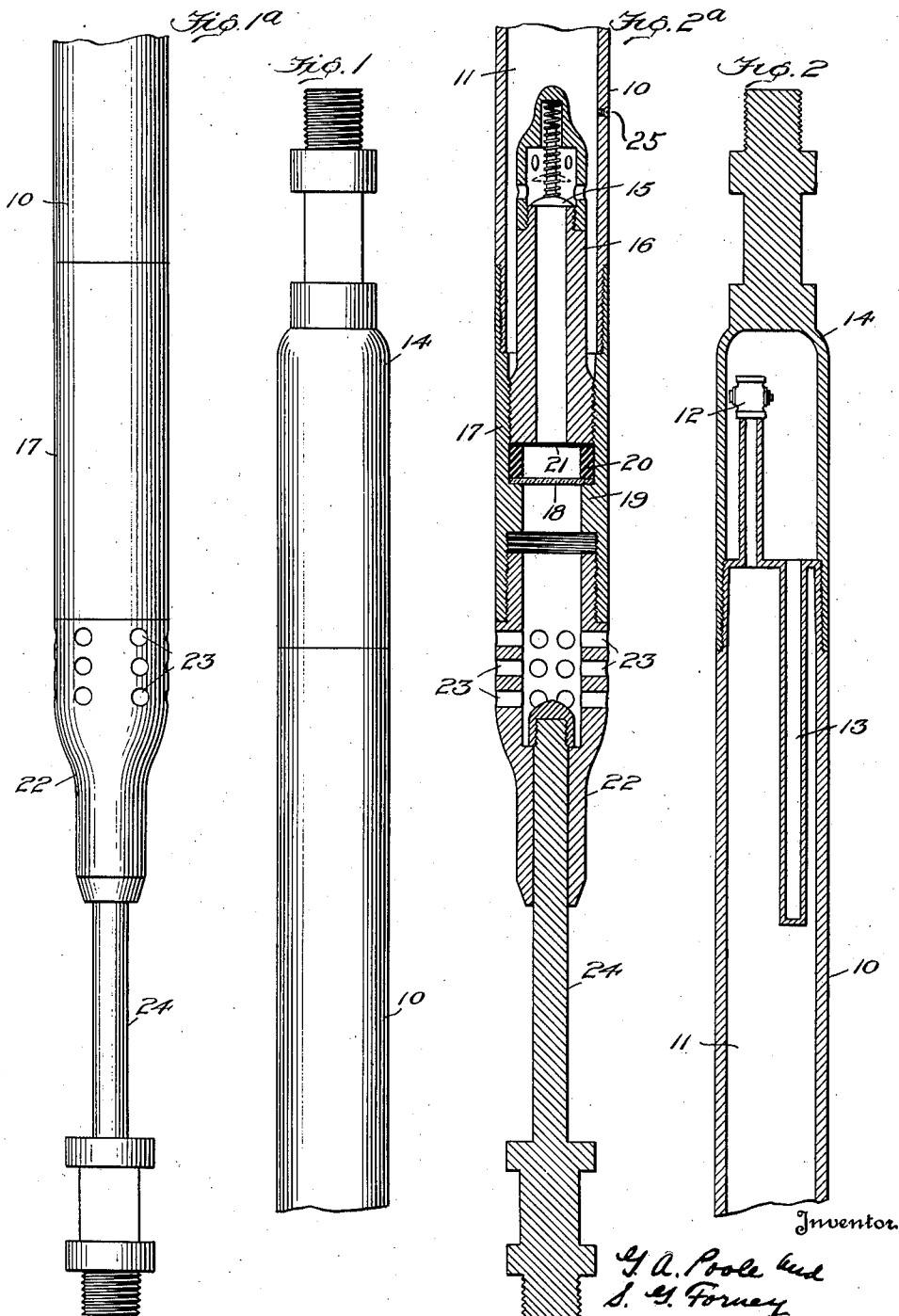
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FORMATION SAMPLER

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FORMATION SAMPLER

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This invention relates to devices for determining formation temperatures, pressures, oil gas ratios, and water encroachment in oil wells.

5 The primary object is to provide a device of this character that is exceedingly useful in that the pressures in the well may be accurately determined.

10 Another object is to provide a device of this type that is comparatively simple in construction and may be produced at a comparatively low cost.

15 More specifically, the invention contemplates a device having what might be termed a sampling chamber provided with outlet and inlet valves and a second closure or barrier for normally preventing admission of fluids to said chamber. The inlet valve is adapted to be closed by pressures within said chamber but by the use of the second closure, the chamber may be evacuated through the outlet valve to produce a vacuum therein. In this condition, the device is lowered in the well to the desired point, after which the second closure or barrier is adapted to be ruptured, thereby permitting a quantity of oil and gas as it exists in that formation to enter the chamber where it is trapped by the closing of the inlet valves due to the then existing pressures in said chamber.

20 With these and other objects in view, the invention consists in certain novel details of construction and combinations and arrangements of parts, all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings,

40 Figures 1, 1^a illustrate the present device in elevation; and

Figs. 2, 2^a constitute a longitudinal sectional view thereof but with the several sections or parts disassembled.

45 Various alterations, of course, may be made in the device illustrated, but in the preferred embodiment shown in the accompanying drawings, there is a comparatively long cylindrical body composed of a plurality of sections that may be disconnected as shown in Figs. 2, 2^a.

The next to the upper section 10 is hollow and constitutes the sampling chamber 11. It is closed at its upper end at which point it is provided with a manually operable valve 12 and with a well 13 in which a thermometer (not shown) may be inserted. The upper or cap piece 14 is adapted to be screwed on section 10, the upper extremity of said cap piece being formed with a machined sucker rod pin for attachment of a sucker rod and sand line for lowering the device in the well.

55 In order to determine pressures within the well, air must be withdrawn from chamber 11 to create a vacuum therein until the device is positioned within the well and it is desired to permit the contents of the well to enter said chamber. This is accomplished by providing said chamber with an inlet valve 15 held closed by pressures within the chamber and a barrier that will prevent the fluids in the well gaining access to said chamber until such barrier is removed, this not being permitted until the device is properly positioned in the well. The preferred arrangement consists in having said inlet valve 15 carried by a tube 16 threaded in a section 17 attached to the lower end of section 10, a glass disk 18 being clamped against a shoulder 19 on section 17 by said tube. Preferably, a hard rubber ring 20 and a mesh screen 21 are interposed between said glass disk and the tube. This glass disk, or whatever breakable material that may be used in lieu thereof, forms a barrier that normally renders valve 15 and chamber 11 inaccessible after a vacuum has been created in the latter. To the lower end of section 17 there is attached another section 22 in which there is slidably retained a plunger 24. Said section 22 is also formed with a multiplicity of orifices 23 through which the contents of the well have access to the interior of the device up to the barrier or disk 18. The lower end of plunger 24 is also formed to permit attachment of an anchor, this end portion of said plunger being illustrated in the present instance as an ordinary sucker rod pin.

90 In use, the several sections and parts are assembled as shown in Figs. 2, 2^a, with the exception of upper section 14, and air ex-

hausted from chamber 11 through valve 12. Section 14 is then applied to the device and a sucker rod attached to the lowermost section to serve as an anchor. The device is then lowered the desired distance in the well and the latter closed in at the top of the usual tubing or well casing. After allowing sufficient time for the well to build up its rock pressure, the device is dropped suddenly to the bottom with the result that plunger 24 will rupture the barrier or glass disk 18. This allows the materials in the well to pass through screen 21, tube 16 and inlet valve 15 into chamber 11, where it will be trapped by said valve being closed by pressure then existing or built up in said chamber. The device is then withdrawn from the well and section 14 removed. By attaching a pressure gage to valve 12 a reading may be recorded. This reading must be corrected for a calibrated instrument reading, the calibration depending upon the pressure necessary to raise valve 15. In this way, the rock pressure is determined and a temperature reading may be taken from a thermometer in well 13. A hose can then be attached to valve 12 and a gas test meter and the measurement of the gas recorded as it passes at a slow rate through the meter. After the gas pressure is exhausted, the device is inverted, a vent screw 25 released and the fluid allowed to drain through valve 12 and accurately measured. The rates of dissolved gas in the oil may also then be calculated.

What we claim is:

1. In a device of the character described, the combination of a tubular member having a chamber therein, an outlet valve through which air may be exhausted from the chamber, an automatically operable inlet valve for said chamber, a breakable closure in the bore of said tubular member normally preventing access of fluids through said member to said inlet valve and chamber, and a plunger loose in said member for rupturing said closure upon impact against the bottom of a well.

2. In a device of the character described, the combination of a metallic, non-collapsible tubular member having a chamber therein, valves controlling the flow of fluids into and out of said chamber, a breakable closure in said tubular member normally preventing access of fluids to said inlet valve, and means carried by said tubular member for fracturing said closure upon impact against the bottom of a well.

3. In a device of the character described, the combination of a tubular member having a chamber therein, valves controlling the flow of fluids into and out of said chamber, a breakable barrier in said member normally preventing access to said inlet valve, and means for rupturing said breakable barrier at any desired depth in a well.

4. In a device of the character described, the combination of a tubular member having a chamber therein, valves controlling the flow of fluids into and out of said chamber, a breakable barrier in said member normally preventing access to said valve, and a plunger slidably carried by said tubular member for breaking said barrier.

5. In a device of the character described, the combination of a tubular member having the chamber therein, valves controlling the flow of fluids into and out of said chamber, a breakable barrier in said member normally preventing access to said inlet valve, and a plunger slidably carried by said tubular member adapted to rupture said barrier, said plunger normally projecting beyond the end of said member and having means for attaching a rod thereto.

6. In a device of the character described, the combination of a tubular member having a chamber therein with a duct extending from one end of said chamber, an outlet valve at the opposite end of said chamber, an inlet valve in said duct adapted to be closed by pressures built up in said chamber, a breakable barrier in said duct preventing access of fluids to said inlet valve, and means for rupturing said barrier at will.

7. In a device of the character described, the combination of a tubular member having a chamber therein with a duct extending from one end of said chamber, an outlet valve at the opposite end of said chamber, an inlet valve in said duct adapted to be closed by pressures built up in said chamber, a breakable barrier in said duct preventing access of fluids to said inlet valve, and a plunger carried by said member adapted to impact against and rupture said barrier.

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