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(54) **DESCRIPTION OF HYDROCARBONS FOR RECOVERY FROM WATER BEARING COAL USING ELECTROMAGNETIC ENERGY**

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(57) **ABSTRACT**

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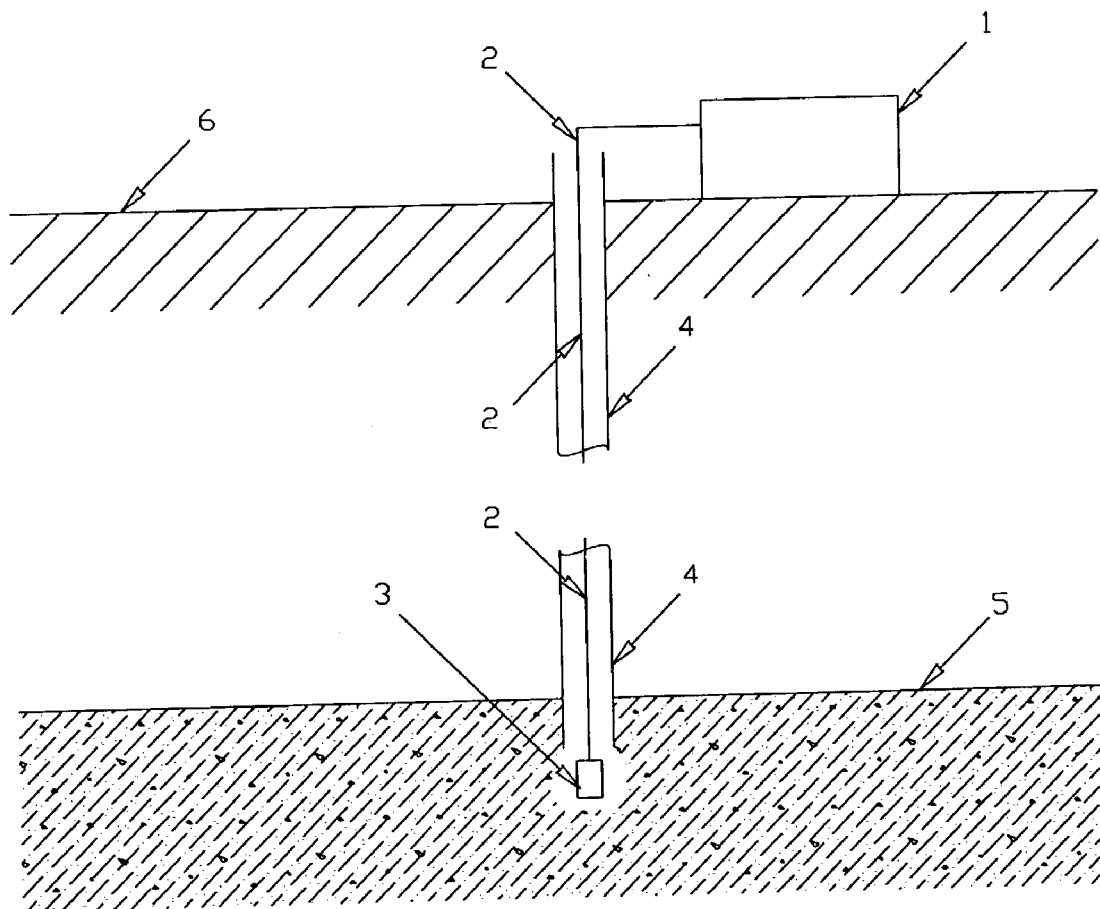
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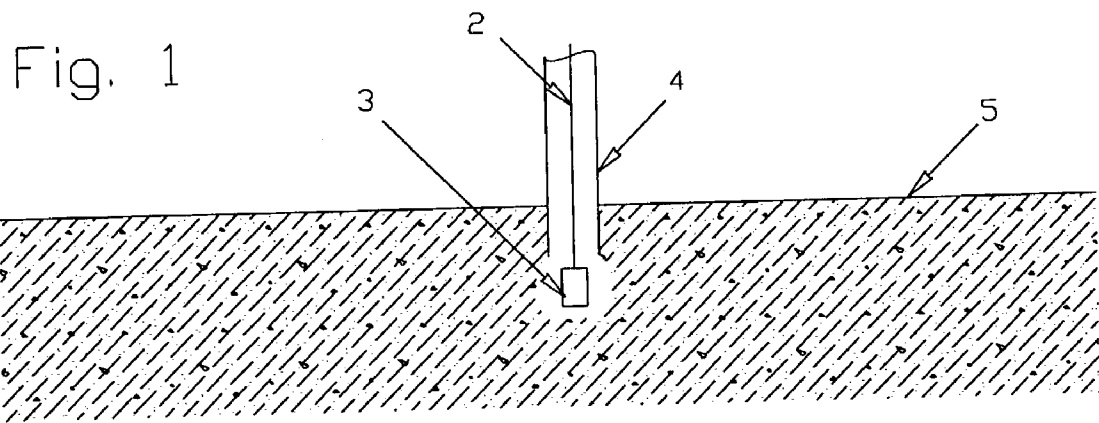
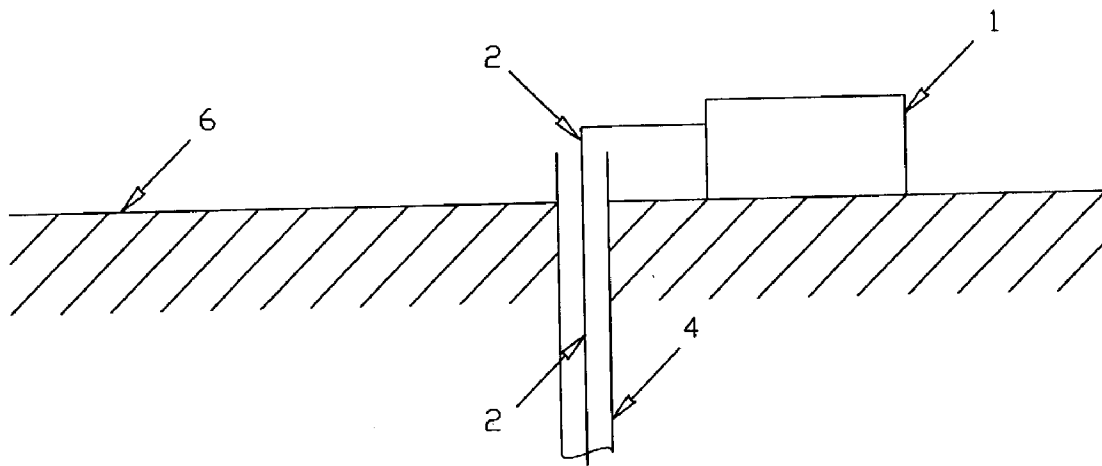
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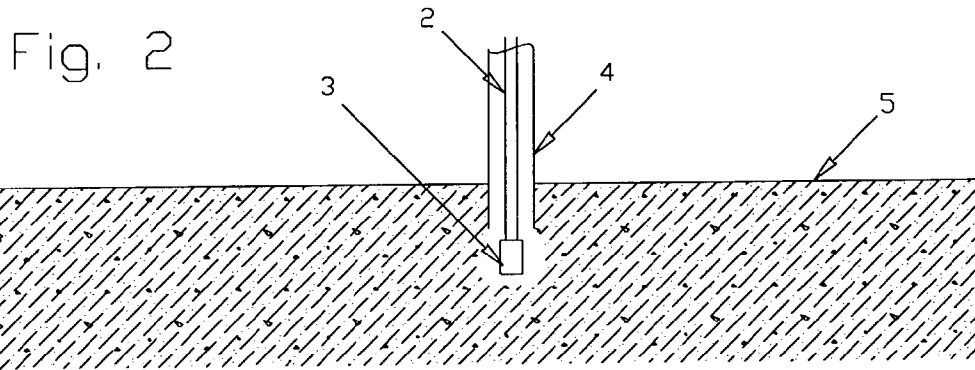
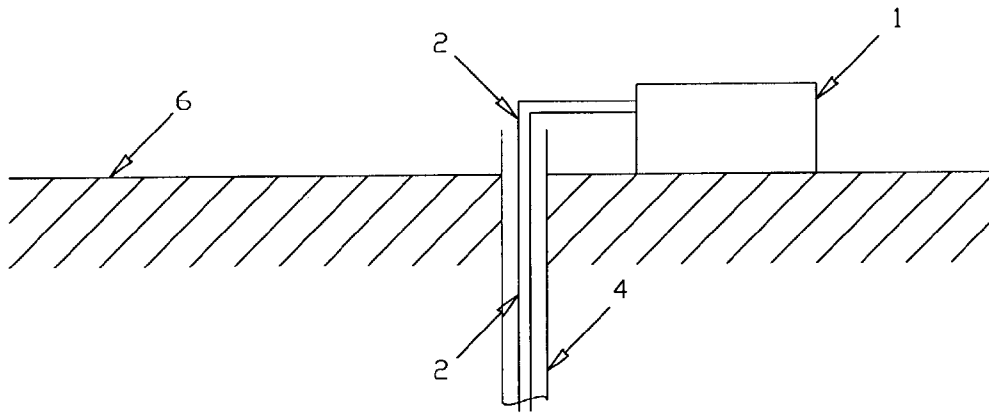
A method is described herein using electromagnetic energy to desorb hydrocarbons which are adsorbed to water bearing coal deposited below the ground surface. The electromagnetic energy is produced at either the surface and directed toward the coal, or it is produced directly in or near the coal and directed toward the coal. Because of the exposure to electromagnetic energy, adsorbed hydrocarbons are energized sufficiently to desorb from the coal and are available for recovery through other conventional methods.

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DESORPTION OF HYDROCARBONS FOR RECOVERY FROM WATER BEARING COAL USING ELECTROMAGNETIC ENERGY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] The embodiment of the principles related to the present invention relates to the recovery of hydrocarbons adsorbed to water bearing coal which is deposited below ground surface. Water pressure in the coal traps the hydrocarbons onto the coal surface. The method relates to the desorption of the hydrocarbons by energizing them and overcoming the water pressure holding them to the surface, thus eliminating or reducing the amount of water needed to be removed to facilitate desorption. In describing the invention, a well is placed into the subsurface directly into the coal deposit. Electromagnetic energy is directed toward the coal either by producing the electromagnetic energy at the surface and conveying it thru the well to the subsurface, or by producing it with an emitter directly in the subsurface with power to the emitter directed by a power line running through the well. Hydrocarbons are energized to a sufficient level to desorb from the coal into solution within the water where the hydrocarbons are available for recovery through conventional methods.

[0005] Desorbing hydrocarbons from water bearing coal deposited below ground surface is typically accomplished by one of two methods: 1) The water overlying and in the coal is removed to reduce the pressure in the coal deposit to release the adsorbed hydrocarbon from the coal. 2) Sequestering agents such as carbon dioxide are used to preferentially adsorb to the coal in lieu of the hydrocarbons. The first method suffers from three drawbacks: a) removal of large quantities of water from and overlying of the coal can be costly; b) Disposal of the water removed may require environmental and/or other permits and treatment prior to discharge and disposal; c) the water resource is removed from the ground and may not recover sufficiently in the near future as a usable groundwater resource. The second method is costly due to the cost of the sequestering agents and still may require the removal of water overlying and from the coal.

BRIEF SUMMARY OF INVENTION

[0006] The embodiment of the principles related to the present invention comprises the use of electromagnetic energy in water bearing coal for the desorption of adsorbed hydrocarbons for recovery from coal.

[0007] Electromagnetic energy is generated either at the surface and/or subsurface and directed into the water bearing coal. Exposure of molecules to electromagnetic energy increases the energy in molecules.

[0008] Hydrocarbons are desorbed from the coal by either adsorbing electromagnetic energy directly or the transfer of energy from other molecules which are energized by electromagnetic energy. Due to a sufficient increase in energy, these hydrocarbons are no longer bound by adsorption to the coal and are available for recovery.

[0009] Water permeates coal beds, and its pressure traps hydrocarbons in the coal. Typically to produce hydrocarbons from coal, water must be drawn off first, lowering the pressure so hydrocarbons can flow out of the coal and to the well bore. By exposure of a water bearing coal deposit to electromagnetic energy, the efficiency of hydrocarbon desorption and recovery from coal is increased by the reduction or elimination of the amount of overlying groundwater that requires pumping.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0010] Other objects, features and advantages of this invention will be apparent from the study of the written description and the drawing in which:

[0011] **FIG. 1** is a front elevational view taken from the side of representing a preferred embodiment of the current invention illustrating a configuration where the electromagnetic energy is produced at the subsurface.

[0012] **FIG. 2** is a front elevational view taken from the side of representing a preferred embodiment of the current invention illustrating a configuration where the electromagnetic energy is produced at the surface and conveyed to the subsurface via a coaxial cable and/or wave guide to an antenna.

DETAILED DESCRIPTION OF INVENTION

[0013] The principles relating to the present invention may be readily comprehended through consideration of the elements necessary to achieve the object of the same as represented in the preferred embodiment of these principles depicted in the drawings attached hereto. The invention is comprised of a power source and an electromagnetic device/emitter to generate electromagnetic energy. The electromagnetic energy device/emitter is either placed in or near the water bearing coal deposit and the electromagnetic energy is directed toward the water bearing coal deposit, or the electromagnetic energy is transmitted via a coaxial cable and/or a waveguide placed in a well and/or conduit to an antenna placed in or near the water bearing subsurface coal deposit and directed to the water bearing coal deposit.

[0014] Referring now specifically to **FIG. 1**, the power source **1** located at the ground surface **6** is connected directly via a power line **2** which runs through a well and/or conduit **4** to the electromagnetic device/emitter located in the subsurface **3** near or in a water bearing coal deposit **5**.

[0015] Referring now specifically to **FIG. 2**, the power source and the electromagnetic device/emitter **1** located at the ground surface **6**, and the energy is transmitted to the subsurface via a coaxial cable and/or a waveguide **2** to an antenna located in the subsurface **3** near or in a water bearing coal deposit **5**.

[0016] Obviously, numerous variations and modifications can be made without departing from the spirit of the present invention. Therefore, it should be clearly understood that the form of the present invention described above and shown in the figures of the accompanying drawing is illustrative only and is not intended to limit the scope of the present invention.

With the understanding that the foregoing description is exemplary of the preferred embodiment of the principles relating to the present invention, I hereby claim to secure by Utility Application for Patent the following claims:

1. The method comprising the desorption of hydrocarbons for recovery from water bearing coal deposited below the ground surface by exposure to electromagnetic energy generated directly in the subsurface and directed into the water bearing coal.

2. The method comprising the desorption of hydrocarbons for recovery from water bearing coal deposited below the ground surface by exposure to electromagnetic energy generated at the surface and transmitted to an antenna in the subsurface and directed into the water bearing coal.

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