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(54) **SYSTEM AND METHOD FOR SUBTERRANEAN ACCESS**

(76) Inventor: **Joseph A. Zupanick**, Pineville, WV (US)

Correspondence Address:
BAKER BOTTS L.L.P.
2001 ROSS AVENUE
SUITE 600
DALLAS, TX 75201-2980 (US)

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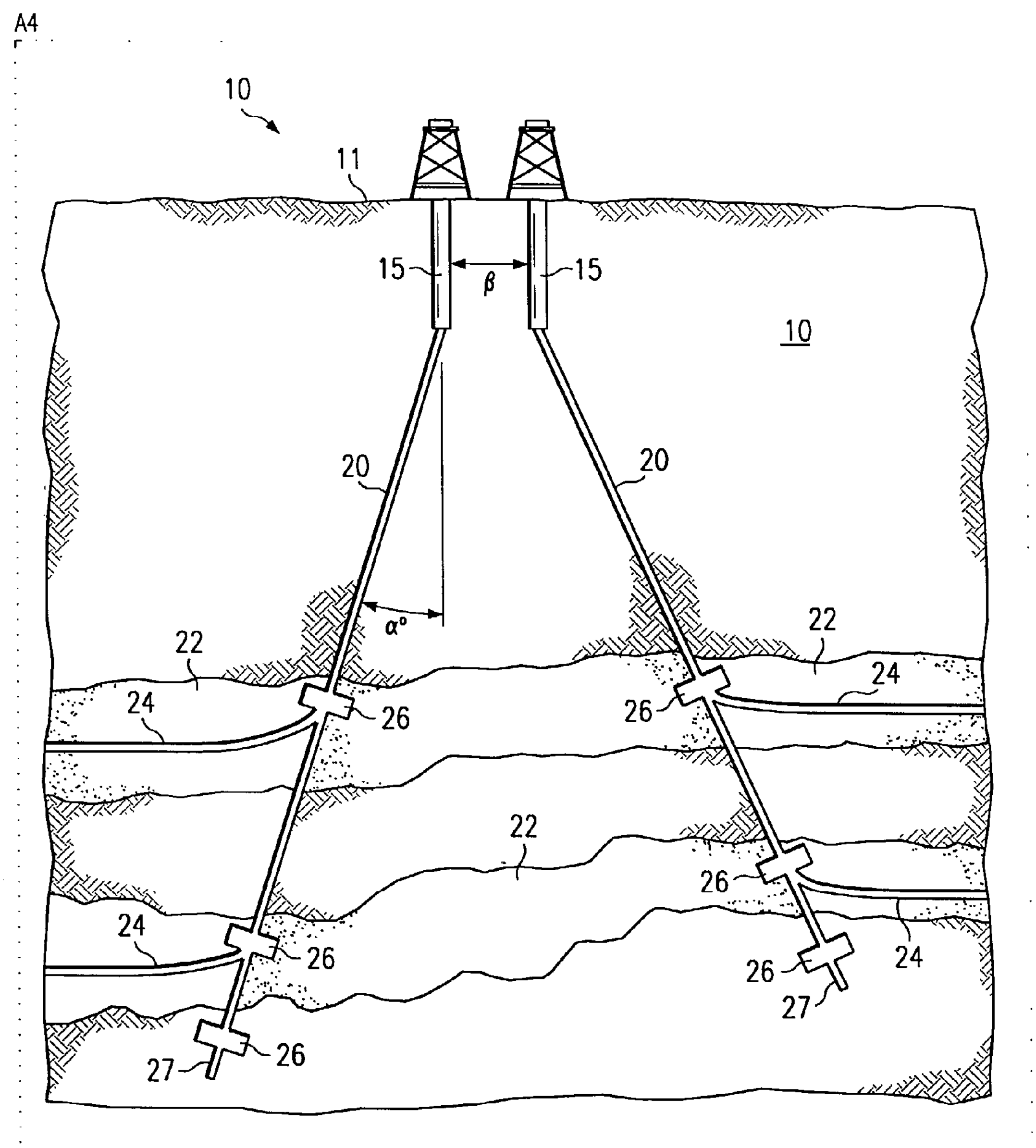
(52) **U.S. Cl.** **166/313**; 166/50

(57) **ABSTRACT**

A system for accessing a subterranean zone from the surface includes a first, second and third entry well bore extending from the surface, the first, second and third entry well bores located on the same drilling pad at the surface. A slanted well bore extends from each of the entry well bores to the subterranean zone. A substantially horizontal drainage pattern extends from the slanted well bores into the subterranean zone.



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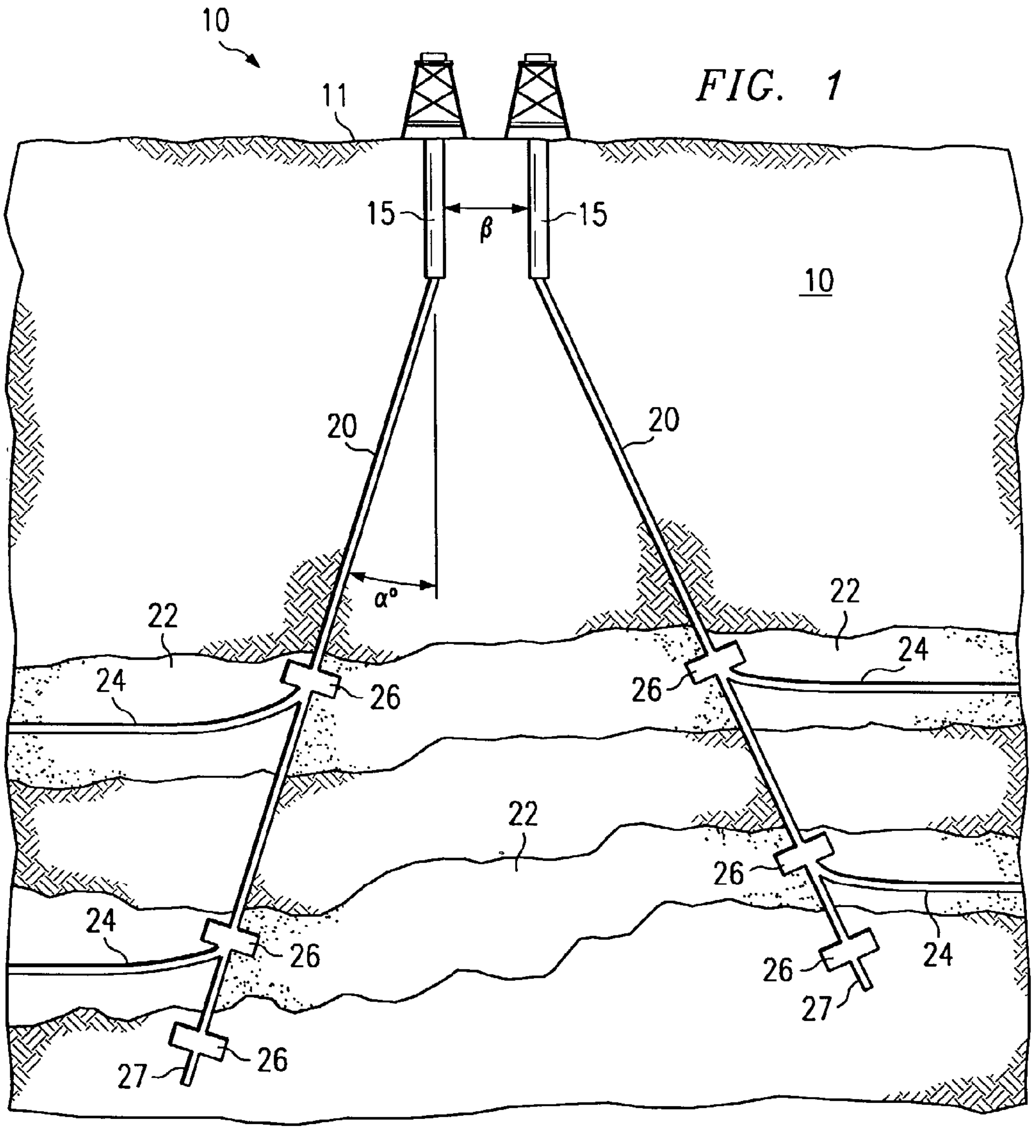


FIG. 1

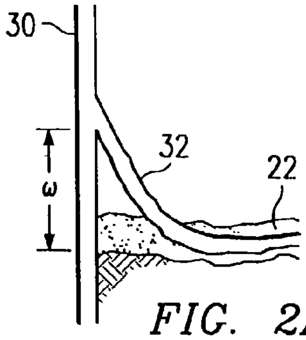


FIG. 2A

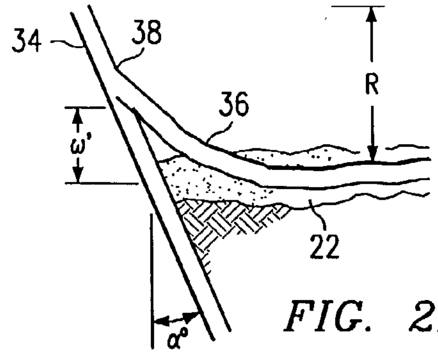
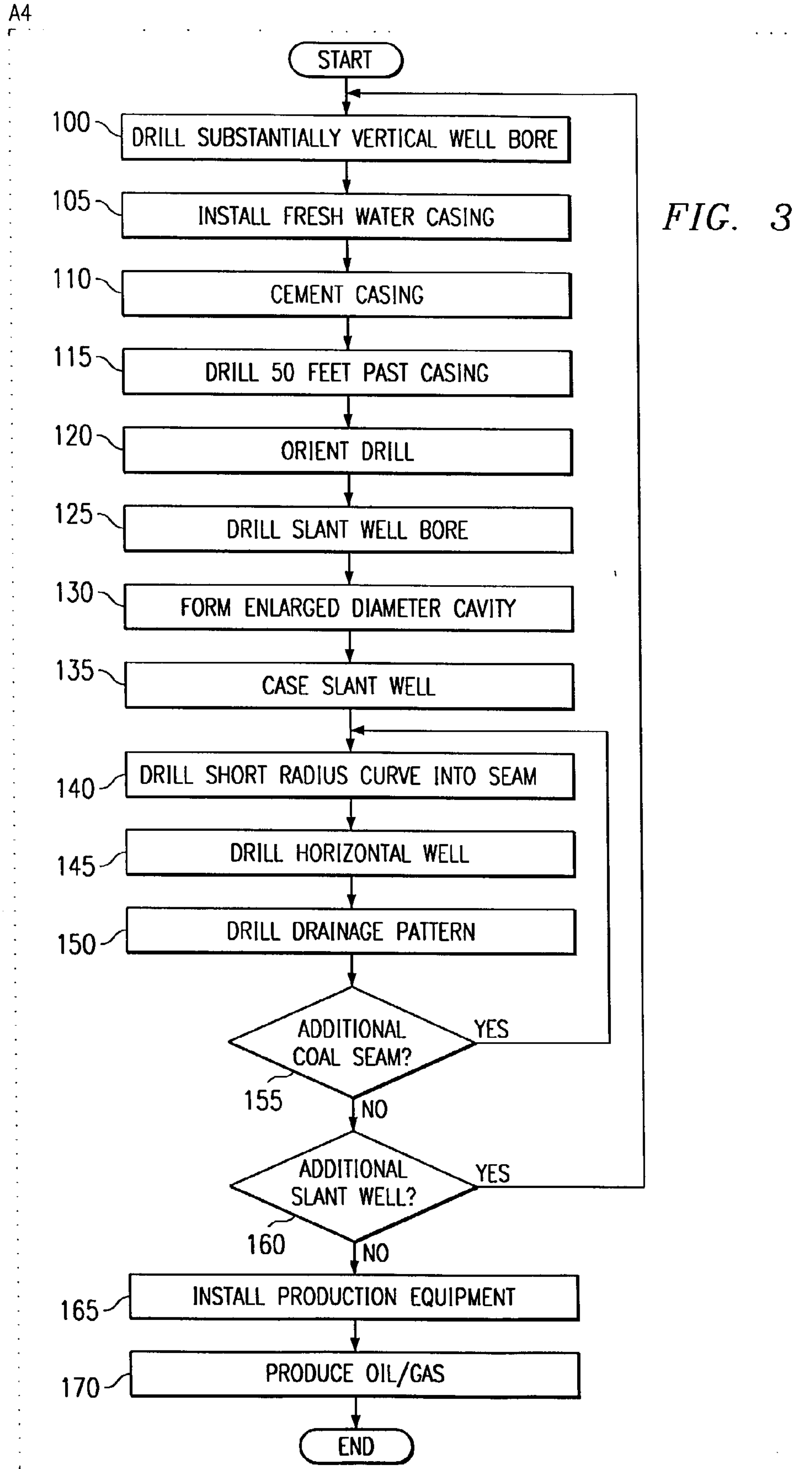


FIG. 2B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START
100
DRILL SUBSTANTIALLY VERTICAL WELL BORE
105
INSTALL FRESH WATER CASING
110
CEMENT CASING
115
DRILL 50 FEET PAST CASING
120
ORIENT DRILL
125
DRILL SLANT WELL BORE
130
FORM ENLARGED DIAMETER CAVITY
135
CASE SLANT WELL
140
DRILL SHORT RADIUS CURVE INTO SEAM
145
DRILL HORIZONTAL WELL
150
DRILL DRAINAGE PATTERN
ADDITIONAL COAL SEAM?
YES
155
NO
ADDITIONAL SLANT WELL?
YES
160
NO
165
INSTALL PRODUCTION EQUIPMENT
170
PRODUCE OIL/GAS
END

FIG. 3

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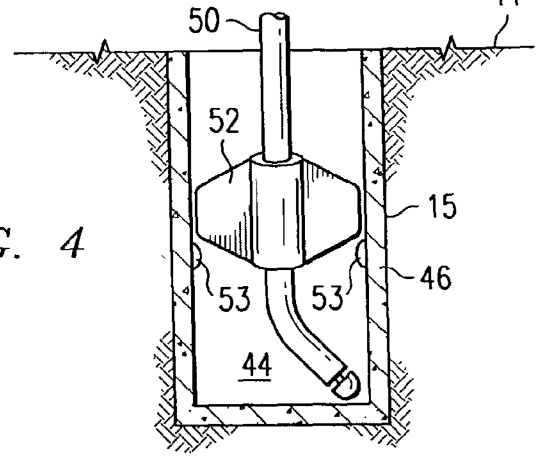

FIG. 4

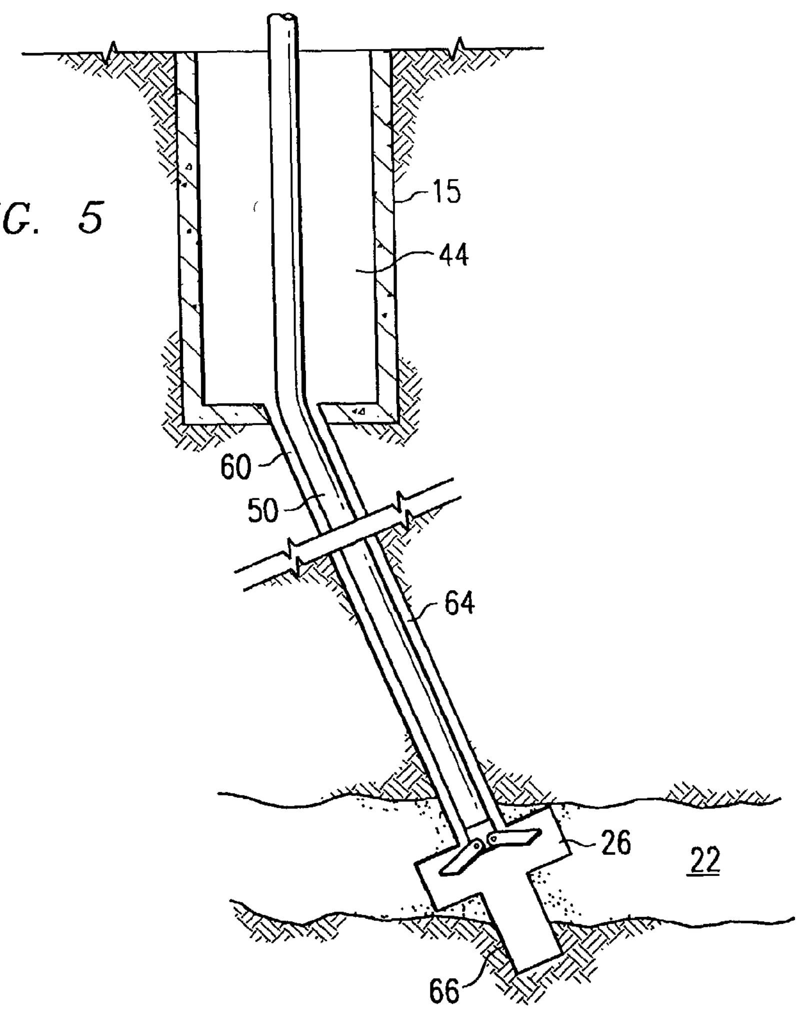

FIG. 5

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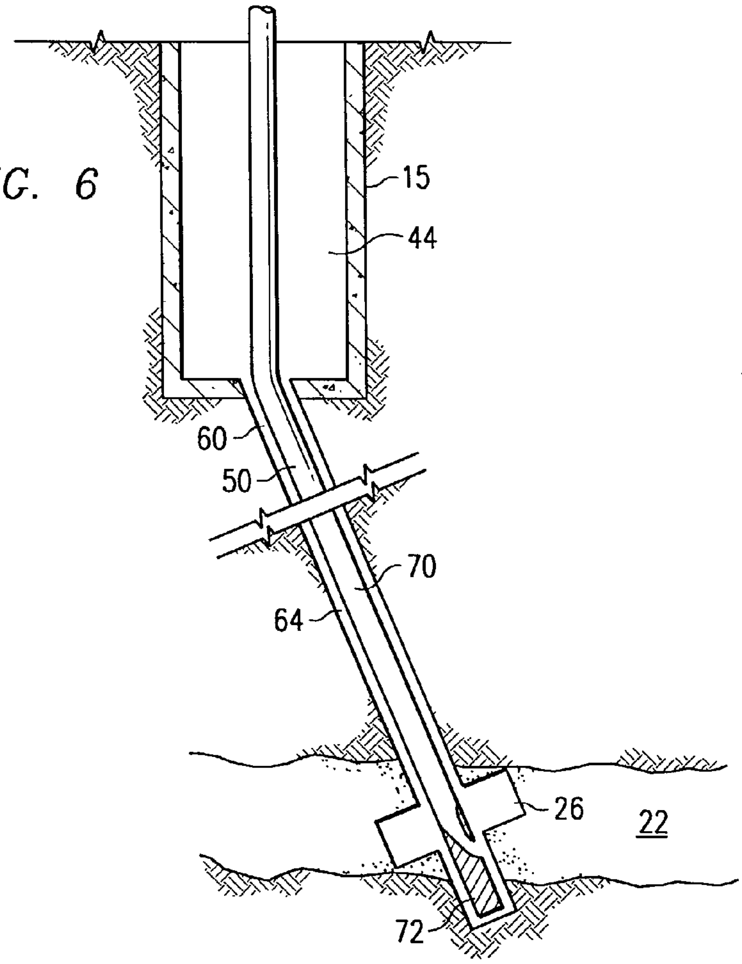

FIG. 6

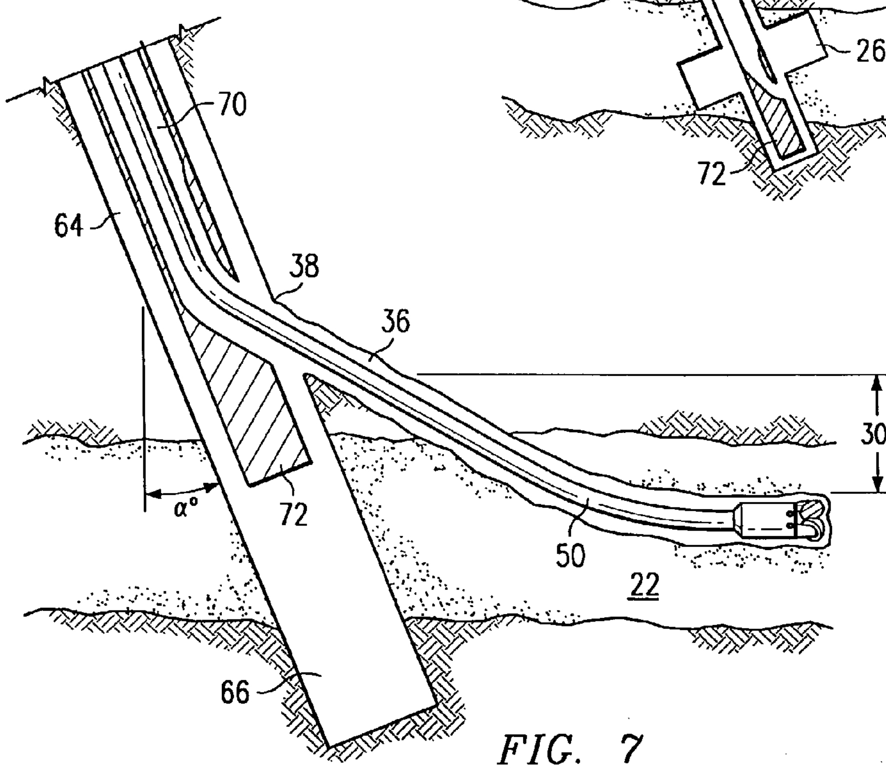

FIG. 7

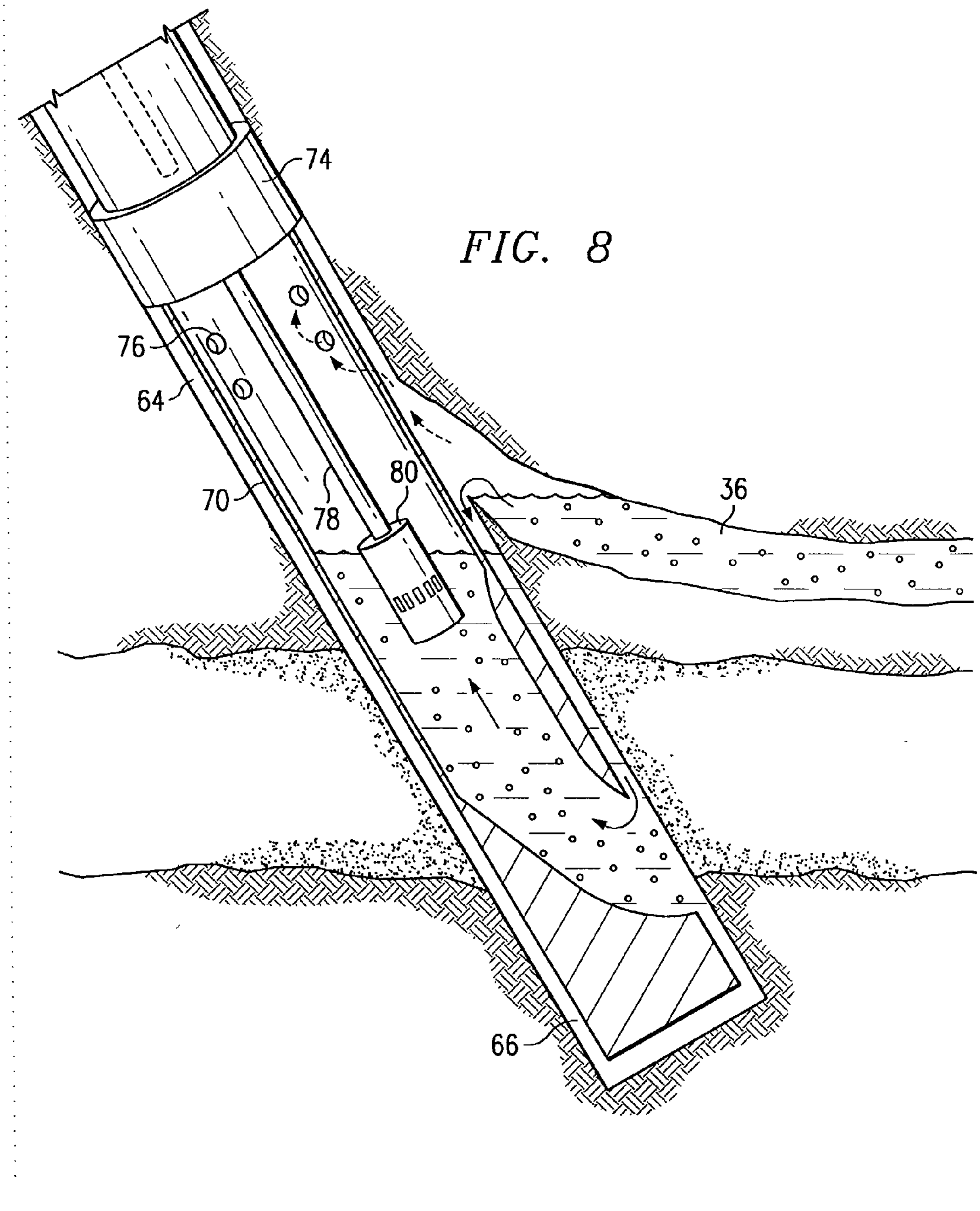

FIG. 8

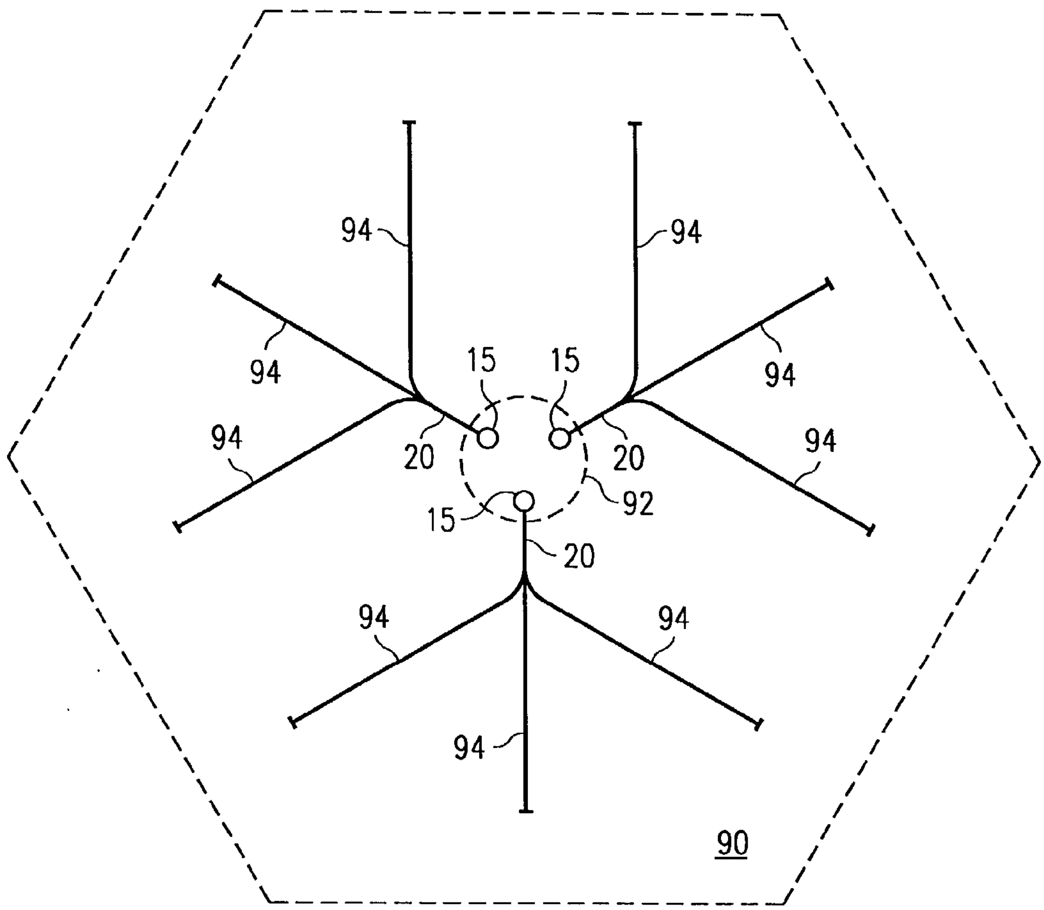

FIG. 9

SYSTEM AND METHOD FOR SUBTERRANEAN ACCESS

RELATED PATENT APPLICATIONS

[0001] This application claims the priority benefit of U.S. patent application Ser. No. 09/774,996 filed Jan. 30, 2001 entitled "Method and System for Accessing a Subterranean Zone from a Limited Surface Area."

[0002] This application is related to U.S. patent application Ser. No. 10/004,316 entitled "Slant Entry Well System and Method" filed on Oct. 30, 2001.

TECHNICAL FIELD OF THE INVENTION

[0003] The present invention relates generally to systems and methods for the recovery of subterranean resources and, more particularly, to a system and method for subterranean access.

BACKGROUND OF THE INVENTION

[0004] Subterranean deposits of coal contain substantial quantities of entrained methane gas. Limited production and use of methane gas from coal deposits has occurred for many years. Substantial obstacles, however, have frustrated more extensive development and use of methane gas deposits in coal seams. The foremost problem in producing methane gas from coal seams is that while coal seams may extend over large areas of up to several thousand acres, the coal seams are fairly thin, varying from a few inches to several meters. Vertical wells drilled into the coal deposits for obtaining methane gas can only drain a fairly small radius around the coal deposits. Further, coal deposits are not amenable to pressure fracturing and other methods often used for increasing methane gas production from rock formations. As a result, once the gas easily drained from a vertical well bore in a coal seam is produced, further production is limited in volume. Additionally, coal seams are often associated with subterranean water, which must be drained from the coal seam in order to produce the methane.

[0005] Horizontal drilling patterns have been tried in order to extend the amount of coal seams exposed to a drill bore for gas extraction. Such horizontal drilling techniques, however, require the use of a radiused well bore which presents difficulties in removing the entrained water from the coal seam. The most efficient method for pumping water from a subterranean well, a sucker rod pump, does not work well in horizontal or short radiused bores.

[0006] A single slanted well bore allows for effective water removal via a sucker rod pump, capturing a benefit of a horizontal well system, without limiting the use of horizontal drainage patterns in the target zone.

SUMMARY OF THE INVENTION

[0007] The present invention provides a slant entry well system and method for accessing a subterranean zone from the surface that substantially eliminate or reduce the disadvantages and problems associated with previous systems and methods. In particular, certain embodiments of the present invention provide a slant entry well system and method for efficiently producing and removing entrained methane gas and water from a coal seam without requiring excessive use of radiused or articulated well bores or large surface area in which to conduct drilling operations.

[0008] In accordance with one embodiment of the present invention, a system for accessing a subterranean zone from the surface includes a first, second, and third entry well bore extending from the surface, the first, second, and third entry well bores located no more than one thousand feet away from each other at the surface. A slanted well bore extends from each of the first and second entry well bores to the subterranean zone. A substantially horizontal drainage pattern extends from the slanted well bores into the subterranean zone.

[0009] According to another embodiment of the present invention, a method for accessing a subterranean zone from the surface includes forming three or more closely spaced entry well bores and forming a plurality of slanted well bores from the entry well bores to the subterranean zone. The method also includes forming drainage patterns from the slanted well bores into the subterranean zone and enlarged cavities in the slanted well bores.

[0010] Embodiments of the present invention may provide one or more technical advantages. These technical advantages may include the formation of three or more closely spaced entry well bores, a plurality of slanted well bores, and drainage patterns to optimize the area of a subsurface formation which may be drained of gas and liquid resources. This allows for more efficient drilling and production and greatly reduces costs and problems associated with other systems and methods. Another technical advantage includes providing a method for accessing a subterranean zone from the surface using a plurality of slanted well bores with one or more enlarged cavities. The enlarged cavities allow for reduction of velocity of gases escaping through the slanted well bores, aiding in the removal of entrained liquids and optimizing the removal of resources from the subterranean zone.

[0011] Other technical advantages of the present invention will be readily apparent to one skilled in the art from the following figures, descriptions, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For a more complete understanding of the present invention and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like numerals represent like parts, in which:

[0013] **FIG. 1** illustrates an example slant well system for production of resources from a subterranean zone;

[0014] **FIG. 2A** illustrates a vertical well system for production of resources from a subterranean zone;

[0015] **FIG. 2B** illustrates a portion of an example slant entry well system in further detail;

[0016] **FIG. 3** illustrates an example method for producing water and gas from a subsurface formation;

[0017] **FIG. 4** illustrates an example entry well bore;

[0018] **FIG. 5** illustrates the use of an example system of an entry well bore and a slanted well bore;

[0019] **FIG. 6** illustrates an example system of an entry well bore and a slanted well bore;

[0020] **FIG. 7** illustrates an example system of a slanted well bore and an articulated well bore;

[0021] **FIG. 8** illustrates production of water and gas in an example slant well system; and

[0022] **FIG. 9** illustrates an example drainage pattern for use with a slant well system.

DETAILED DESCRIPTION OF THE INVENTION

[0023] **FIG. 1** illustrates an example slant well system for accessing a subterranean zone from the surface. In the embodiment described below, the subterranean zone is a coal seam. It will be understood that other subterranean formations and/or zones can be similarly accessed using the slant well system of the present invention to remove and/or produce water, hydrocarbons, and other fluids in the zone, to treat minerals in the zone prior to mining operations, to inject or introduce fluids, gases, or other substances into the zone or for any other appropriate purpose.

[0024] Referring to **FIG. 1, a** slant well system **10** includes entry well bores **15**, slant wells **20**, articulated well bores **24**, cavities **26**, and rat holes **27**. Entry well bores **15** extend from the surface **11** towards the subterranean zone **22**. Slant wells **20** extend from the terminus of each entry well bore **15** to the subterranean zone **22**, although slant wells **20** may alternatively extend from any other suitable portion of an entry well bore **15**. As used herein, "each" means all of a particular subset. Where there are multiple subterranean zones **22** at varying depths, as in the illustrated example, slant wells **20** extend through the subterranean zones **22** closest to the surface into and through the deepest subterranean zone **22**. Articulated well bores **24** may extend from each slant well **20** into each subterranean zone **22**. One or more cavities **26** may be located along a slant well **20** and a cavity **26** or a rat hole **27** may be located at the terminus of each slant well **20**.

[0025] In FIGS. **1**, and, **4-8**, entry well bores **15** are illustrated as being substantially vertical; however, it should be understood that entry well bores **15** may be formed at any suitable angle relative to the surface **11** to accommodate, for example, surface geometries and attitudes and/or the geometric configuration or attitude of a subterranean resource. In the illustrated embodiment, each slant well **20** is formed to angle away from entry well bore **15** at an angle designated α, which in the illustrated embodiment is approximately 20 degrees. It will be understood that each slant well **20** may be formed at other angles to accommodate surface topologies and other factors similar to those affecting entry well bores **15**. In the illustrated embodiment, slant wells **20** are formed in relation to each other at an angular separation of approximately sixty degrees. It will be understood that slant wells **20** may be separated by other angles depending likewise on the topology and geography of the area and location of the target coal seam **22**.

[0026] Entry well bores **15** are formed at the surface at a distance of β feet apart. In the illustrated embodiment, entry well bores **15** are approximately twenty feet apart. It will be understood that entry well bores **15** may be formed at other separations to accommodate surface topologies and/or the geometric configuration or attitude of a subterranean resource.

[0027] In some embodiments, entry well bores **15** may be between two feet and one hundred feet apart. In some embodiments, the entry well bores **15** may be located on the same drilling pad. As used herein, "on the same drilling pad" means located at the same drilling location where drilling operations are being conducted. In some embodiments, entry well bores **15** are closely spaced together. As used herein, "closely spaced" means on the same drilling pad.

[0028] Cavities **26** may be formed at intervals along slant wells **20** above one or more of articulated well bores **24**. For example, cavities **26** may be formed immediately above an articulated well bore **24**. Cavities **26** may also be formed proximate to the junction of slant well **20** and articulated well bore **24**. As used herein, proximate means immediately above, below, or at the junction of slant well **20** and articulated well bore **24**. It will be understood that other appropriate spacing may also be employed to accommodate, for example, sub-surface geometries and attitudes and/or the geometric configuration or attitude of a subterranean resource. Slant well **20** may also include a cavity **26** and/or a rat hole **27** located at the terminus of each slant well **20**. Slant wells **20** may include one, both, or neither of cavity **26** and rat hole **27**.

[0029] **FIGS. 2A and 2B** illustrate by comparison the advantage of forming slant wells **20** at an angle off the vertical. Referring to **FIG. 2A, a** vertical well bore **30** is shown with an articulated well bore **32** extending into a coal seam **22**. As shown by the illustration, fluids drained from coal seam **22** into articulated well bore **32** must travel along articulated well bore **32** upwards towards vertical well bore **30**, a distance of approximately W feet before they may be collected in vertical well bore **30**. This distance of W feet is known as the hydrostatic head and must be overcome before the fluids may be collected from vertical well bore **30**. Referring now to **FIG. 2B, a** slant entry well **34** is shown with an articulated well bore **36** extending into coal seam **22**. Slant entry well **34** is shown at an angle a away from the vertical. As illustrated, fluids collected from coal seam **22** must travel along articulated well bore **36** up to slant entry well **34**, a distance of W' feet. Thus, the hydrostatic head of a slant entry well system is reduced as compared to a substantially vertical system. Furthermore, by forming slant entry well **34** at angle α, the articulated well bore **36** drilled from tangent or kick off point **38** has a greater radius of curvature than articulated well bore **32** associated with vertical well bore **30**. This allows for articulated well bore **36** to be longer than articulated well bore **32** (since the friction of a drill string against the radiused portion is reduced), thereby penetrating further into coal seam **22** and draining more of the subterranean zone.

[0030] **FIG. 3** illustrates an example method of forming a slant entry well **20**. The steps of **FIG. 3** will be further illustrated in subsequent FIGS. **4-8**. The method begins at step **100** wherein an entry well bore is formed. At step **105**, a fresh water casing or other suitable casing is installed into the entry well bore formed at step **100**. At step **110**, the fresh water casing is cemented in place inside the entry well bore of step **100**.

[0031] At step **115**, a drill string is inserted through the entry well bore, and is used to drill approximately fifty feet past the casing. In some embodiments, a short, radiused bore is formed. In some embodiments, the radiused bore may be two hundred feet long and articulate thirty-five degrees over its length. It will be understood that other lengths and degrees may be employed based on the local geology and topography. At step **120**, the drill is oriented to the desired angle of the slant well and, at step **125**, a slant well bore is drilled down into and through the target subterranean zone. At step **130**, one or more cavities are formed in the slant well.

[**0032**] At step **135** the slant well casing is installed. Next, at step **140**, a short radius curve is drilled into the target coal seam. Next, at step **145**, a substantially horizontal well bore is drilled into and along the coal seam. It will be understood that the substantially horizontal well bore may depart from a horizontal orientation to account for changes in the orientation of the coal seam. Next, at step **150**, a drainage pattern is drilled into the coal seam through the substantially horizontal well. The drainage pattern may comprise a pinnate pattern, a crow's foot pattern, or other suitable pattern. At decisional step **155**, a determination is made whether additional subterranean zones are to be drained as, for example, when multiple subterranean zones are present at varying depths below the surface. If additional subterranean zones are to be drained, the process repeats steps **140** through **155** for each additional subterranean zone. If no further subterranean zones are to be drained, the process continues to step **160**.

[**0033**] At decisional step **160**, a determination is made whether additional slant wells are required. If additional slant wells are required, the process returns along the Yes branch to step **100** and repeats through step **155**. A separate entry well bore may be formed for each individual slant well bore. Thus, for each slant well, the process begins at step **100**, wherein a substantially vertical well bore is found. In some embodiments, however, multiple slant wells may be formed from one entry well bore.

[**0034**] If no additional slant wells are required, the process continues along the No branch to step **165**.

[**0035**] At step **165**, production equipment is installed into each slant well and at step **170** the process ends with the production of water and gas from the subterranean zone.

[**0036**] Although the steps have been described in a certain order, it will be understood that they may be performed in any other appropriate order. Furthermore, one or more steps may be omitted, or additional steps performed, as appropriate.

[**0037**] For example, where multiple target zones are present (as determined at step **155**), an enlarged diameter cavity may be found (step **130**) above each target zone before any of the short radius curves are drilled (step **140**). Alternatively, all of the short radius curves may be found in each target zone (step **140**) before any enlarged diameter cavities are found (step **130**). Other suitable modifications will be apparent to one skilled in the art.

[**0038**] **FIG. 4** illustrates entry well bore **15** and casing **44** in its operative mode as a slant well **20** is about to be drilled. Corresponding with step **110** of **FIG. 3, a** cement retainer **46** is poured or otherwise installed around the casing inside entry well bore **15**. The cement casing may be any mixture or substance suitable to maintain casing **44** in the desired position with respect to entry well bore **15**. A drill string **50** is positioned to begin forming a slant well. In order to keep drill string **50** relatively centered in casing **44**, a stabilizer **52** may be employed. Stabilizer **52** may be a ring and fin type stabilizer or any other stabilizer suitable to keep drill string **50** relatively centered. To keep stabilizer **52** at a desired depth in well bore **15**, stop ring **53** may be employed. Stop ring **53** may be constructed of rubber or metal or any other suitable down-hole environment material.

[**0039**] **FIG. 5** illustrates an example system of a slant well **20**. Corresponding with step **115** of **FIG. 3**, well bore **60** is drilled approximately fifty feet past the end of entry well bore **15** (although any other appropriate distance may be drilled). Well bore **60** is drilled away from casing **44** in order to minimize magnetic interference and improve the ability of the drilling crew to guide the drill bit in the desired direction. As described above in conjunction with **FIG. 3**, well bore **60** may also comprise an articulated well bore with a radius of thirty-five degrees in two hundred feet.

[**0040**] Corresponding with step **120** of **FIG. 3**, the drill bit is oriented in preparation for drilling slant entry well bore **64**. Corresponding with step **125** of **FIG. 3, a** slant entry well bore **64** is drilled from the end of the radius well bore **62** into and through the subterranean zone **22**. Alternatively, slant well **20** may be drilled directly from entry well bore **15**, without including tangent well bore **60** or radiused well bore. A rat hole **66**, which is an extension of slant well **64**, is also formed. Rat hole **66** may also be an enlarged diameter cavity or other suitable structure. Corresponding with step **130** of **FIG. 3, a** cavity **26** is formed in slant well **64**.

[**0041**] Cavity **26** acts as a velocity reduction chamber, separating entrained liquids from gasses destined for the surface. Without at least one cavity **26** located closer to the surface than the shallowest lateral well bore, entrained liquids form a mist that raises down-hole pressure. Friction is increased by the liquids entrained in escaping gasses, creating increased back pressure (down-hole pressure). Reducing the gas velocity separates out the liquid as the velocity drops below the speed at which the gas can entrain liquids. Cavity **26** lowers the velocity of the gas enough to separate out the entrained liquids, allowing the gas to proceed to the surface more efficiently.

[**0042**] In the illustrated embodiment, cavity **26** is shown immediately above the expected kick-off point for a subsequent short radiused well bore. It will be understood that cavity **26** may be otherwise suitably located. Moreover, it will be understood that cavity **26** may also be formed after the horizontal drainage pattern is formed.

[**0043**] **FIG. 6** is an illustration of the positioning of the casing in a slant well **64**. For ease of illustration, only one slant well **64** is shown. Corresponding with step **135** of **FIG. 3, a** whipstock casing **70** is installed into the slant entry well bore **64**. In the illustrated embodiment, whipstock casing **70** includes a whipstock **72** which is used to mechanically direct a drill string into a desired orientation. It will be understood that other suitable techniques may be employed and the use of a whipstock **72** is not necessary when other suitable methods of orienting a drill bit through slant well **64** into the subterranean zone **22** are used. Whipstock casing **70** is oriented such that whipstock **72** is positioned so that a subsequent drill bit is aligned to drill into the subterranean zone **22** at a desired depth.

[0044] **FIG. 7** illustrates whipstock casing **70** and slant entry well bore **64** in further detail. As discussed in conjunction with **FIG. 6**, whipstock casing **70** is positioned within slant entry well bore **64** such that a drill string **50** will be oriented to pass through slant entry well bore **64** at a desired tangent or kick off point **38**. This corresponds with step **140** of **FIG. 3**. Drill string **50** is used to drill through slant entry well bore **64** at tangent or kick off point **38** to form articulated well bore **36**. In a particular embodiment, articulated well bore **36** has a radius of approximately seventy-one feet and a curvature of approximately eighty degrees per one hundred feet. In the same embodiment, slant entry well **64** is angled away from the vertical at approximately ten degrees. In this embodiment, the hydrostatic head generated in conjunction with production is roughly thirty feet. However, it should be understood that any other appropriate radius, curvature, and slant angle may be used.

[0045] **FIG. 8** illustrates a slant entry well **64** and articulated well bore **36** after drill string **50** has been used to form articulated well bore **36**. In a particular embodiment, a horizontal well and drainage pattern may then be formed in subterranean zone **22**, as represented by step **145** and step **150** of **FIG. 3**.

[0046] Referring to **FIG. 8**, whipstock casing **70** is set on the bottom of rat hole **66** to prepare for production of oil and gas. A sealer ring **74** may be used around the whipstock casing **70** to prevent gas produced from articulated well bore **36** from escaping outside whipstock casing **70**. Gas ports **76** allow escaping gas to enter into and up through whipstock casing **70** for collection at the surface. As described above, liquids entrained in the escaping gas may be separated from the gas in enlarged diameter cavities **26** situated above the articulated well bore **36**. As the liquids separate from the gas, the liquids travel down slant well **64** and are collected in rat hole **66**. Rat hole **66** may also comprise an enlarged diameter cavity (not shown) to collect liquids arriving from above.

[0047] A pump string **78** and submersible pump **80** is used to remove water and other liquids that are collected from the subterranean zone through articulated well bore **36**. As shown in **FIG. 9**, the liquids, under the power of gravity and the pressure in subterranean zone **22**, pass through articulated well bore **36** and down slant entry well bore **64** into rat hole **66**. From there the liquids travel into the opening in the whipstock **72** of whipstock casing **70** where they come in contact with the installed pump string **78** and submersible pump **80**. Submersible pump **80** may be a variety of submersible pumps suitable for use in a down-hole environment to remove liquids and pump them to the surface through pump string **78**. Installation of pump string **78** and submersible pump **80** corresponds with step **165** of **FIG. 3**. Production of liquid and gas corresponds with step **170** of **FIG. 3**.

[0048] **FIG. 9** illustrates an example drainage pattern **90** that may be drilled from articulated well bores **36**. At the center of drainage pattern **90** is a plurality of entry well bores **15** on a drilling pad **92** at the surface. In one embodiment, entry well bores **15** are spaced approximately twenty feet apart. It will be understood that other suitable spacings may also be employed.

[0049] Connecting to each entry well bore **15** is a slant well **20**. At the terminus of slant well **20**, as described above, are substantially horizontal well bores **94** roughly forming a "crow's foot" pattern off of each of the slant wells **20**. It will be understood that any other suitable drainage patterns, for example, a pinnate pattern, may be used. In an example embodiment, the horizontal reach of each substantially horizontal well bore **94** is approximately three hundred feet. Additionally, the lateral spacing between the parallel substantially horizontal well bores **94** is approximately eight hundred feet. In this particular embodiment, a drainage area of approximately six hundred and forty acres would result.

[0050] Although the present invention has been described with several embodiments, various changes and modifications may be suggested to one skilled in the art. It is intended that the present invention encompass such changes and modifications as fall within the scope of the appended claims.

What is claimed is:

1. A method for accessing a subterranean zone from the surface, comprising:

forming a first entry well bore from the surface;

forming one or more slanted well bores from the first entry well bore to the subterranean zone;

forming a second entry well bore from the surface, the second entry well bore located on the same drilling pad as the first entry well bore at the surface;

forming one or more slanted well bores from the second entry well bore to the subterranean zone;

forming a third entry well bore from the surface, the third entry well bore located on the same drilling pad as the first and second entry well bores at the surface;

forming one or more slanted well bores from the third entry well bore to the subterranean zone; and

forming a substantially horizontal drainage pattern from each of the slanted well bores into the subterranean zone.

2. The method of claim 1, wherein the horizontal drainage patterns comprise a horizontal well bore extending from the slanted well bore and a plurality of lateral well bores extending from the horizontal well bore.

3. The method of claim 2, wherein the horizontal drainage patterns comprise a crow's foot configuration.

4. The method of claim 2, wherein the lateral well bores are configured to drain an area of the subterranean zone of at least 640 acres.

5. The method of claim 2, wherein the horizontal drainage patterns comprise a pinnate configuration.

6. The method of claim 1, further comprising removing resources from the subterranean zone through the horizontal drainage patterns to the surface.

7. The method of claim 1, further comprising forming an enlarged cavity in each of the slanted well bores proximate to and above the subterranean zone.

8. The method of claim 1, further comprising forming an enlarged cavity in each of the slanted well bores above the horizontal drainage pattern.

9. The method of claim 7, wherein the enlarged cavity is located proximate to the junction of the slanted well bore and the substantially horizontal drainage pattern.

10. The method of claim 1, wherein the first, second, and third entry well bores are spaced approximately twenty feet apart.

11. The method of claim 1, further comprising forming a second horizontal drainage pattern from each of the slanted well bores into a second subterranean zone.

12. A system for accessing a subterranean zone from the surface, comprising:

a first entry well bore extending from the surface;

a second entry well bore extending from the surface, the second entry well bore located on the same drilling pad as the first entry well bore at the surface;

a third entry well bore extending from the surface, the third entry well bore located on the same drilling pad as the first and second entry well bores;

one or more slanted well bores extending from each of the first, second, and third entry well bores to the subterranean zone; and

a substantially horizontal drainage pattern extending from the slanted well bores into the subterranean zone.

13. The system of claim 12, wherein the horizontal drainage patterns comprise a horizontal well bore extending from the slanted well bore and a plurality of lateral well bores extending from the horizontal well bore.

14. The system of claim 13, wherein the horizontal drainage patterns comprise a crow's foot configuration.

15. The system of claim 13, wherein the lateral well bores are configured to drain an area of the subterranean zone of at least 640 acres.

16. The system of claim 13, wherein the horizontal drainage patterns comprise a pinnate configuration.

17. The system of claim 12, further comprising an enlarged cavity in each of the slanted well bores proximate to the subterranean zone.

18. The system of claim 12, further comprising an enlarged cavity in each of the slanted well bores between the surface and the horizontal drainage pattern.

19. The system of claim 17, wherein the enlarged cavity is located proximate to the junction of the slanted well bore and the substantially horizontal drainage pattern.

20. The system of claim 12, wherein the first, second, and third entry well bores are spaced approximately twenty feet apart at the surface.

21. The system of claim 12, further comprising a second substantially horizontal drainage pattern extending from each slanted well bore into a second subterranean zone.

22. A system for accessing a subterranean zone from the surface, comprising:

three or more entry well bores extending from the surface;

one or more slanted well bores extending from each entry well bore to the subterranean zone;

a substantially horizontal drainage pattern extending from the slanted well bores into the subterranean zone; and

an enlarged cavity in each of the one or more slanted well bores, located proximate to the junction of the slanted well bore and the substantially horizontal drainage pattern.

23. A system for accessing multiple subterranean zones from the surface, comprising:

three ore more entry well bores extending from the surface;

one or more slanted well bores extending from each entry well bore to one or more subterranean zones;

one or more substantially horizontal drainage patterns extending from the slanted well bores into each of the one or more subterranean zones; and

one or more enlarged cavities in each of the slanted well bores positioned proximate to the junction of the slanted well bores and the one or more of the substantially horizontal drainage patterns.

24. The system of claim 23, wherein the three or more entry well bores are located on the same drilling pad.

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