HYDRAULIC DOWNHOLE OIL RECOVERY SYSTEM

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ABSTRACT

An improved hydraulic downhole oil recovery system that incorporates an above ground unit and a submersible, reciprocating downhole pump unit. This system, by pumping oil to the surface both during the upstroke and down-stroke, is able to continuously pump oil to the surface as not previously possible. Oil production is doubled with virtually no increase in energy consumption during operation. Water-based fluid, rather than hydraulic fluid, is responsible for actuating the reciprocating downhole pump unit. The water-based fluid is transferred through the system using coil tubing. The system further relies upon coil exterior production tubing to provide exceptional advantage in deviated oil wells.
HYDRAULIC DOWNHOLE OIL RECOVERY SYSTEM

CITATION TO PARENT APPLICATION(S)

[0001] This is a continuation-in-part with respect to U.S. patent application Ser. No. 10/945,962, filed on Sep. 20, 2004, from which priority is claimed pursuant to 35 U.S.C. 120; which is a continuation-in-part with respect to U.S. patent application Ser. No. 10/945,530, filed on Sep. 20, 2004, from which priority is claimed pursuant to 35 U.S.C. 120; which is a continuation-in-part with respect to U.S. patent application Ser. No. 10/884,376, filed on Jul. 2, 2004, from which priority is claimed pursuant to 35 U.S.C. 120.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] Applicant’s invention generally relates to an improved hydraulic downhole oil recovery system. More specifically, applicant’s invention relates to an oil recovery system that employs coil tubing, in both its production tubing and fluid transfer tubing, and water-based fluid, rather than hydraulic fluid, to offer its user tremendous advantages in view of systems known in the art. Moreover, production efficiency is greatly increased as the present system pumps oil to the surface during both its upstroke and its downstroke.

[0004] 2. Background Information

[0005] Conventional oil recovery systems are hampered by limitations on both the depth and volume of oil that can be recovered. The present invention does away with these presently accepted limitations. In fact, known oil recovery systems can generally recover 400 barrels of oil per day, at a depth of 1000 feet, using full-sized standard surface pumps. However, embodiments of applicant’s invention will be able to recover 1500 barrels per day, using a fraction of the energy consumed by conventional systems. Moreover, particular embodiments of the present invention allow certain embodiments of the system to be maintained on solar energy, which is not feasible with known downhole oil recovery systems.

[0006] Conventional oil recovery systems are relatively short-lived and require a high level of maintenance in view of the present device. Current systems rely on large, cumbersome parts that are prone to leaking and causing wear and tear of standard production tubing. However, Applicant’s invention provides a much smaller surface unit with fewer moving parts, and it incorporates coil tubing. As such, maintenance and the risk of leaks are reduced.

[0007] A large portion of the problems associated with known oil recovery systems come from the secured-production tubing configuration of those systems. Specifically, reciprocation of the sucker rod within the production tube causes wear and tear of the tubing. As a result, leaks often originate within the tubing at the secured reciprocation location. This leads to both inefficiency and environmental contamination. Such problems are exaggerated in the common case of deviated oil wells. As will be further discussed, Applicant’s invention eliminates these common problems through the novel use of coil production tubing.

[0008] Common oil recovery systems also present significant problems at the surface. Surface pumps are loud, cumbersome, visually offensive, dangerous, and environmentally unfriendly. As such, restrictions are placed on both where and when these systems can be used. Prohibitive zoning restrictions are often based on the way the pumps look, how they sound, and the inconvenience they cause to people in their proximity. Further, it is widely known in the art that conventional surface pumps are prone to leaking both oil and hazardous fumes. As such, environmental concerns are very high and periodic maintenance is required, all the while cost of operation increases while efficiency decreases.

[0009] Surface pumps are also dangerous; each year, injuries and deaths result from the operation of such pumps. These occurrences often involve children who make their way to the pumps, drawn by curiosity, only to get caught in the moving parts.

[0010] Applicant’s invention provides a refreshing solution to the problems mentioned above and avoids the worst characteristics associated with known surface pumps. The present invention uses only a fraction of the energy required for standard surface pumps. As such, the present invention is much smaller and quieter, is easily housed and insulated, and greatly reduces the likelihood of leaks and need for maintenance. Further, the present invention eliminates the dangers associated with surface pumps as there are no large, cumbersome moving parts.

[0011] There is a narrow range of hydraulically operated oil recovery systems known in the art. Yet, of these known systems, none are believed to be operative in reality, and at best are not able to match the advantages provided by Applicant’s invention. For instance, Schulte (U.S. Pat. No. 5,494,102) discloses a downhole operated pump having a power piston reciprocated by alternating pressurized hydraulic fluid flow controlled at the surface by a hydraulic power control system which quickly reverses the flow direction.

[0012] Applicant’s invention is distinguished from Schulte specifically in a number of ways. While Schulte teaches an apparatus having a power piston above the production piston, the present invention provides for a power piston below the production piston. Such configuration provides greater efficiency and allows the present system to be operated on much less energy.

[0013] Schulte teaches a power piston that runs along the well bore itself. However, the present invention provides for a power piston/production piston configuration whereby each piston is actuated within a removable tube housing located within the well bore. This feature provides for a straightforward maintenance or replacement scheme that is simply not available with devices known in the art.

[0014] Applicant’s invention also provides a scheme whereby either the volume of the power piston or the volume of the production piston may be changed with respect to one another. As such, the power piston/production piston ratio may be manipulated to vary the power fluid/production fluid ratio for different situations. For example the size of the power piston may be increased with respect to the production piston. This scheme will allow the present system to be operated on an extremely small amount of power. In fact, such embodiments are thought to operate within the range of solar power sources; this feature is not available with any
known devices. Alternatively, the size of the production piston could be increased with respect to the power piston. This scheme will allow the present system achieve rates of oil production not currently possible. For example, the present system will be able to produce up to 1500 barrels of oil per day while accepted limitations fall around 400 barrels of oil a day. As mentioned, the components are housed in a removable tubing, as such, the power piston/production piston ratio may be changed in accordance with changing amounts and depths of available oil.

The present invention further provides a tremendous improvement in oil production efficiency. Traditional oil well pump devices can only pump oil to the surface during an upstroke. However, the present system, through employment of a double-acting pump and a novel component configuration, allows for oil to be continuously pumped to the surface. That is, oil is sent to the surface during both the upstroke and the downstroke. Perhaps of even greater importance, this “double action” is achieved with no greater expenditure of power. So, while production is double, energy consumption remains constant!

Furthermore, the present invention provides for a much longer service life than that of the prior art. Applicant’s invention utilizes a metal-to-metal sealing device not found in the prior art. The use of such device is thought to at least double the service life of the submersible pump, not to mention its extreme temperature capabilities.

The present invention also incorporates the use of coil tubing throughout the system. Coil tubing is known in the industry and is typically used to clean sand from well bores; however, no known products have been able to incorporate such tubing to transfer power fluid and provide housing for system components. In the past, fitting system components and power fluid tubing within coil tubing has proven to be too difficult. Applicant’s invention, however, provides for the novel use of such tubing to transfer power fluid and house components. This feature makes Applicant’s invention particularly useful in deviated oil wells when compared to presently available products.

The present invention is further distinguished over the prior art in general, and the Schultz patent in particular, by the use of water-based fluid rather than hydraulic fluid to actuate the downhole reciprocating pump unit. The substitution of water-based fluid for hydraulic fluid may appear to be a subtle distinction at first glance. Nevertheless, the use of water-based fluid in the present system has virtually eliminated the most common problems associated with presently proposed, but impractical hydraulic recovery systems, including: the compression of production fluid circulated throughout the system, inflexible fluid transfer lines, fluid friction during downhole and return flow cycles, and fluid viscosity.

In view of the limitations and hazards associated with traditional oil recovery systems, and the defects in presently proposed hydraulically operated oil recovery systems, a great need exists for a system that can operate efficiently and safely. Through use of coil tubing, water-based fluid rather than hydraulic fluid, and a unique combination of system components, Applicant’s invention eliminates problems associated with known recovery systems and provides tremendous progress in view of those systems.

SUMMARY OF THE INVENTION

In view of the foregoing, it is an object of the present invention to provide an oil recovery system that pumps oil to the surface during both its upstroke and its downstroke.

It is another object of the present invention to provide an oil recovery system that has an oil production to energy consumption ratio.

It is another object of the present invention to provide an oil recovery system that eliminates conventional tubing wear and tear.

It is another object of the present invention to provide an oil recovery system that eliminates weak tubing link unreliability.

It is another object of the present invention to provide an oil recovery system that eliminates surface leaks.

It is another object of the present invention to provide an oil recovery system that eliminates pumping unit liability.

It is another object of the present invention to provide an oil recovery system that eliminates submersible pump inefficiencies.

It is another object of the present invention to provide an oil recovery system that may exceptionally useful in deviated oil wells.

It is another object of the present invention to provide an oil recovery system that produces and maintains relatively high volume lift in relatively low production wells.

It is another object of the present invention to provide an oil recovery system that may be used in environmentally sensitive locations.

It is another object of the present invention to provide an oil recovery system that may be safely used in urban environments.

It is another object of the present invention to provide an oil recovery system that may be used in corrosive environments.

It is another object of the present invention to provide an oil recovery system that may be used in remote locations.

It is another object of the present invention to provide an oil recovery system that contains a surface adjustable lift capacity.

It is another object of the present invention to provide an oil recovery system that can be powered by solar energy or other alternative power sources.

It is another object of the present invention to provide an oil recovery system that employs the use of coil production tubing.
It is another object of the present invention to provide an oil recovery system that maintains its power piston below its production piston.

It is another object of the present invention to provide an oil recovery system that employs the use of pressure controlled surface pumps.

It is another object of the present invention to provide an oil recovery system that requires an exceptionally low amount of service.

It is another object of the present invention to provide an oil recovery system with exceptionally long service life.

In satisfaction of these and related objects, and as will be discussed in the specification to follow, practice of the present invention involves a pressure-type pump surface unit. This surface unit is modified to read and record pressure measurements during pump cycles so that when pressure builds past a certain point at the completion of a cycle, the unit “switches” to begin the next cycle. As mentioned, the surface unit of the present invention is of a pressure-type, and therefore is much smaller, quieter, and cleaner than standard oil well surface units.

The surface unit of the present invention is connected to a downhole apparatus by a pair of hydraulic power lines. The downhole unit of the present invention primarily consists of a power piston, a production piston, a connecting rod, and a series of inlets, valves, and reservoirs. Operation of the system is initiated when power fluid is alternately pumped through each power line, thereby actuating a downhole power piston between a top position and a bottom position. Specifically, as fluid is pumped through the upward power line, the fluid volume of the reservoir below the power piston expands, thereby forcing the power piston upward. During the following down-stroke, fluid is pumped through the down-stroke power line, and the fluid volume of the reservoir above the power piston expands thereby forcing the power piston downward.

A connecting rod extends from the power piston to the production piston. In holding the power piston and production piston fixed with respect to one another, the connecting rod traverses both a hydraulic power fluid reservoir and an oil containing reservoir. Importantly, the connecting rod, in conjunction with a metal to metal seal with the pump barrel, forms a fluid-tight seal between the power fluid reservoir and the oil reservoir. This feature not only allows the connecting rod to actuate between a top position and a bottom position while keeping the “dirty” oil environment separate from the “clean” power fluid environment, but also significantly extends the service life of the entire system through the use of metal to metal seals.

The production piston rests along the top surface of the connecting rod and is actuated between a bottom position just above the power fluid reservoir and a top position just below a one-way valve. These one-way valves are standard, “check” valves as known in the art. That is, each valve consists of a loosely seeded bearing that rests about a grooved slot. Each bearing may become unseeded, thereby allowing fluid to flow in a given direction yet returns to a seeded position to prevent backflow of any fluid.

As the production piston is actuated from a bottom position to a top position, oil is cycled from a first inlet, positioned below the production piston, to a first reservoir positioned between the power fluid reservoir and the production piston. During this stage, production oil located in a second reservoir, positioned between the production piston and a one way check valve, is forced through the check valve and into the rest of the system. Specifically, the bottom valve remains in the seeded position as it rises, forcing oil through the top valve. As the bottom valve begins to lower, the top valve returns to the seeded position, preventing fluid from returning. This action also creates the vacuum that is responsible for sucking the oil through the production shaft and above the bottom valve. This process is repeated through a series of valves until the oil is cycled to the surface.

As the production piston is actuated from a bottom position to a top position, oil is cycled from a second inlet, positioned above the production piston, into a second reservoir positioned between the production piston and a one way check valve. During this stage, production oil located in the first reservoir, positioned between the production piston and the power fluid reservoir, is forced through an adjacent shaft leading from the first reservoir to a location above the second reservoir separated by a one way valve. Said adjacent shaft also contains its own one way valve so that fluid only flows through the shaft during the down-stroke, and no backflow is permitted.

As mentioned, Applicant’s invention circulates a water-based fluid, rather than hydraulic fluid, throughout the system. This substitution promotes both the novel design and great efficiency of the present invention. More specifically, the use of water-based fluid provides for a much greater operating efficiency. That is, typical hydraulic fluid is compressible and therefore requires a significantly greater number of pump strokes to “pressure up” than a column of water-based fluid. As a result, the efficiency of hydraulic fluid decreases over any appreciable distance as its compression causes wasted pump strokes, which directly translates to lost power. Because the present system uses incompressible water-based fluid, problems associated with fluid compressibility have been eliminated. Specifically, power loss is avoided as there is no appreciable loss in efficiency due to the compression of the circulated production fluid.

Other useful embodiments of the invention are thought to utilize additives that may increase the viscosity of the water-based hydraulic fluid. Such may involve the use of “oils” to form emulsions. These embodiments are thought to be particularly useful in further reducing fluid friction and further improving operating efficiency.

However, the benefits associated with the present system do not end with use of water-based fluid. The novelty of the present invention further lies in the placement and action of the downhole pump. The downhole pump is placed below the production oil, as such, the surface unit is in a mechanically superior alignment. That is, the surface unit is responsible for actuating only the downhole pump, rather than cycling the entire production string through the production tube. This feature alone, and in conjunction with an efficient surface unit, provides for an extreme decrease in the energy used during production.
Additionally, devices of the past have not been successful in using coil tubing, as it has proven too difficult to incorporate such tubing within the production tube itself. However, Applicant has cleared that hurdle. The present system provides for the coil, flexible tubing contained within the production tube all the while circulating water-based fluid from the surface to the downhole pump unit. This feature alone, and particularly in combination with coil production tubing, allows the present invention to be useful in deviated wells that would otherwise be inaccessible.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Applicant’s invention may be further understood from a description of the accompanying drawings, wherein unless otherwise specified, like referenced numerals are intended to depict like components in the various views.

**FIG. 1** is a cross sectional view of the submersible pump portion of the improved hydraulic downhole oil recovery system of the present invention.

**FIG. 2** is a cross sectional view of the improved hydraulic downhole oil recovery system of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

With reference to **FIG. 2**, the improved hydraulic down-hole oil recovery system of the present invention is identified generally by the reference number 10. In the preferred embodiment, device 10 includes surface pump unit 12. Surface pump unit 12 includes a power fluid 14 through upstroke power line 16 during one cycle and sends power fluid 14 through downstroke power line 18 in a following downstroke cycle. Surface unit 12 reversely engages with power lines 16 and 18 so as to form a fluid-tight seal, such seal is formed by standard tube fittings as known in the art. In the preferred embodiment, pump unit 12 is a pressure pump, modified to contain a “switch off pressure sensor” 13 which reads the pressure at the surface pump on both the upstroke and the downstroke. At the point each stroke is carried out, pressure increases beyond a preset “switch off” point where sensor 13 sends a signal to pump 12 to begin the next stroke. Further, surface unit 12 transfers power fluid 14 by alternating pressure on both power line 16 and power line 18, such pressure change may be carried out in a number of ways as is known in the art. Finally, in the preferred embodiment, power fluid 14 is water-based fluid. As previously discussed in the specification, the use of water-based fluid in conjunction with device 10 provides its user with a number of advantages.

Upstroke power line 16 and downstroke power line 18 both extend from surface pump unit 12 and follow along the length of removable production tube 20. Production tube 20, in the preferred embodiment, reversely slides along outer shaft 21. In the preferred embodiment, upstroke power line 16 and downstroke power line 18 are comprised of coil production tubing. As previously discussed in the specification, power line made of this material allows the present invention to be particularly useful in deviated oil wells.

Referring to **FIG. 1**, upstroke power line 16 leads to upstroke reservoir 22 and is connected thereto by upstroke fitting 24. Downstroke power line 18 leads to downstroke reservoir 26 and is connected thereto by downstroke fitting 28. Both fitting 24 and fitting 28 are standard tube fittings as known in the art.

As surface pump unit 12 sends power fluid 14 through upstroke power line 16, power fluid 14 fills upstroke reservoir 22 such that its fluid volume increases, thereby actuating power plunger 30 in an upward direction so that the fluid power volume of downstroke reservoir 26 decreases. Likewise, as surface pump unit 12 sends power fluid 14 through downstroke power line 18, power fluid 14 fills downstroke reservoir 26 such that its fluid volume increases, thereby actuating power plunger 30 in a downward direction, so that the fluid volume of upstroke reservoir 22 decreases.

Again referring to **FIG. 1**, power plunger 30 is actuated between a top position and a bottom position where plunger 30 reaches a position just above upstroke fitting 24 at completion of the downstroke in the bottom position, and where plunger 30 reaches a position just below downstroke fixture 28 at completion of the upstroke in the top position. The pressure change in power line 16 and 18, and resulting fluid volume change in reservoirs 22 and 26, respectively, is the mechanism responsible for actuating power plunger 30. In the preferred embodiment, power plunger 30 is a “spray metal” plunger, or made of some suitable alloy and is shaped so as to form a fluid-tight fit with removable production tube 20. Again referring principally to **FIG. 1**, connecting rod 32 is attached to power plunger 30 and extends therefrom. Connecting rod 32 is of such length that connecting rod 32 extends beyond pump barrel seal 38 during both the downstroke and the upstroke. Connecting rod 32 is actuated between a top position and a bottom position where its top portion rests just above pump barrel seal 38 in a bottom position, at completion of a down-stroke, and where its bottom portion rests just below pump barrel seal 38 in a top position, at completion of an upstroke. The combination of connecting rod 32 and pump barrel seal 38 form a fluid-tight seal, as such, downstroke reservoir 26 remains completely sealed from first reservoir 40 during both the upstroke and downstroke. In the preferred embodiment, connecting rod 32 and pump barrel seal 38 are fitted so that a 1/16th inch gap in found on either side of rod 32. This fit is thought to be most beneficial that it allows rod 32 to freely move between its top and bottom position while preventing production oil from flowing between rod 32 and pump barrel seal 38. Such a fluid tight seal is particularly beneficial in that it separates the clean environment of power fluid 14 from the dirty environment of the production fluid cycled by device 10. As previously discussed in the specification, this has not been possible with known hydraulically-driven systems. Additionally, in the preferred embodiment, pump barrel seal 38 provides metal to metal sealing with connecting rod 32. This metal to metal sealing combination significantly extends the service life of device 10 resulting in much greater economic operating efficiency.

Referring to **FIG. 1**, immediately above pump barrel seal 38 is first reservoir 40. Adjacent to first reservoir 40 is first inlet 41. In the preferred embodiment, first inlet 41 is a one way valve that allows production fluid to flow into first reservoir 40 during an upstroke, but does not allow backflow. During an upstroke, production fluid is drawn into device 10 through first inlet 41 where it travels through and
fills first reservoir 40. During a down-stroke, production fluid is pushed from first reservoir 40 by production piston 46, and flows through adjacent shaft 48, through one way valve 49, and into upper reservoir 53. This pumping of production fluid during the down-stroke is the very thing that sets this embodiment apart from its parent, and further from any devices known in the art. Importantly, with this configuration, production of oil is precisely doubled, yet there is no increase in energy consumption in view of a previous embodiment that only pumps oil during the upstroke.

[0061] Production piston 46 is connected to and rests just above connecting rod 32 and is of a generally solid cylinder-form. Production piston 46 is actuated between a top position and a bottom position where piston 46 rests just above pump barrel seal 38 at completion of a down-stroke in a bottom position, and piston 46 reaches just below one way valve 52 at completion of an upstroke, in a top position. As previously mentioned in the specification, the volume of both production piston 46 and power piston 30 may be changed with respect to one another. This change in ratio between production piston 46 and power piston 30 has particular applicability in a low production energy context.

[0062] Second reservoir 42 is positioned between production piston 46 and one way valve 52. Adjacent to second reservoir 42 is second inlet 43. In the preferred embodiment, second inlet 43 is a one way valve that allows production fluid to flow into second reservoir 42 during a down-stroke, but does not allow backflow. During a down-stroke, production fluid is drawn into device 10 through second inlet 43 where it travels through and fills second reservoir 42. During an upstroke production fluid is pushed from second reservoir 42 by piston 46, and flows through valve 52, and into upper reservoir 53. This pumping of production fluid during the upstroke compliments pumping of production fluid to the surface during the down-stroke so that production fluid travels to the surface in a continuous manner. Again, by virtue of pumping oil to the surface during both the upstroke and down-stroke, production of oil is precisely doubled, yet there is no increase in energy consumption in view of a previous embodiment that only pumps oil during the upstroke.

[0063] In the preferred embodiment, valve 52 is of a standard type as known in the art. That is, a loosely seeded bearing 51 rests upon a grooved slot. During upstroke, bearing 51 becomes unseeded and allows production fluid to flow from second reservoir 42, through valve 52, and into upper reservoir 53. Production fluid easily flows into reservoir 53 as bearing 51 becomes unseeded and the oil is pushed into reservoir 53. During down-stroke, bearing 51 remains seeded as fluid flows into reservoir 53 from adjacent shaft 48. As device 10 completes a pumping cycle, production fluid is continuously pushed through reservoir 53 and adjoining reservoirs, separated by other one way valves, until the production fluid reaches the surface.

[0064] Although the invention has been described with reference to specific embodiments, this description is not meant to be construed in a limited sense. Various modifications of the disclosed embodiments, as well as alternative embodiments of the inventions will become apparent to persons skilled in the art upon reference to the description of the invention. It is, therefore, contemplated that the appended claims will cover such modifications that fall within the scope of the invention.

I claim:

1. An improved hydraulic downhole oil recovery system, comprising:

   a submersible downhole unit, comprising:

   an inner removable shell housing;

   a first power fluid transfer tube having a first and second end;

   a second power fluid transfer tube having a first and second end;

   power fluid;

   a power piston housed within said inner removable shell, wherein said power piston is actuated between a first position and a second position by differential pressure exerted on either side of said power piston by said power fluid;

   a power fluid transfer tube receiving means, said power fluid transfer tube receiving means being reversibly mated with said first and second power fluid transfer tube second ends, said power fluid transfer tube receiving means reversibly connected to said inner removable shell housing, said power fluid transfer receiving means being located on either side of said power piston;

   a production piston, said production piston being located within said inner removable shell housing;

   a connecting rod, said connecting rod being located between said power piston and said production piston, said connecting rod being configured to hold said power piston and said production piston in a fixed position with respect to one another, said production piston being configured for actuation between a first position and a second position by corresponding actuation of said power piston through said connecting rod, said connecting rod being located within said inner removable shell housing;

   a pump barrel seal, said pump barrel seal configured circumferentially around said connecting rod, wherein said pump barrel seal prevents cross-contamination between said power fluid and production fluid;

   a first production fluid tube;

   a second production fluid tube, wherein said second production fluid tube being configured to join said first production tube above and below said production piston, wherein production fluid is pushed through said first production fluid tube during a production piston upstroke, and wherein production fluid is pushed through said second production fluid tube during a production piston down-stroke;
a first aperture, said first aperture configured for drawing production fluid into said inner removable shell housing above said production piston;

a second aperture, said second aperture configured for drawing production fluid into said inner removable shell housing below said production piston;

a plurality of valves, said plurality of valves being configured for allowing one-way flow of production fluid as said production fluid cycles through said downhole submersible unit; and

an above ground surface unit, comprising:

a fluid pumping means;

a pressure measuring means for measuring pressure on said first and second power fluid transfer tubes; and

a power fluid transfer tube initiating means, wherein said power fluid transfer tube initiating means reversibly mates with said first end of said first and second power fluid transfer tubes.

2. The improved hydraulic downhole oil recovery system of claim 1, wherein said first and second power fluid transfer tubes are comprised of coil tubing.

3. The improved hydraulic downhole oil recovery system of claim 1, wherein said removable inner shell housing is comprised of coil tubing.

4. The improved hydraulic downhole oil recovery system of claim 1, wherein said power fluid is water-based.

5. The improved hydraulic downhole oil recovery system of claim 1, wherein said pump barrel seal is comprised of a metallic substance.

6. The improved hydraulic downhole oil recovery system of claim 1, wherein the size of said power piston may be varied for maximum operation.

7. The improved hydraulic downhole oil recovery system of claim 1, wherein the size of said production piston may be varied for maximum operation.

8. The improved hydraulic downhole oil recovery system of claim 1, wherein said power piston is comprised of a solid, metallic material.

9. The improved hydraulic downhole oil recovery system of claim 1, wherein said production piston is comprised of a solid, metallic material.