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SUPERINTENDENCIA DE INDUS

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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Solicitud de Patente de Invención titulada: "Bomba de eje con movimiento alternativo para fluidos arenosos"

Solicitante: Weatherford/Lamb, Inc.

PRESENTACIÓN COPIA CERTIFICADA DE DOCUMENTO DE PRIORIDAD

ÁLVARO CORREA ORDÓÑEZ, mayor de edad y vecino de Bogotá D.C., identificado según aparece al pie de mi firma, en mi condición de apoderado de la sociedad en referencia, presento copia certificada de la solicitud de patente US13/206,411, sobre la cual se reclama prioridad en la presente solicitud de patente.

Atentamente,

ÁLVARO CORREA ORDÓÑEZ

C.C. No. 79.143.366 de Usaquén

T.P. 20.281

Anexos: Documento de Prioridad US13/206,411
Traducción al castellano de portada y reivindicaciones

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CUMPLE LOS REQUISITOS PARA OTORGARLE UNA FECHA DE
PRESENTACIÓN BAJO EL 35 USC 111.

Y
Y

NÚMERO DE SOLICITUD: 13/206,411
FECHA DE PRESENTACIÓN: Agosto 09, 2011

EL CÓDIGO DE PAÍS Y NÚMERO DE SU SOLICITUD DE PRIORIDAD,
PARA SER USADA PARA PRESENTACIÓN EN EL EXTRANJERO DE
ACUERDO CON LA CONVENCION DE PARIS, ES US13/206.411



Por la Autoridad del
De acuerdo con la Secretaría de Comercio para
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Oficina de Marcas y Patentes de los Estados
Unidos

(Aparece firma ilegible)
W. MONTGOMERY
Funcionario Certificador

REIVINDICACIONES

1. Una bomba en el fondo de un pozo, comprende

Un depósito que tiene una primera válvula de una vía que restringe el paso de fluido hacia afuera del depósito;

Un émbolo dispuesto de manera que se mueve alternadamente en el depósito y que tiene primero y segundo sellos entre el émbolo y el depósito, el émbolo tiene una segunda válvula de una vía que restringe el paso de fluido hacia afuera de un interior del émbolo y dentro de un volumen variable definido entre la primera y la segunda válvulas; y

Un filtro dispuesto sobre el émbolo entre el primero y segundo sellos y separa el interior del émbolo de un espacio entre el émbolo y el depósito, el filtro permite el paso del fluido entre el interior y el espacio y restringe el paso de los granos desde el interior hacia el espacio.

2. La bomba de la reivindicación 1, en donde el primer sello comprende uno ó más sellos limpiadores dispuestos en el exterior del émbolo y se acoplan en el interior del depósito.

3. La bomba de la reivindicación 1, en donde el filtro define una abertura con una dimensión, y en donde el espacio define una

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holgura promedio alrededor de un interior del depósito y un exterior del émbolo que es mayor ó igual a la dimensión de la abertura.

4. La bomba de la reivindicación 1, en donde el filtro impide que el grano más grande a una dimensión pase, y en donde el espacio define una holgura promedio alrededor de un interior del depósito y un exterior del émbolo que es mayor ó igual a la dimensión.
5. La bomba de la reivindicación 1, en donde el filtro comprende una malla enrollada con alambre dispuesta al menos parcialmente alrededor del émbolo.
6. La bomba de la reivindicación 1, en donde la primera válvula de una vía comprende una válvula cheque que tiene una bola movable con relación a un asiento.
7. La bomba de la reivindicación 1, en donde la segunda válvula de una vía comprende una válvula cheque que tiene una bola movable con relación a un asiento.

8. La bomba de la reivindicación 1, en donde en una primera carrera donde el depósito y el émbolo se mueven uno respecto del otro en una primera dirección, el volumen variable disminuye, la primera válvula de una vía se cierra, y la segunda válvula de una vía se abre.
9. La bomba de la reivindicación 8, en donde en la primera carrera, el fluido que entra al interior del émbolo desde el volumen variable por la segunda válvula de una vía limpia el granulado adyacente a una porción del filtro expuesta en el interior del émbolo.
10. La bomba de la reivindicación 1, en donde en una segunda carrera donde el depósito y el émbolo se mueven uno respecto del otro en una segunda dirección, el volumen variable se incrementa, la primera válvula de una vía se abre, y la segunda válvula de una vía se cierra.
11. La bomba de la reivindicación 1, en donde en la segunda carrera, el filtro permite el flujo del fluido desde el interior del émbolo hacia el espacio e impide que al menos algún granulado en el interior del émbolo pase afuera del émbolo y dentro del espacio.

12. La bomba de la reivindicación 1, en donde el segundo sello comprende un sello fluido formado con el fluido ubicado en el espacio entre el depósito y el émbolo.
13. La bomba de la reivindicación 1, en donde el segundo sello comprende un sello limpiador dispuesto entre el depósito y el émbolo.
14. La bomba de la reivindicación 13, en donde el sello limpiador es empujado para restringir el deslizamiento de los granos en una dirección.
15. La bomba de la reivindicación 14, en donde el sello limpiador es empujado para restringir el deslizamiento de los granos pasando el sello y por el espacio hacia el filtro.
16. Un sistema de varillas alternantes, comprende

Una bomba en la superficie que mueve alternadamente una varilla en un pozo; y

Una bomba en el fondo de un pozo dispuesta en un tubular en el pozo y accionada por la varilla, la bomba tiene

Un depósito que tiene una primera válvula de una vía que restringe el paso de fluido hacia afuera del depósito;

Un émbolo dispuesto de manera que se mueve alternadamente en el depósito y que tiene primero y segundo sellos entre el émbolo y el depósito, el émbolo tiene una segunda válvula de una vía que restringe el paso de fluido hacia afuera de un interior del émbolo y dentro de un volumen variable definido entre la primera y la segunda válvulas; y

Un filtro dispuesto sobre el émbolo entre el primero y segundo sellos y separa el interior del émbolo de un espacio entre el émbolo y el depósito, el filtro permite el paso del fluido entre el interior y el espacio y restringe el paso de los granos desde el interior hacia el espacio.

17. Un método para producir fluido en un pozo arenoso, comprende:

Sellar un émbolo dispuesto en un depósito con primero y segundo sellos;

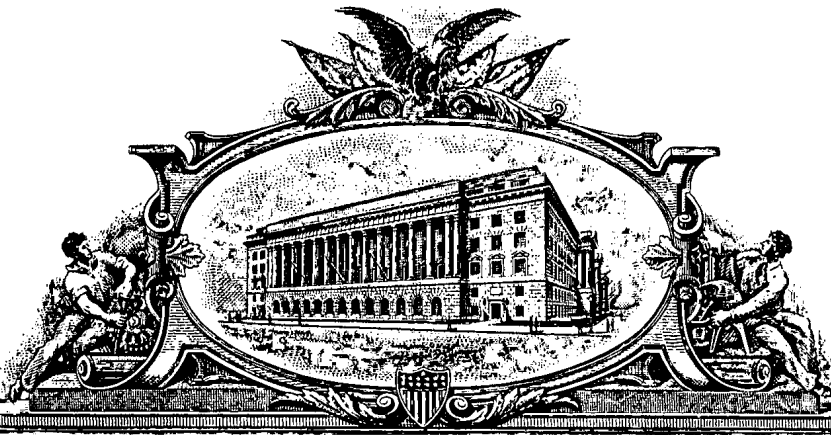
Transferir un primer volumen de fluido y partículas ó granos atrapados en un primer interior del depósito a un segundo interior del émbolo mediante mover alternadamente el émbolo con respecto al depósito en una primera dirección;

Elevar un segundo volumen de fluido y partículas atrapadas en el segundo interior del émbolo mediante mover alternadamente el émbolo con respecto al depósito en una segunda dirección;

Impedir que los granos arriba del émbolo pasen a un espacio entre el émbolo y el depósito usando un primer sello;

Permitir la comunicación fluida entre el segundo interior del émbolo y el espacio entre el primero y segundo sellos; e

Impedir que al menos algo del granulado en el segundo interior del émbolo pase por fuera del émbolo y dentro del espacio.



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TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

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July 31, 2012

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *13/206,411*

FILING DATE: *August 09, 2011*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US13/206,411*

By Authority of the

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W. Montgomery
W. MONTGOMERY
Certifying Officer

Electronic Acknowledgement Receipt	
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Title of Invention:	Reciprocating Rod Pump for Sandy Fluids
First Named Inventor/Applicant Name:	William C. Lane
Customer Number:	90116
Filer:	Sean Patrick McDermott
Filer Authorized By:	
Attorney Docket Number:	205-0282US
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	Datasheet_205-0282US.pdf	1031370	no	4
			60ef7547c7a394e2dc7427e62e57a39acdd ea9a4		
Warnings:					
Information:					
2		Application_205-0282US_filed. pdf	128199	yes	16
			b36bf513567b0f0dfb746e341d7d6f9cd21a a8dd		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	11	
	Claims		12	15	
	Abstract		16	16	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Figures_205-0282US_filed.pdf	140118	no	6
			3d2d4c6c2a7c9efb04543b480d3477cf9e9 34ab9		
Warnings:					
Information:					
4	Oath or Declaration filed	Declaration_205-0282US.pdf	1505404	no	3
			f898bd1848eba23e15ee1ec46fe1ced9f9b0 b33e		
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32474	no	2
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Warnings:					
Information:					
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Reciprocating Rod Pump for Sandy Fluids***-by-******William C. Lane*****BACKGROUND**

[0001] Many hydrocarbon wells are unable to produce at commercially viable levels without assistance in lifting the formation fluids to the earth's surface. In some instances, high fluid viscosity inhibits fluid flow to the surface. More commonly, formation pressure is inadequate to drive fluids upward in the wellbore. In the case of deeper wells, extraordinary hydrostatic head acts downwardly against the formation and inhibits the unassisted flow of production fluid to the surface.

[0002] A common approach for urging production fluids to the surface uses a mechanically actuated, positive displacement pump. Reciprocal movement of a string of sucker rods induces reciprocal movement of the pump for lifting production fluid to the surface. For example, a reciprocating rod lift system 20 of the prior art is shown in Figure 1A to produce production fluid from a wellbore 10. As is typical, surface casing 12 hangs from the surface and has a liner casing 14 hung therefrom by a liner hanger 16. Production fluid F from the formation 19 outside the cement 18 can enter the liner 14 through perforations 15. To convey the fluid, production tubing 30 extends from a wellhead 32 downhole, and a packer 36 seals the annulus between the production tubing 30 and the liner 14. At the surface, the wellhead 32 receives production fluid and diverts it to a flow line 34.

[0003] The production fluid F may not produce naturally reach the surface so operators use the reciprocating rod lift system 20 to lift the fluid F. The system 20 has a surface pumping unit 22, a rod string 24, and a downhole rod pump 50. The surface pumping unit 22 reciprocates the rod string 24, and the reciprocating string 24 operates the downhole rod pump 50. The rod pump 50 has internal components attached to the rod string 24 and has external components positioned in a pump-seating nipple 31 near the producing zone and the perforations 15.

[0004] As best shown in the detail of Figure 1B, the rod pump 50 has a barrel 60 with a plunger 80 movably disposed therein. The barrel 60 has a standing valve 70, and the

plunger 80 is attached to the rod string 24 and has a traveling valve 90. For example, the traveling valve 90 is a check valve (*i.e.*, one-way valve) having a ball 92 and seat 94. For its part, the standing 70 disposed in the barrel 60 is also a check valve having a ball 72 and seat 74.

[0005] As the surface pumping unit 22 in Figure 1A reciprocates, the rod string 24 reciprocates in the production tubing 30 and moves the plunger 80. The plunger 80 moves the traveling valve 90 in reciprocating upstrokes and downstroke. During an upstroke, the traveling valve 90 as shown in Figure 1B is closed (*i.e.*, the upper ball 92 seats on upper seat 94). Movement of the closed traveling valve 90 upward reduces the static pressure within the pump chamber 62 (the volume between the standing valve 70 and the traveling valve 90 that serves as a path of fluid transfer during the pumping operation). This, in turn, causes the standing valve 70 to unseat so that the lower ball 72 lifts off the lower seat 74. Production fluid F is then drawn upward into the chamber 62.

[0006] On the following downstroke, the standing valve 70 closes as the standing ball 72 seats upon the lower seat 74. At the same time, the traveling valve 90 opens so fluids previously residing in the chamber 62 can pass through the valve 90 and into the plunger 80. Ultimately, the produced fluid F is delivered by positive displacement of the plunger 80, out passages 61 in the barrel 60. The moved fluid then moves up the wellbore 10 through the tubing 30 as shown in Figure 1A. The upstroke and down stroke cycles are repeated, causing fluids to be lifted upward through the wellbore 10 and ultimately to the earth's surface.

[0007] The conventional rod pump 50 holds pressure during a pumping cycle by using sliding mechanical and/or hydrodynamic seals disposed between the plunger's outside diameter and the barrel's inside diameter. Sand in production fluids and during frac flowback can damage the seals. In particular, the differential pressure across the seals causes fluid to migrate past the seals. When this migrating fluid contains sand, the seals can become abraded by the sand so the seals eventually become less capable of holding pressure. Overtime, significant amounts of sand can collect between the plunger and the barrel, causing the plunger to become stuck within the barrel.

[0008] Production operations typically avoid using such a rod pump in wellbores having sandy fluids due to the damage that can result. However, rod pumping in sandy

fluids has been a goal of producers and lift equipment suppliers for some time. To prevent sand damage, screens can be disposed downhole from the pump 50 to keep sand from entering the pump 50 altogether. Yet, in some applications, using a screen in such a location may not be feasible, and the screen and the rathole below can become fouled with sand. In other application, it may actually be desirable to produce the sand to the surface instead of keeping it out of the pump 50.

[0009] One solution to deal with sandy fluids uses extra tight seals in the pump 50 to exclude the sand. In pumping operations, however, there will always be some fluid leakage due to the pressure differential so eventually the sand will wear the seal. Extra loose hydrodynamic seals with long sealing surfaces are sometimes used to let sand pass. These long, loose hydrodynamic seals can extend the life of the pump because the longer seals can accommodate more damage than conventional rod pumps. However, damage still occurs; there is just more sacrificial surface to accept the damage. Thus, the life of the pump is extended even though damage continues.

[0010] Another solution to deal with sandy fluids shown in Figure 2A uses a rod pump 50 as disclosed in U.S. Pat. No. 2,160,811. As before, the rod pump 50 has a plunger 80 disposed in a barrel 60 and has a standing valve 70 and a traveling valve 90. An upper sealing zone 84a between the plunger 80 and barrel 60 has hard metal rings 85 that engage inside the barrel 60. A lower sealing zone 84b uses the sliding cooperation between the barrel 60 and the plunger 80 to form a fluid seal. A chamber 86 is disposed between the two sealing zones 84a-b to deal with sand that may collect uphole of the plunger 80. This chamber 86 is maintained in communication with the interior 82 of the plunger 80 using circumferentially spaced ports 83.

[0011] During a downstroke of the plunger 80, the chamber 86 decreases in volume, and fluid displaces from the chamber 86 through the ports 83 and into the interior 82 of the plunger 80. Thus, any sand and silt that may have entered the chamber 86 through the upper sealing zone 84a is discharged into the plunger 80 to be removed with the main body of fluid. In this way, the sand or silt is prevented from reaching the lower sealing zone 84b and causing damage during a subsequent upstroke.

[0012] In a related solution to the rod pump 50 of Figure 2A, a sand snare chamber can be used in the rod pump. For example, the Harbison-Fischer Sand-Pro® pump

disclosed in US Pat. Nos. 7,686,598 and 7,909,589 has a plunger with a sand snare chamber defined in its walls to catch the sand. (SAND-PRO is a registered trademark of Harbison-Fischer, Inc. of Crowley, Texas.) Figure 2B shows an example of such a rod pump 50 having a sand snare chamber 100.

[0013] Again, the pump 50 has a barrel 60 with a plunger 80 located therein and has standing and traveling valves 70 and 90. The plunger 80 has a first portion 83 having a first seal 84a with the barrel 60, and the plunger 80 has a third portion 87 having a second seal 84b with the barrel 60. The first seal 84a has resilient members, while the second seal 84b is a fluid seal. An opening 81 at the top of the plunger 80 allows lifted fluid to pass up the barrel 60 and the production tubing (not shown) to be produced.

[0014] In between the first and second portions 83 and 87, the plunger 60 has a second portion 85 that forms a balancing chamber 86 between the barrel 60 and the plunger 80. The plunger's second portion 85 also has an opening 88 to allow communication between the plunger's interior 82 and the balancing chamber 86. A wall 89 is located relative to the opening 88 and forms a sand snare chamber 100 between the balancing chamber 86 and the plunger interior passage 82.

[0015] To pump fluid from a sandy well, the plunger 80 reciprocates with respect to the barrel 60. Pressure equalizes across the first seals 84a by venting pressure from inside of the plunger 82 to outside of the plunger 80 in the balancing chamber 86 between the two seals 84a-b. In the meantime, the pump 50 uses the wall 89 to capture sand from the fluid exiting the opening 88 in the sand snare chamber 100. This collection isolates the sand from the sets of seals 84a-b to reduce wear.

[0016] Unfortunately, the sand snare chamber 100 on the pump 50 has some drawbacks. For example, the volume available to collect sand can be limited. In addition, the chamber 100 can create turbulence during pumping which can tend to keep the sand flushed out of the sand snare chamber 100 and into the sealing areas 84a-b.

[0017] The subject matter of the present disclosure is directed to overcoming, or at least reducing the effects of, one or more of the problems set forth above.

SUMMARY

[0018] A downhole pump has a barrel and a plunger movably disposed therein. The barrel has a first one-way valve restricting fluid passage out of the barrel. The plunger is reciprocally disposed relative to the barrel and has first and second seals formed in a gap between the plunger and the barrel. The plunger also has a second one-way valve restricting fluid passage out of the plunger and into a variable volume defined between the first and second one-way valves.

[0019] The first seal can have wiper seals disposed on the plunger and engaging inside the barrel. The second seal is preferably a hydrodynamic seal formed by fluid in a gap between the plunger and barrel. A filter or screen is disposed on the plunger between the first and second seals, and the filter or screen restricts at least some particulate (*i.e.*, most particulate or larger particulate) inside the plunger from passing into the gap.

[0020] In a downstroke, a first volume of fluid and particulate trapped in the barrel transfers into the plunger through the traveling valve as the plunger reciprocates downhole in the barrel. In an upstroke, a second volume of fluid and particulate trapped in the plunger lifts uphole in the production tubing as the plunger reciprocates uphole in the barrel. At the same time, the first volume fills with fluid and particulate as the standing one-way valve opens and the chamber fills due to the reduced pressure produced therein.

[0021] During either stroke, the first seal prevents particulate uphole of the plunger from passing into the gap between the plunger and the barrel. The filter or screen, however, prevents (most or larger) particulate inside the plunger from passing out of the plunger with fluid flowing into the gap between the first and second seals. This primarily occurs during the upstroke when some of the fluid in the plunger is allowed to pass through the filter or screen and into the gap to maintain the hydrodynamic seal between the plunger and barrel.

[0022] The foregoing summary is not intended to summarize each potential embodiment or every aspect of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

- [0023] Fig. 1A illustrates a reciprocating rod lift system having a rod pump according to the prior art.
- [0024] Fig. 1B illustrates a detailed cross-sectional view of the rod pump of Fig. 1A.
- [0025] Fig. 2A illustrates a rod pump having a balancing chamber according to the prior art for use in a sandy well.
- [0026] Fig. 2B illustrates a rod pump having a sand snare chamber according to the prior art for use in a sandy well.
- [0027] Fig. 3 illustrates a rod pump according to the present disclosure for use in a sandy well.
- [0028] Fig. 4A illustrates the rod pump of Fig. 3 during a downstroke.
- [0029] Fig. 4B illustrates the rod pump of Fig. 3 during an upstroke.
- [0030] Fig. 5 illustrates the rod pump having another arrangement of seals.

DETAILED DESCRIPTION

[0031] A rod pump 200 in Figure 3 can be used with a reciprocating rod system, such as described previously, to lift production fluids of a well to the surface. The pump 200 can produce sand with the production fluid while preventing the sand from entering sealing areas on the pump 200. As shown, the pump 200 has a barrel 210 with a plunger 230 movably disposed therein. The components of the pump 200 are schematically shown and are composed of suitable materials, housings, couplings, and the like as known in the art. The barrel 210 disposes in production tubing 30 with a pump seating nipple 202 or other component as conventionally done, and the plunger 230 disposes for reciprocal movement with an attached rod 24 in the barrel 210.

[0032] The barrel 210 has a standing one-way valve 220 that restricts passage of fluid out of the barrel 210, and the plunger 230 has a traveling one-way valve 240 that restricts passage of fluid out of the plunger 230. Both valves 220 and 240 can be ball check valves have a ball 222 and 242 movable relative to a corresponding seat 224 and 244. Other types of one-way valves could be used, however.

[0033] The barrel 210 defines an interior 212 in which the plunger 230 is disposed, and the plunger 230 defines an interior 232 as well. The standing valve 220 permits fluid flow from the production tubing 30 to flow into the barrel's interior 212, but restricts fluid flow in the opposite direction. The traveling valve 240 permits fluid flow from the barrel's interior 212 (and especially a variable volume 214 between the valves 220 and 240) to enter the plunger's interior 232, but restricts fluid flow in the opposite direction

[0034] A gap 213 is formed between the plunger 230 and the barrel 210 and has first and second seals 250 and 260. The uphole seal 250 is a mechanical seal having pressure-balanced wiper seals or similar types of seals that dispose about the outside of the plunger 230 and engage inside the barrel 210. During operation, the wiper seals 250 keep produced sand uphole of the pump 200 from entering the gap 213 between the plunger 230 and barrel 210.

[0035] The downhole seal 260 can be any type of suitable seal. As shown in Figure 3, the downhole seal 260 is a fluid or hydrodynamic seal that uses the fluid trapped in the gap 213 to hold pressure. The outside surface of the plunger 230 (especially at the seal 260) can be hardened with a coating or the like to increase resistance to wear.

Typically, the inside surface of the barrel 210 and the outside surface of the plunger 230 have a tight clearance to create the fluid seal 260. The actual clearance can depend in part on the type of fluid to be encountered, such as heavy or light crude, expected particulate sizes, and other details of the pump 200 as discussed below. The fluid seal 260 can be a long hydrodynamic seal effective in extending the life of the pump 50.

[0036] Interposed between the seals 250 and 260, the plunger has a filter 270. Fluid can pass through openings 272 in the filter 270 into the gap 213 for pressure balance. A region 215 of the gap 213 surrounding the filter 270 defines a pressure-balancing region that allows pressure to balance across the first seal 250. This region 215 may or may not define a wider portion of the gap 213 depending on the implementation.

[0037] Although fluid can pass through, the filter 270 restricts passage of at least some of the particulates inside the plunger 230 from passing into the gap 213. (It will be appreciated that the filter 270 may not restrict passage of all particulate therethrough. Yet, the filter 270 can be configured to restrict the passage of most particulate or at least larger particulate for a given implementation.) The filter 270 can be a wire-

wrapped screen, a perforated tubular portion, a mesh screen, or any suitable type of barrier, medium, or the like for restricting passage of particulate matter, such as sand, in downhole production fluid. Preferably, the filter 270 is a slotted, wire-wrapped screen having a circumferentially wound wire 274 forming a number of slots for the openings 272. The wrapped wire 274 can be profiled V-wire and allows the slot's dimension to be precisely controlled. The narrower portion of the slotted openings 272 preferably face the interior 232 of the plunger 230 to help prevent particulate passing through the screen filter 270 from wedging in between the wires 274 as it passes out to the gap 213.

[0038] Produced fluid from the formation enters the production tubing 30 downhole of the pump 200. As the reciprocating rod system reciprocates the rod 24 attached to the plunger 230, the produced fluid is lifted above the pump 200 and is eventually produced at the surface. During a downstroke by the rod as shown in Figure 4A, for example, the standing valve 220 closes. At the same time, the traveling valve 240 opens so fluids previously residing in the variable volume chamber 214 can pass through the valve 240 and into plunger's interior 232.

[0039] Rather than screening the production fluid before it enters the barrel's chamber 214, the pump 200 allows sand to enter the barrel 210 so it can eventually be produced with the production fluid that has collect in the chamber 214. This means that produced sand collects in the lifted column of fluid above the pump 200 so the pump 200 must prevent the produced sand from entering sealing areas on the pump 200 during operation.

[0040] During the downstroke, the wiper seals 250 maintain a barrier between the uphole and downhole portions of the pump 200 and keeps produced sand above the pump 200 from entering the gap 213 between the plunger 230 and barrel 210. Head pressure is present inside the barrel 210 above and below the plunger 230, inside the plunger 230, and in the pressure-balance region outside the filter 270 below the wiper seals 250. (As is known, head pressure refers to the pressure exerted by weight of the column of fluid above a given point.) Therefore, pressure is balanced across the first seals 250 so that there is no slippage (*i.e.*, fluid does not pass between the seal 250 and the surrounding surface of the barrel 210 engaged thereby). At the same time,

pressure is also balanced across the second seal 260 in the gap 213 so that there is no slippage either.

[0041] During the upstroke by the rod 230 as shown in Figure 4B, the traveling valve 240 closes, and movement of the closed traveling valve 240 upward creates reduced pressure within the pump chamber 214. In turn, the standing valve 220 opens so production fluids and any sand downhole of the pump 200 can be drawn into the chamber 214. Head pressure is present inside the barrel 210 above the plunger 230 and in the pressure-balance region 215 outside the filter 270 below the wiper seals 250. As before, the wiper seals 250 are pressure-balanced so there is no slippage. In this way, the wiper seals 250 maintain the barrier between the uphole and downhole portions of the pump 200 and keep produced sand above the pump from entering the gap 213 between the plunger 230 and barrel 210.

[0042] During the upstroke, fluid slippage can occur in the gap 213 between the inside of the barrel 210 and the outside of the plunger 230, and fluid flows from the interior 232 of the plunger 230 to the gap 213 through the filter 270 to maintain the hydrodynamic seal 260. As a result, a pressure differential occurs, reducing the pressure in the expanding chamber 214 to draw new production fluid and sand into the barrel 210 past the standing valve 220.

[0043] As noted above, the filter 270 allows some of the lifted fluid in the plunger's interior 232 to pass through and enter the gap 213 to maintain the hydrodynamic seal 260. Yet, the filter 270 limits the size of particulate matter that can enter the hydrodynamic sealing gap 213. In this way, larger particulates cannot enter the gap 213 and abrade the surfaces, which would compromise the pumps operation. The gap 213 is preferably sized larger than the particulate matter permitted to pass through the filter 270 so that the screened matter can pass through the hydrodynamic sealing gap 213 without abrading the sealing surfaces forming the seal 260. To achieve this, the average clearance of the gap 213 is preferably equal to or greater than the width of the openings 272 (*i.e.*, slots) in the filter 270 and any particulates that the filter 270 may pass. For example, the filter 270 can be a screen having slots for the openings 272, and the slot size may be as small as 0.006-in. Thus, the difference between the barrel's ID and the plunger's OD is preferably greater than 0.012-in. This would produce a gap

213 with an average clearance of about 0.006-in. around the inside of the barrel 210 and the outside of the plunger 230. Particulates larger than 0.006-in. that could cause damage if they were to pass in the gap 213 are instead restricted by the filter 270. Meanwhile, fluid flow for pressure balancing and any smaller particulates (*i.e.*, less than 0.006-in.) can still pass through the openings 272 in the filter 270 and into the gap 213.

[0044] The upstroke and down stroke cycles of Figures 4A-4B are repeated, causing fluids to be lifted upward through the production tubing 30 and ultimately to the earth's surface. Flow through the pump 200 continuously washes the interior surface of the filter 270, which can keep it from fouling. With this arrangement, sandy fluids produced from the formation will produce less wear on the sealing surfaces. Being able to lift the sand with the production fluids means that any produced sand below the pump 200 will not foul a downhole screen or fill up the rathole.

[0045] As noted previously, the filter 270 installs at the pressure-balancing region of the plunger 230. The pump 200 can be constructed with the filter 270 integrally formed as part of the plunger 230, or a separate screen assembly can be installed as an add-on above a standard barrel 210 and plunger 230. The filter 270 can be an insert assembly that couples upper and lower sections of the plunger 230 together, or the filter 270 can be a plug-type insert that screws onto the plunger 230. The pump 200 can extend the life of a reciprocating rod lift system, reduce well maintenance costs, and increase overall production of an oil and gas well.

[0046] Figure 5 illustrates the rod pump 50 having another arrangement of seals. (The same reference numerals are used for similar components to the previous embodiments.) Rather than having a downhole seal that is a hydrodynamic or fluid seal as in the previous arrangement of Figure 3, this pump 50 in Figure 5 has a second seal 255 that is a mechanical seal having wiper seals. To deal with sand or the like, the wiper seals 255 are biased to restrict particulate slippage in one direction. For example, the wiper seals 255 are biased to restrict particulate slippage past the seal 255 and through the gap 213 towards the filter 270.

[0047] In another alternative, the rod pump 50 can have uphole and downhole seals that are both hydrodynamic seals (*i.e.*, similar to seal 260 in Fig. 3). In yet another alternative, the rod pump 50 can have an opposite arrangement of seals than that

shown in Figure 3. In other words, the uphole seal can be a hydrodynamic seal (*i.e.*, like seal 260 in Fig. 3), while the downhole seal can be a mechanical seal (*i.e.*, like wiper seal 250 in Fig. 3). Although these alternatives are not illustrated, one skilled in the art will appreciate that features from one or more embodiments disclosed herein can be combined with features of one or more other embodiments disclosed herein.

[0048] The foregoing description of preferred and other embodiments is not intended to limit or restrict the scope or applicability of the inventive concepts conceived of by the Applicants. In exchange for disclosing the inventive concepts contained herein, the Applicants desire all patent rights afforded by the appended claims. Therefore, it is intended that the appended claims include all modifications and alterations to the full extent that they come within the scope of the following claims or the equivalents thereof.

WHAT IS CLAIMED IS:

1. A downhole pump, comprising
a barrel having a first one-way valve restricting fluid passage out of the barrel;
a plunger reciprocally disposed in the barrel and having first and second seals
with the plunger and the barrel, the plunger having a second one-way
valve restricting fluid passage out of an interior of the plunger and into a
variable volume defined between the first and second one-way valves;
and
a filter disposed on the plunger between the first and second seals and
separating the interior of the plunger from a gap between the plunger and
the barrel, the filter permitting fluid passage between the interior and the
gap and restricting particulate in the interior from passing into the gap.
2. The pump of claim 1, wherein the first seal comprises one or more wiper seals
disposed outside the plunger and engaging inside the barrel.
3. The pump of claim 1, wherein the filter defines an opening with a dimension, and
wherein the gap defines an average clearance around an inside of the barrel and an
outside of the plunger that is greater than or equal to the dimension of the opening.
4. The pump of claim 1, wherein the filter prevents particulate greater than a
dimension from passing therethrough, and wherein the gap defines an average
clearance around an inside of the barrel and an outside of the plunger that is greater
than or equal to the dimension.
5. The pump of claim 1, wherein the filter comprises a wire-wrapped screen at least
partially disposed about the plunger.
6. The pump of claim 1, wherein the first one-way valve comprises a check valve
having a ball movable relative to a seat.

7. The pump of claim 1, wherein the second one-way valve comprises a check valve having a ball movable relative to a seat.
8. The pump of claim 1, wherein in a first stroke moving the barrel and the plunger relative to one another in a first direction, the variable volume decreases, the first one-way valve closes, and the second one-way valve opens.
9. The pump of claim 8, wherein in the first stroke, fluid entering the interior of the plunger from the variable volume through the second one-way valve clears particulate adjacent a portion of the filter exposed to the interior of the plunger.
10. The pump of claim 1, wherein in a second stroke moving the barrel and the plunger relative to one another in a second direction, the variable volume increases, the first one-way valve opens, and the second one-way valve closes.
11. The pump of claim 10, wherein in the second stroke, the filter permits fluid flow from the interior of the plunger to the gap and prevents at least some particulate in the interior of the plunger from passing out of the plunger and into the gap.
12. The pump of claim 1, wherein the second seal comprises a fluid seal formed with fluid disposed in the gap between the barrel and the plunger.
13. The pump of claim 1, wherein the second seal comprises a wiper seal disposed between the barrel and the plunger.
14. The pump of claim 13, wherein the wiper seal is biased to restrict particulate slippage in one direction.
15. The pump of claim 14, wherein the wiper seal is biased to restrict particulate slippage past the seal and through the gap towards the filter.

16. A reciprocating rod system, comprising:
- a surface pump reciprocating a rod in a well; and
 - a downhole pump disposed in a tubular in the well and actuated by the rod, the pump having—
 - a barrel having a first one-way valve restricting fluid passage out of the barrel;
 - a plunger reciprocally disposed in the barrel and having first and second seals with the plunger and the barrel, the plunger having a second one-way valve restricting fluid passage out of an interior of the plunger and into a variable volume defined between the first and second one-way valves; and
 - a filter disposed on the plunger between the first and second seals and separating the interior of the plunger from a gap between the plunger and the barrel, the filter permitting fluid passage between the interior and the gap and restricting particulate in the interior from passing into the gap.

17. A method of producing fluid in a sandy well, comprising:
- sealing a plunger disposed in a barrel with first and second seals;
 - transferring a first volume of fluid and particulate trapped in a first interior of the barrel into a second interior of the plunger by reciprocating the plunger and the barrel relative to one another in a first direction;
 - lifting uphole a second volume of fluid and particulate trapped in the second interior of the plunger by reciprocating the plunger and the barrel relative to one another in a second direction;
 - preventing particulate uphole of the plunger from passing in a gap between the plunger and the barrel using the first seal;
 - permitting fluid communication between the second interior of the plunger and the gap between the first and second seals; and
 - preventing at least some particulate in the second interior of the plunger from passing out of the plunger and into the gap.

ABSTRACT

A downhole pump has a barrel and a plunger movably disposed therein. The gap between the barrel and plunger has first and second seals. The barrel and plunger each have a one-way valve restricting fluid passage out of it. A filter or screen is disposed on the plunger between the first and second seals. In a downstroke, fluid and particulate in the barrel transfers into the plunger. In an upstroke, fluid and particulate in the plunger lifts uphole. At the same time, a volume in the barrel fills with fluid and particulate. During either stroke, the first seal prevents particulate uphole of the plunger from passing into the gap. The filter or screen, however, prevents at least some particulate (*i.e.*, most or larger particulate) inside the plunger from passing out of the plunger with fluid flowing into the gap between the first and second seals.

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

This declaration is of the following type:

- ☒ original
- ☐ divisional
- ☐ continuation
- ☐ continuation-in-part

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Reciprocating Rod Pump for Sandy Fluids

SPECIFICATION IDENTIFICATION

The specification of which:

- ☒ is filed herewith
- ☐ was filed on _____, under Serial No. _____, executed on even date herewith; or
- ☐ Express Mail No.(as Serial No. not yet known) and was amended on _____ (if applicable)
- ☐ was described and claimed in PCT International Application No. _____ filed on _____ and as amended under PCT Article 19 on _____.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56, and which is material to the examination of this application; namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent.

- ☒ In compliance with this duty there is attached an Information Disclosure Statement in accordance with 37 CFR §1.98.

WCC

PRIORITY CLAIM (35 U.S.C. §119)

I hereby claim foreign priority benefits under Title 35, United States Code, §119, of any provisional or foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below, and have also identified below any provisional or foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

- ☒ No such applications have been filed.
- ☐ Such applications have been filed as follows:

A. Prior foreign/PCT application(s) filed within 12 mos. (6 mos. for design) prior to this application, and any priority claims under 35 USC §119

<u>Country/PCT</u>	<u>Application Number</u>	<u>Date Filed</u>	<u>Priority Claimed</u>
			☐ Yes ☐ No
			☐ Yes ☐ No

B. All foreign application(s), if any, filed more than 12 mos. (6 mos. for design) prior to this U.S. application

<u>Country/PCT</u>	<u>Application Number</u>	<u>Filing Date</u>
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C. U.S. Provisional Application filed within 12 months prior to this application

<u>Serial Number</u>	<u>Filing Date</u>
----------------------	--------------------

PRIORITY CLAIM (35 USC §120)

I hereby claim the benefit under Title 35, United States Code, §120, of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information that is material to the examination of this application (namely, information where there is substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

- ☒ No such applications have been filed.
- ☐ Such applications have been filed, as follows:

<u>Serial Number</u>	<u>Filing Date</u>	<u>Patented</u>	<u>Pending</u>	<u>Abandoned</u>
		☐	☐	☐
		☐	☐	☐

WU

POWER OF ATTORNEY

I hereby appoint:

Practitioners associated with Customer Number 90116;

as attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

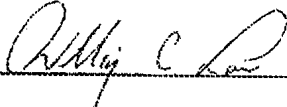
Please send correspondence and direct telephone calls to:

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Attn: Sean McDermott, Reg. No. 49,000
WONG, CABELLO, LUTSCH, RUTHERFORD & BRUCCULERI, LLP
20333 State Highway 249, Suite 600
Houston, TX 77070
Telephone: 832/446-2400
Facsimile: 832/446-2424

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Sec. 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full name of sole inventor: William C. Lane

Inventor's signature: 

Date: Aug 9, 2011

Residence: 78 Meadowridge Place
The Woodlands, Texas 77381

Post Office Address: Same as above Country of Citizenship: U.S.

(Declaration ends with this page)

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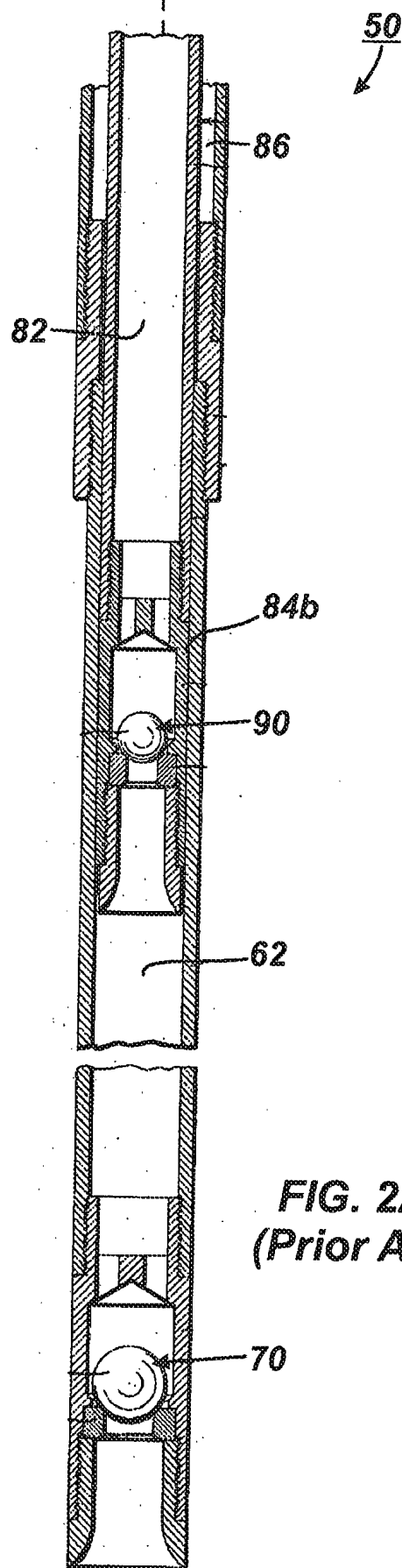
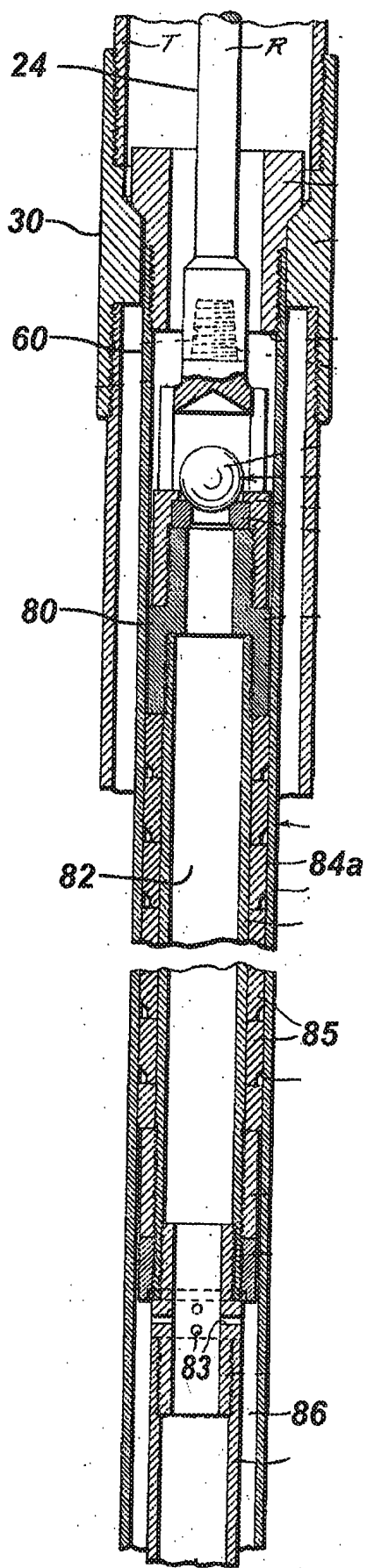


FIG. 2A
(Prior Art)

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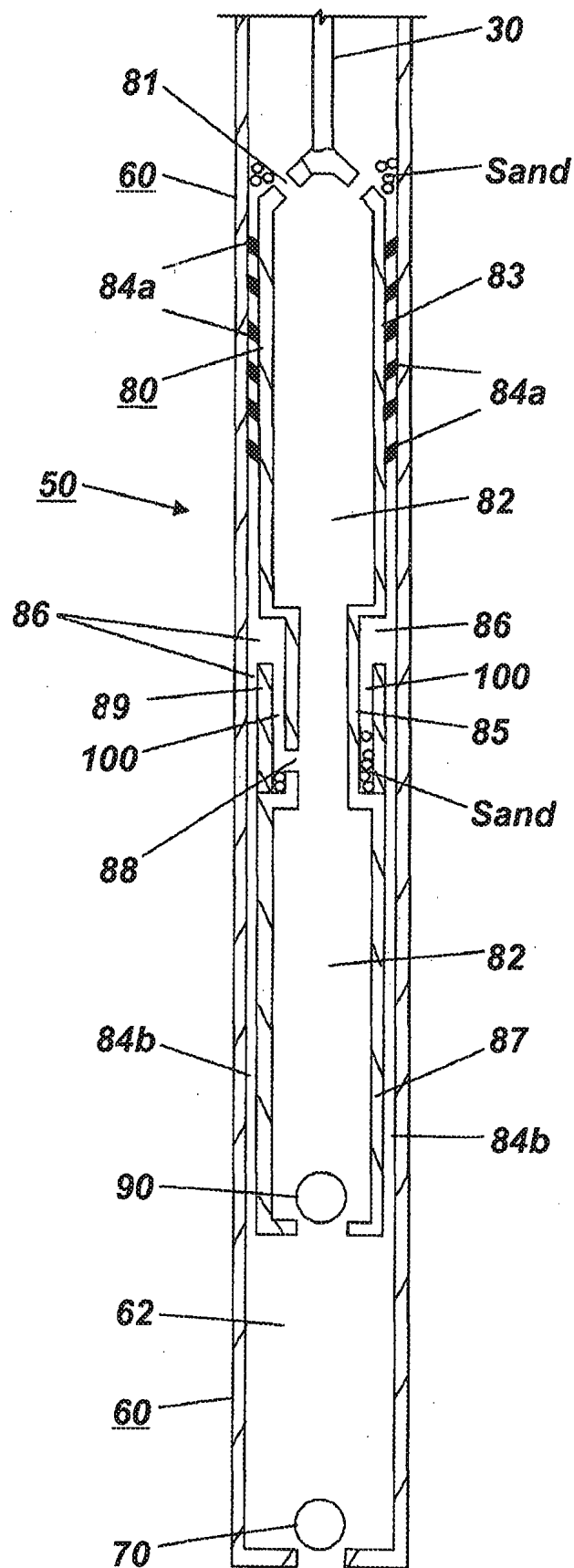


FIG. 2B
(Prior Art)

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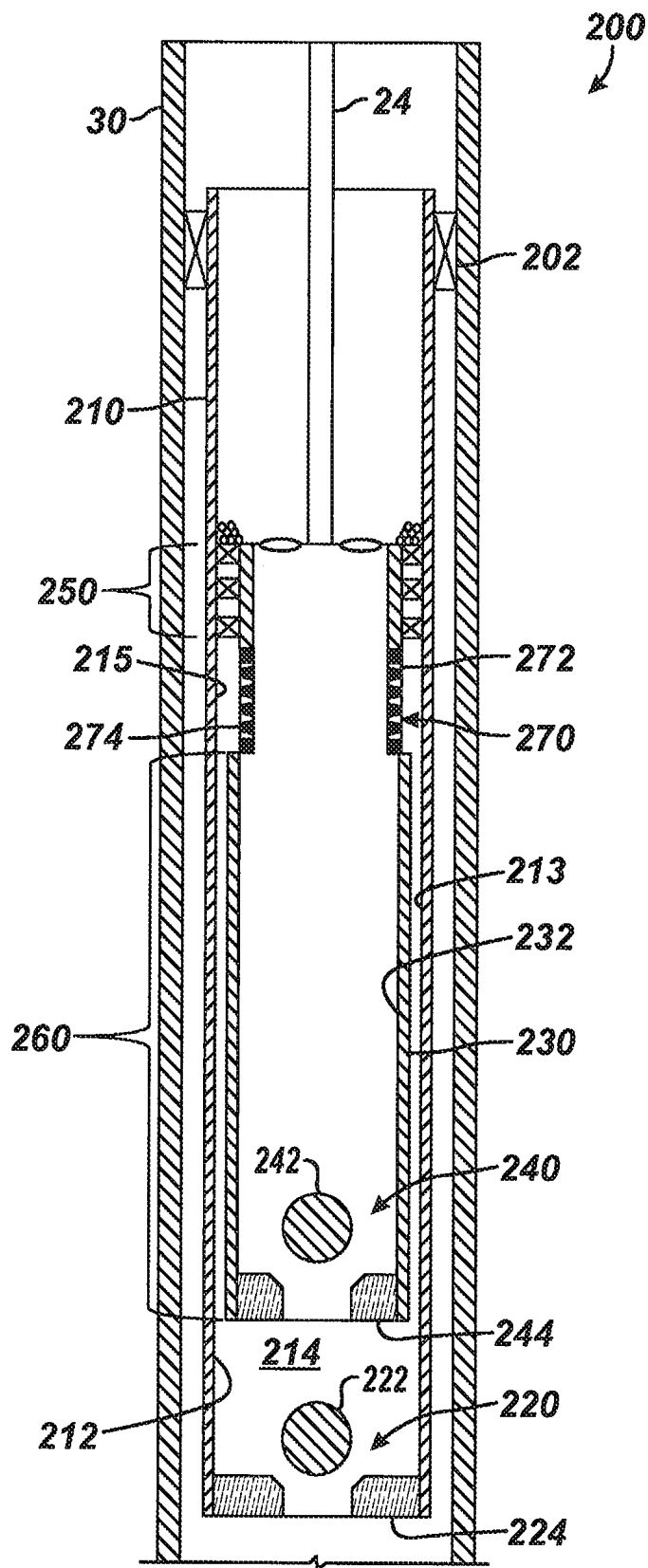


FIG. 3

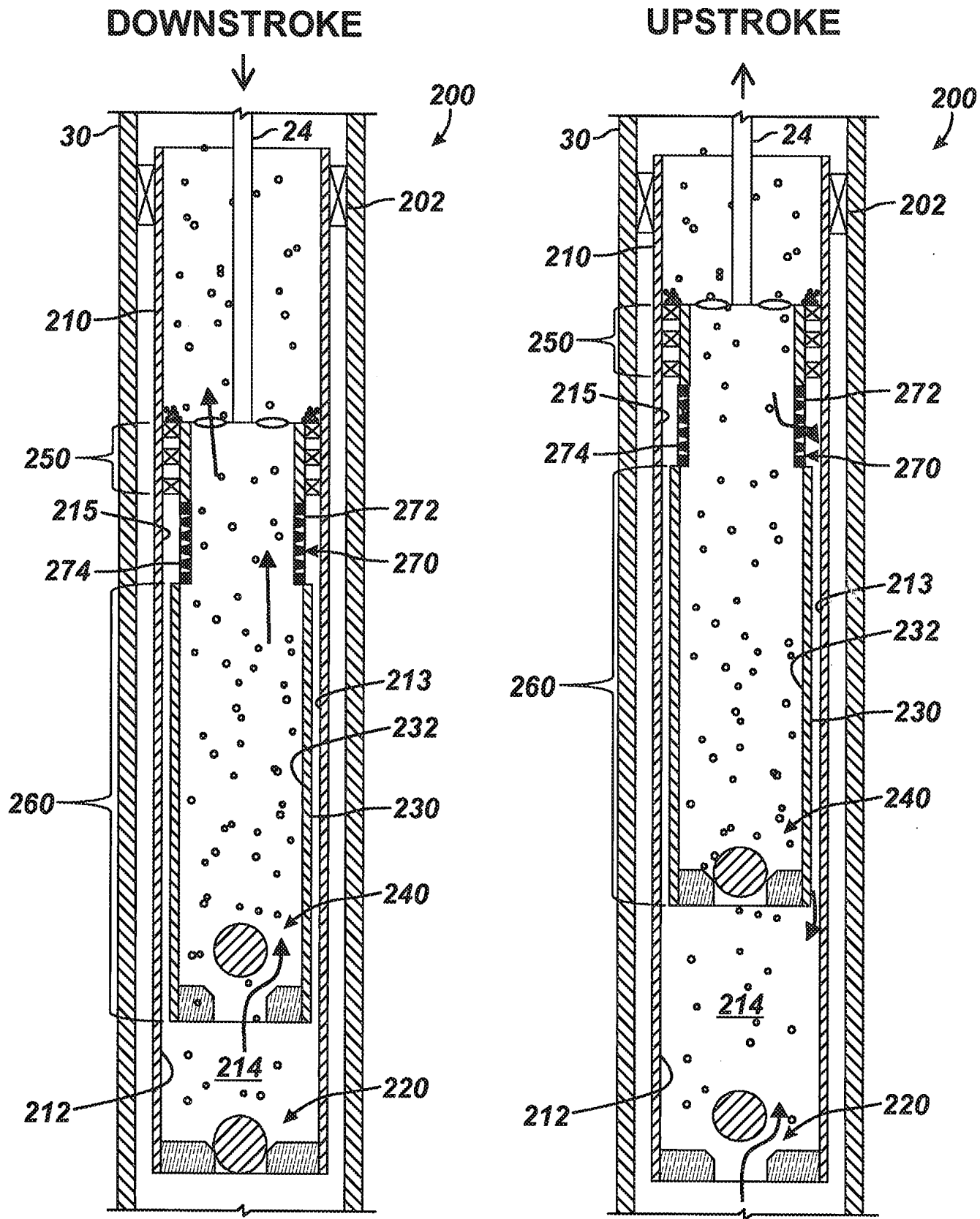


FIG. 4A

FIG. 4B

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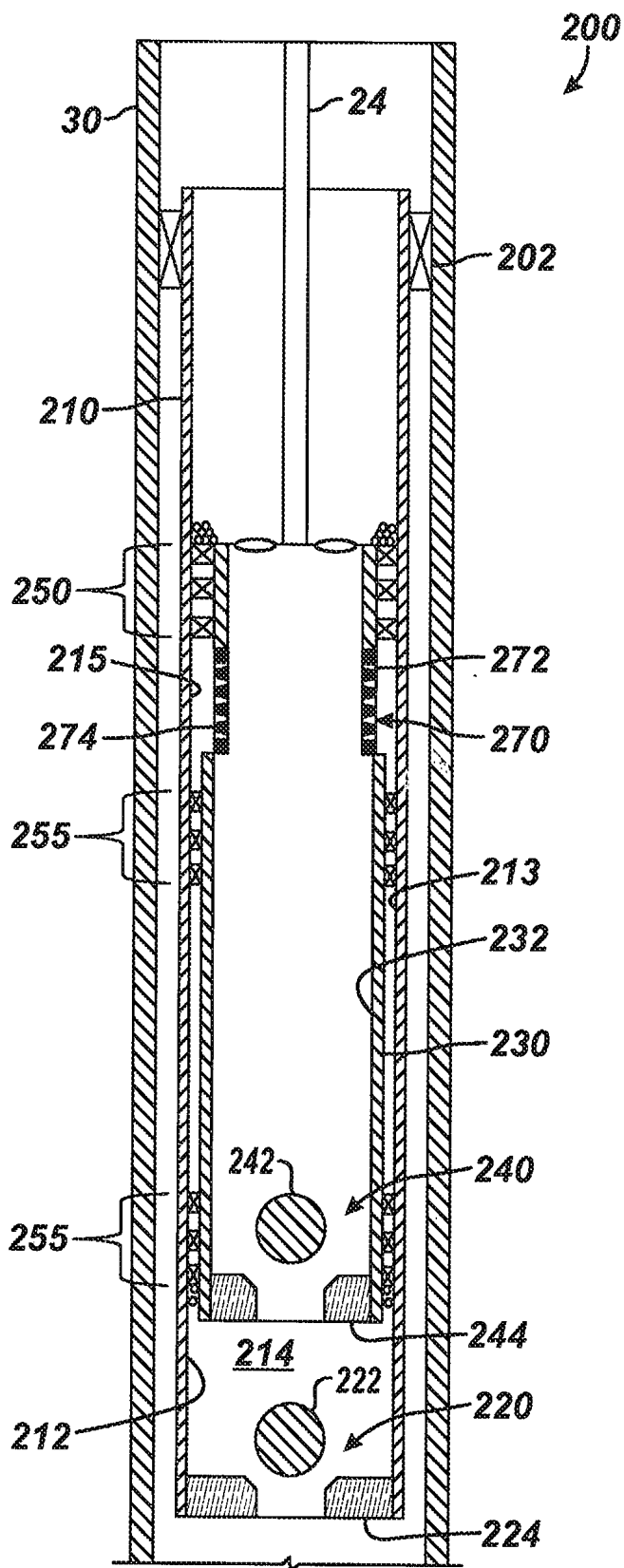


FIG. 5

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	205-0282US
		Application Number	
Title of Invention	Reciprocating Rod Pump for Sandy Fluids		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Applicant Information:

Applicant 1					Remove		
Applicant Authority		☒ Inventor		☐ Legal Representative under 35 U.S.C. 117		☐ Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name		Family Name		Suffix	
	William	C.		Lane			
Residence Information (Select One)		☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	The Woodlands	State/Province	TX	Country of Residence i		US	
Citizenship under 37 CFR 1.41(b) i		US					
Mailing Address of Applicant:							
Address 1		78 Meadowridge Place					
Address 2							
City	The Woodlands			State/Province	TX		
Postal Code	77381		Countryi	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.							
Add							

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	90116		
Email Address	WCPatent@counselip.com		Add Email Remove Email

Application Information:

Title of the Invention	Reciprocating Rod Pump for Sandy Fluids		
Attorney Docket Number	205-0282US	Small Entity Status Claimed ☐	
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	3

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	205-0282US
		Application Number	
Title of Invention	Reciprocating Rod Pump for Sandy Fluids		

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	90116		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

			Remove
Application Number	Country i	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			☒ Yes ☐ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1	Remove
------------	-------------------

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	205-0282US
		Application Number	
Title of Invention	Reciprocating Rod Pump for Sandy Fluids		

If the Assignee is an Organization check here. ☒			
Organization Name	Weatherford/Lamb, Inc.		
Mailing Address Information:			
Address 1	515 Post Oak Blvd, Ste 600		
Address 2			
City	Houston	State/Province	TX
Country ⁱ	US	Postal Code	77027
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the Add button. Add			

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/Sean McDermott/		Date (YYYY-MM-DD)	2011-08-09	
First Name	Sean	Last Name	McDermott	Registration Number	49000

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.