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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 06-109581- -00003-0000

Fecha: 2008-05-14 14:08:10 Dep. 2020 NULCREACIONE
Ira. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 538 PETICION Folios: 2

Re.: Expediente No. 06 109.581
Fase Nacional Solicitud de Patente PCT
a nombre de
SCHLUMBERGER TECHNOLOGY B.V.
Código 011 – 378 - 538

En relación con la solicitud contenida en el Expediente de la referencia y, en particular, con la publicación del extracto de la misma en la Gaceta de la Propiedad Industrial No. 583 de 18 de Diciembre de 2007, por medio del presente escrito muy respetuosamente me permito solicitarle se sirva proceder a efectuar el **EXAMEN DE PATENTABILIDAD** de la solicitud aquí contenida.

Para tal efecto, acompaño el comprobante de pago por concepto de la tasa respectiva, Recibo No. 38,146

De Usted Atentamente,

GERMAN CASTILLO GRAU
T.P. No. 2.978 del C.S.J.

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47

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 890176089-2

RECIBO OFICIAL DE CAJA : 08 - 38,146
FECHA : MAYO 14 DE 2008

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 06-109581- -00003-0000

Fecha: 2008-05-14 14:08:10 Dep. 2020 NUECREACION
Tra. 11 PATENTICION Lve. 378 FASENACIONAL
Act. 538 PETICION Folios: 2

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PAGO	Vr. PAGO
CASTILLO GRAU Y ASOCIADOS	CONSIGNACION	BANCO DE BOGOTA	062754387	2544577	13/05/2008	154,000.00
CASTILLO GRAU Y ASOCIADOS	CONSIGNACION	BANCO DE BOGOTA	062754387	2546117	13/05/2008	5,460,000.00

***** CONCEPTO *****

CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1	50005-01-01 SOLICITUDES	85 EXAMEN DE PATENTABILIDAD DE INVEN	420,000.00
TOTAL :			\$ 420,000.00

SO CUATROCIENTOS VEINTE MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No. _____

48

DIVISIÓN DE NUEVAS CREACIONES

RADICACIÓN EXPEDIENTE No. 06-109581

EL EXTRACTO DE LA PRESENTE SOLICITUD DE **PATENTE DE INVENCION**

FUE PUBLICADO EN LA GACETA DE PROPIEDAD INDUSTRIAL No **583** DE

FECHA **18 DE DICIEMBRE DE 2007** EL TÉRMINO HÁBIL SEÑALADO POR LA

LEY EXPIRA EL **14 DE MARZO DE 2008**

NOTA: Dentro del plazo de los seis (6) meses siguientes a partir de la fecha de publicación en la gaceta de Propiedad Industrial, deberá solicitar y cancelar el examen de patentabilidad so pena de que la solicitud caiga en abandono, de acuerdo con lo establecido en el Artículo 44 de la Decisión 486/2000.

SE PRESENTARON OPOSICIONES POR PARTE DE TERCEROS.

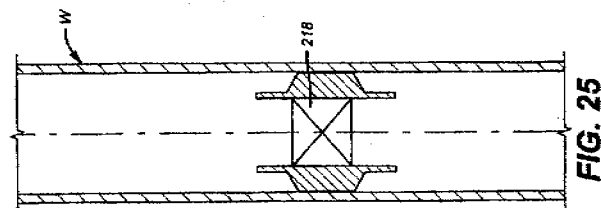
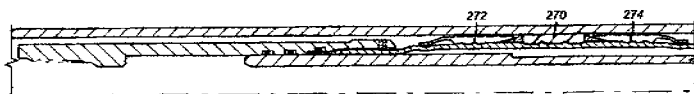
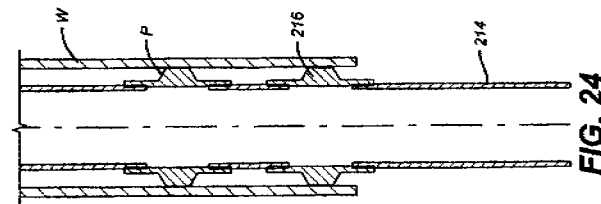
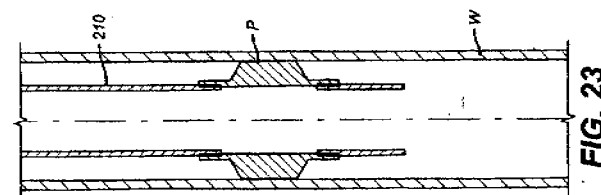
SI _____ NO X



US 2003/0141079 A1

(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: **US 2003/0141079 A1**Doane et al. (43) Pub. Date: **Jul. 31, 2003**(54) **EXPANDABLE PACKER WITH ANCHORING FEATURE****Publication Classification**(51) Int. Cl.⁷ **E21B 33/12**
(52) U.S. Cl. **166/387; 166/134**(76) Inventors: **James C. Doane**, Friendswood, TX
(US); **Jason M. Harper**, Houston, TX
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Richard T. Redano
Duane Morris LLP
Suite 500
One Greenway Plaza
Houston, TX 77046 (US)(21) Appl. No.: **10/301,229**(22) Filed: **Nov. 21, 2002****Related U.S. Application Data**(63) Continuation-in-part of application No. 10/117,521,
filed on Apr. 5, 2002.(60) Provisional application No. 60/344,314, filed on Dec.
20, 2001.(57) **ABSTRACT**

An expandable packer or anchor is disclosed. It features a gripping device integral to or mounted in a sleeve over the mandrel and mating undulating surfaces to help maintain grip under changing load conditions. Upon expansion, pressure on a sealing element is enhanced by nodes to increase internal pressure as it engages an outer tubular. Adjacent retaining rings limit extrusion and enhance grip. A gripping device, such as wicks on slips, preferably digs into the outer tubular. The expansion is preferably by pressure and can incorporate pressure intensifiers delivered by slick line or wire line. Release is accomplished by a release tool, which is delivered on slick line or wire line. It stretches the anchor or packer longitudinally, getting it to retract radially, for release. The release tool can be combined with packers or anchors that have a thin walled feature in the mandrel, to release by pulling the mandrel apart.

**FIG. 25****FIG. 24****FIG. 23**

b7d

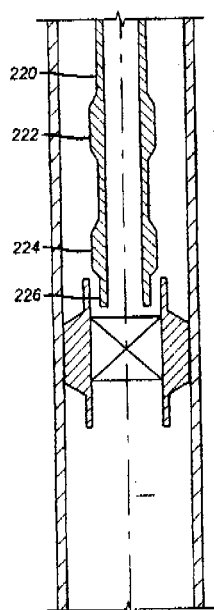


FIG. 26

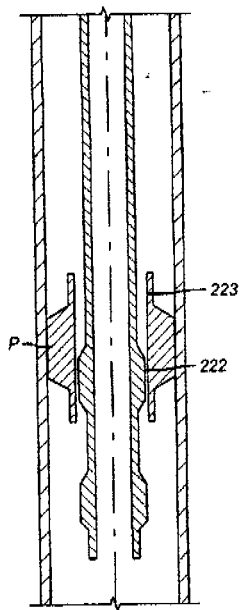


FIG. 27

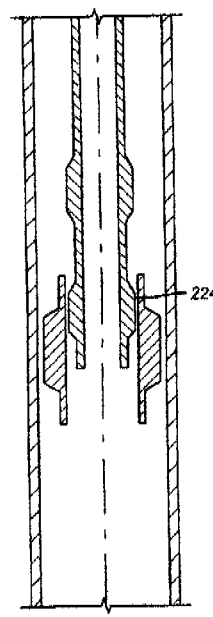


FIG. 28

EXPANDABLE PACKER WITH ANCHORING FEATURE

PRIORITY INFORMATION

[0001] This application is a continuation-in-part of prior U.S. application Ser. No. 10/117,521, filed on Apr. 5, 2002, which claims the benefit of U.S. Provisional Application No. 60/344,314 filed on Dec. 20, 2001.

FIELD OF THE INVENTION

[0002] The field of this invention relates to packers and more particularly to packers that can be set by expansion and more particularly incorporating an anchoring feature to engage the surrounding tubular upon physical expansion of the packer.

BACKGROUND OF THE INVENTION

[0003] Traditional packers comprised of a sealing element having anti-extrusion rings on both upper and lower ends and a series of slips above or below the sealing element. Typically a setting tool would be run with the packer to set it. The setting could be accomplished hydraulically due to relative movement created by the setting tool when subjected to applied pressure. This relative movement would cause the slips to ride up cones and extend into the surrounding tubular. At the same time, the sealing element would be compressed into sealing contact with the surrounding tubular. The set could be held by a body lock ring, which would prevent reversal of the relative movement, which caused the packer to set in the first instance.

[0004] As an alternative to pressure through the tubing to the setting tool to cause the packer to set, another alternative was to run the packer in on wire line with a known electrically operated setting tool such as an E-4 made by Baker Oil Tools. In this application, a signal fires the E-4 causing the requisite relative movement for setting the packer. Some of these designs were retrievable. A retrieving tool could be run into the set packer and release the grip of the lock ring so as to allow a stretching out of the slips back down their respective cones and for the sealing element to expand longitudinally while contracting radially so that the packer could be removed from the well.

[0005] In the past, sealing has been suggested between an inner and an outer tubular with a seal material in between. That technique, illustrated in U.S. Pat. No. 6,098,717, required the outer tubular or casing to be expanded elastically and the inner tubular to be expanded plastically. The sealing force arose from the elastic recovery of the casing being greater than the elastic recovery of the inner tubular, thus putting a net compressive force on the inner tubular and the seal. Other expansion techniques, described in U.S. Pat. Nos. 5,348,095; 5,366,012; and 5,667,011 simply related to expansion of slotted tubulars, serving as a liner in open hole, as a completion technique. U.S. Pat. No. 4,069,573 illustrates the use of expansion to form a tubular casing patch.

[0006] The present invention relates to construction features and methods of employing packers that can be expanded into sealing position. The surrounding tubular does not need to be expanded to set the packer of the present invention. Rather, an anchor such as slips is used to support the expanded sealing element and hold it in a set position.

Preferably, existing setting tools, with minor modifications can be used to expand the packer of the present invention. Similarly releasing tools can be employed to remove the packer from its set position. The running string can be exposed to lower pressures than the packer through the use of pressure intensifiers. The expansion force can be pinpointed to the area of the packer, thus avoiding subjecting the formation or the running string to undue pressures during setting of the packer. Alternatively, the inner tubular may simply be an anchor for another tool or a liner string. The anchoring can be ridges on the exterior of the inner tubing directly or on a ring mounted over the inner tubular being expanded. The ring can be slotted to reduce the required expansion force. The slips are retained to the mandrel by undulating mating surfaces. The grip area is enlarged to reduce stress on the tubular. Features are included to help hold the set on shifting load conditions and to augment the applied force on the sealing element. A variety of potential applications are illustrated.

[0007] The setting tool can be delivered through tubing on slick line or wire line or run into the well on rigid or coiled tubing or wire line, among other techniques. The release tool can be likewise delivered and when actuated, stretches the packer or anchor out so that it can be removed from the wellbore. Conventional packers, that have their set held by lock rings, can be released with the present invention, by literally pushing the body apart as opposed to cutting it downhole as illustrated in U.S. Pat. No. 5,720,343.

[0008] These and other advantages of the present invention will be more readily understood from a review of the description of the preferred embodiment, which appears below.

SUMMARY OF THE INVENTION

[0009] An expandable packer or anchor is disclosed. It features a gripping device integral to or mounted in a sleeve over the mandrel and mating undulating surfaces to help maintain grip under changing load conditions. Upon expansion, pressure on a sealing element is enhanced by nodes to increase internal pressure as it engages an outer tubular. Adjacent retaining rings limit extrusion and enhance grip. A gripping device, such as wickers on slips, preferably digs into the outer tubular. The expansion is preferably by pressure and can incorporate pressure intensifiers delivered by slick line or wire line. Release is accomplished by a release tool, which is delivered on slick line or wire line. It stretches the anchor or packer longitudinally, getting it to retract radially, for release. The release tool can be combined with packers or anchors that have a thin walled feature in the mandrel, to release by pulling the mandrel apart.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a section through the packer of the present invention in the run in position;

[0011] FIG. 2 is the view of FIG. 1 with the packer in the set position;

[0012] FIG. 3 is an outside view of the packer showing the slips on a ring with recesses;

[0013] FIGS. 4a-4d show the packer schematically prior to expansion using a pressure intensifier;

[0014] FIGS. 5a-5d show the packer of FIGS. 4a-4d in the set position with the through tubing pressure intensifier removed;

[0015] FIGS. 6a-6b show schematically how force is to be applied to release the packer;

[0016] FIGS. 7a-7b show the released position of the packer after applying the forces shown in FIGS. 6a-6b;

[0017] FIGS. 8a-8b show one version of a release tool for the packer where the release tool is tubing delivered to latch to the top of the packer;

[0018] FIGS. 9a-9b show a through tubing release tool, which can be delivered on wire line or slick line;

[0019] FIGS. 10a-10d show a packer with a mandrel having a thin wall segment with a release tool inserted through tubing and the packer in the set position;

[0020] FIGS. 11a-11d show the packer of FIGS. 10a-10d in the released position.

[0021] FIGS. 12a-12e show the packer run in with a wire line or hydraulic setting tool in the run in position;

[0022] FIGS. 13a-13e show the packer of FIGS. 12a-12e in the set position with the setting tool released;

[0023] FIG. 14 is a section view during run in of a preferred embodiment showing the nodes under the sealing element and the undulating surface contact for the slips;

[0024] FIG. 15 is the view of FIG. 14 in the expanded and set position;

[0025] FIG. 16 is a variation of the packer shown in the set position in FIG. 15 showing a line or conductor through its body;

[0026] FIG. 17 is a section view of a prior art packer in the run in position showing the relatively short slip length involved, which leads to a greater stress on the surrounding tubular;

[0027] FIG. 18 is the packer in FIG. 17 in the set position;

[0028] FIG. 19 is a section view in the set position of the packer of the present invention showing the longer slip lengths leading to a reduced stress on the surrounding tubular;

[0029] FIG. 20 shows the use of the packer of the present invention when drilling out a plug;

[0030] FIG. 21 is the view of FIG. 20 after the plug is drilled out;

[0031] FIG. 22 is the view of FIG. 21 after the bit is released;

[0032] FIG. 23 is the view of FIG. 22 with the packer expanded to the set position;

[0033] FIG. 24 is a section view of an application of the packer of the present invention to a liner top isolation packer next to a liner hanger;

[0034] FIG. 25 shows a set packer having an interior plug;

[0035] FIG. 26 is the view of FIG. 25 showing running in with a string with a seal, a retrieving tool and a slicker bar;

[0036] FIG. 27 shows the plug being knocked out and the seals landed in the packer;

[0037] FIG. 28 shows the retrieving tool releasing the packer by stretching it;

[0038] FIGS. 29a-b are a section view of a one-trip packer with pressure intensifier in the run in position;

[0039] FIGS. 30a-30b are the packer of FIGS. 29a-29b in the set position;

[0040] FIGS. 31a-31b are the packer of FIGS. 30a-30b shown in the ball released position;

[0041] FIG. 32 shows a latching groove for a slick line plug used as an alternative in setting the packer;

[0042] FIG. 33a-33e is an alternative embodiment showing an internal recess on the slips against a cylindrical expansion mandrel, in the run in position;

[0043] FIGS. 34a-34e are the view of FIGS. 33a-33e in the set position; and

[0044] FIGS. 35a-35f are the view FIGS. 34a-34e in the ball release position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0045] Referring to FIG. 1, the packer 10 has a mandrel 10 with an upper thread 12 and a lower thread 14. Upper slip ring 16 attaches at thread 12 and has extending slips 18. As shown in FIG. 3, slips 18 are fingers of preferably metal separated by slots 34. One purpose of the slots 34 is to decrease resistance to expansion. Another is to allow the wickers 32 to be hardened. If the slips were to be continuous and have hardened wickers 32, the brittleness would cause the slips to crack on expansion. Lower slip ring 20 attaches at thread 14 and has finger like slips 22 extending from it. Slips 18 and 22 each have wickers or some other surface sharpness 32 designed to dig in for a supporting bite into the casing C upon expansion of the mandrel 10. A sealing element 24 having backup rings 26 and 28 is disposed between slips 18 and 22. Those skilled in the art will appreciate that the slips 18 and 22 can be formed as an integral part of the mandrel, thus eliminating the threads 12 and 14 as well as the rings 16 and 20. In that event, the slips 18 and 22 can be a series of finger shaped protrusions from the outer surface of the mandrel 10. These protrusions can be integral, welded, or attached in some other way. Although a packer has been described, the sealing element 24 can be eliminated and the slips 18 and 22, regardless of how they are attached, can be used to anchor a tubing string (not shown) or a tool (not shown) attached to the mandrel 10, when the wickers 32 dig into the surrounding casing C. Conceivably, the expansion of the wickers 32 into the casing or outer tubular C can accomplish not only a support function but also a sealing function. Sealing is possible without having to appreciably expand the casing C or even without expanding the casing C at all. The invention can be effective with a single or multiple rings of slips, regardless of their attachment mode, and with a variety of known designs for the sealing element 24.

[0046] The clear advantage of the present invention is that cones are not required to drive the slips outwardly. This means that for a given outside diameter for run in, the packer

or anchor P of FIG. 1 will have a larger internal bore diameter than a design relying on cones to ramp slips out. The larger bore possible in the mandrel 10 comes with no significant reduction of the pressure rating of the packer P.

[0047] The packers 30 and 32 are preferably hardened to facilitate penetration into the casing. The sealing element 24 is preferably Nibsite but can also be made from other materials such as Teflon or PEKK. The backstop rings 26 and 28 are preferably flexible steel and serve the function of keeping the sealing element 24 out of the slots 34 between the slips 18 and 22. Rather than slots 34 to facilitate expansion of the slips 18 and 22, the sleeve that holds the slips can be made thinner or have other openings such as holes to reduce its resistance to expansion. The expansion itself can be carried out with known expansion tools such as roller expanders, swages, or cones. Alternatively an inflatable can be used to expand the mandrel 10 or a pressure technique, as illustrated in 4a-4d, 5a-5d, 12a-12c, and 13a-13c.

[0048] FIGS. 4a-4d illustrate a wire-tubing approach to setting where either a slick line or a wire line can be used to deliver a pressure intensifier 36 to a desired position where it will latch in the tubing 37 adjacent the packer or anchor P. The packer or anchor P is illustrated schematically as the connection at the top of the intensifier 36. Pressure applied into tubing 37 causes ports 39 and 40. Pistons 42, 44, and 46 are connected together for tandem movement. Pressure from ports 39 and 40 enters cavities 48 and 50 to apply downward forces on pistons 42, 44, and 46. Additional pistons can be used for greater force amplification. The use of intensifier 36 allows a lower pressure to be used at the wellhead in case it has a low pressure rating and the expansion force desired at the packer or anchor P exceeds the rated wellhead pressure. Downhole movement of piston 44 forces fluid out of port 52 to expand the packer or anchor P. The intensifier 36 is retrieved after expansion with a known fishing tool, which engages a fishing snub in the top of the intensifier. As shown in FIGS. 5a-5d, the packer or anchor P is set against tubular or casing C and the intensifier is removed from the tubing 37.

[0049] Another way to deliver and set the packer or anchor P is shown in FIGS. 12a-12c and 13a-13c. In these figures the packer or anchor P is delivered on a hydraulic or wire line setting tool, as opposed to the through-tubing techniques previously described. The setting tool is schematically illustrated to cover the use of both hydraulic or wire line setting. A sleeve 54 about the top of the packer or anchor P (FIG. 12a). A gripping sleeve 56 retains the packer or anchor P until the sleeve and 58 fails. Circulation is possible when using the hydraulic setting tool until an object is dropped to allow pressure buildup to ultimately move piston 60 to set the packer or anchor P. Upward movement of the piston 60 breaks the sleeve 58 after delivering the required pressure for expansion through port 62 to the packer or anchor P. The hydraulic setting tool can incorporate pressure intensifiers so as to limit the surface pressure applied to get the desired expansion. In the event the wellhead has a low pressure rating, breaking the sleeve 58 allows removal of the setting tool and a subsequent tagging the packer with production tubing. The pressure intensifier can have more or fewer pistons to get the desired pressure amplification. Hydraulic pressure can be employed to do the expanding instead of or in conjunction

with surface applied pressure. Various ways can be used to connect the tubing to the packer. The expansion tool can be released from the packer by rotation. Known setting tools can be employed such as those made by Baker Oil Tools under model numbers BH, BHH, B-2 and J with only slight adaptations.

[0050] In a wire line variation, the setting tool would be electrically actuated to set off an explosive charge to create the needed pressure for expansion of the packer or anchor P in the manner previously described with the possibility of integrating a pressure intensifier. Once the packer or anchor P is expanded, an automatic release from the setting tool occurs so that it could be removed. Known wire line setting tools like the E-4 made by Baker Oil Tools can be used, or others. The expansion concept is the same, striking a piston with a pressure source and, if necessary a pressure intensifier, creates the pressure for expansion of the packer or anchor P to expand it into position against the tubular or casing C and to trigger an automatic release for retrieval of the setting tool. After the setting tool is pulled out, tubing is tagged into the expanded packer or anchor.

[0051] Release of the packer or anchor P is schematically illustrated in FIGS. 6a-6c. The technique is longitudinal extension as illustrated by opposed arrows 64 and 66. This longitudinal extension results in radial contraction, shown schematically as arrow 68. What actually occurs is that the wickers 30 and 32 (shown in FIG. 1), which had dug into the casing C on expansion, are pulled or sheared out of the casing. The longitudinal extension also draws back the sealing element 24 as the mandrel under it radially contracts. FIGS. 7a-7b show the released position.

[0052] One way to accomplish the release as described above is shown in FIGS. 8a-8c. The release tool 70 is run into the well after the production tubing is pulled. It is secured downhole to the packer at connection 72, which can be a variety of configurations. A ball seat 74 is retained by shear pins 76 and accepts a ball 78 dropped from the surface. Built up pressure pushes down on piston 80 and piston 82 through port 84. Piston 80 bears down on piston 82. Piston 82 bears on shoulder 86 on the packer or anchor P. Thus the packer or anchor P is subjected to a longitudinal extension force from an uphole force at connection 72 and a downhole force at shoulder 86. The resulting radial contraction allows removal of the packer or anchor P with the tubing 72.

[0053] FIGS. 9a-9c show a thru-tubing variation of the release technique. The release tool 88 can be run in on slick line or wire line to latch into latch 90. Pressure is developed on pistons 92, 94, and 96. Ports 98 and 100 allow access to pistons 94 and 96 respectively. Piston 92 bears on piston 94, which in turn bears on piston 96. Piston 96 rests on shoulder 102 on the anchor or packer P while the other end of the release tool 88 is latched at latch 90. Ports 104 and 106 allow pistons 92 and 94, respectively to move by allowing fluid to pass. Accordingly, applied pressure in tubing 108 or generated pressure from an electric line setting tool such as an E-4 made by Baker Oil Tools, stretches the packer or anchor P to get the slips 18 and 22 (see FIG. 1) to let go of their grip on the tubular or casing C in the manner previously described.

[0054] FIGS. 10a-10d and 11a-11d show a packer of known construction except that it has a narrow piston 108 in its mandrel 112. This is a sealing element 114 and slips 116

extendable with cones 118 and 120. A lock ring 122 holds the set. In the past, the packer could be released by releasing the lock ring by cutting the mandrel of the set held by a downhole, as illustrated in U.S. Pat. No. 5,720,340. However, this technique had its uncertainties due to doubts about placement of the cutter and knowledge as to if the cut was completed. The release technique for such packers of the present invention, removes such uncertainties. The release tool 122 can be run from tubing on slick line or wire line and latched at latch 124. A pressure intensifier 126 of the type previously described rests on shoulder 128 of the packer or anchor P. Application of pressure from the surface or the electric line tool puts opposing forces at latch 124 and shoulder 128 until the narrow portion 110 fails in tension. This releases the hold of the set position by the lock ring 122 and allows extension and radial retraction of the slips 116 and the sealing element 114. The break 130 is shown in FIG. 11c. If there are multiple packers or anchors P in the well, the process can be repeated for each one that needs release.

As well, the setting process can be repeated to set in any order desired, other packers or anchors P to isolate a desired zone for example. The release tool can be delivered through the production tubing or on wire line or slick line after the production tubing has been removed. After release, the release tool can drop the tool just released or it can stay with it and allow the released tool to be removed to the surface.

[0055] Other downhole tools can be expanded and extended for release in the manner described above other than packers or anchors. Some examples are screens and perforated liners.

[0056] The techniques described above will also allow for expansion and extension of a variety of tools much faster than a single time, should that become necessary in the life of the well. Extension of the downhole tool for release does not necessarily have to occur in the external failure to be released, as described in conjunction with FIGS. 10 and 11. The extension of a tool such as the packer or anchor P or an embodiment of which is shown in FIG. 1, can allow it to be re-expanded with the variety of tools described above.

[0057] Tubing itself can also be expanded and extended for release using the techniques described above.

[0058] Although the retrieving tool has been illustrated as having a shoulder to obtain the extension, the shoulder can be provided in a variety of configurations or can be replaced by a gripping mechanism. These slips on the release tool. The slips could alternatively replace the latching pin while still putting a downhole force on the lower shoulder. The mandrel can also have an internal and collar can engage the mandrel to put the requisite extension force on the mandrel body.

[0059] Selected zones can be isolated or opened for flow with the techniques previously described. Pressure intensifiers of various designs and pressure magnification devices can be used or, alternatively, no pressure magnification device can be used.

[0060] If the through-tubing tool is used with the explosive charge as the pressure source, then it will need to be removed and the charge replenished before it is used to expand another device in the well. The hydraulically operated through-tubing tool can simply be repositioned and re-pressured to expand another downhole packer, tubular or other tool.

[0061] The various forms of the release tools can be used with conventional packers that set with longitudinal compression of a sealing element and slips with the set held by a lock ring by extending that packer to the point of needed or other failure, which can release the set held by the lock ring.

[0062] Referring now to FIG. 14, a preferred embodiment of the packer P is illustrated. The mandrel 150 has an undulating surface 152 defining peaks 154 and adjacent valleys 156. The peaks 154 and valleys 156 can be rounded, blunt or may define a sharp angle, although a slight radius is preferred. Slips 158 and 159 straddle the sealing element 162, which matches undulating surface 152. The number and height of the undulations can be varied to meet the expected performance conditions for the packer P. Because of the slant orientation of the undulations 152 and 160 a net force from uphole acting in a downhole direction (or vice versa), represented by arrow 161 in FIG. 15, will create a radial component force acting on the slips 158 and 159 whose size depends on the size of the net force acting uphole or downhole and the angle of the mating surfaces of undulations 152 and 160. The resultant force is shown by arrow 163 and it has a radial component shown by arrow 165 and a longitudinal component shown by arrow 167.

[0063] The sealing element 162 has nodes such as 164 and 166 under it. These nodes are protrusions from the mandrel 150. They act to increase the internal pressure in the sealing element 162 so that it retains sealing contact despite load direction or load size changes. Augmenting the increase in internal seal pressure that is caused by one or more nodes such as 164 and 166 are anti-extension rings 168 and 170 that are mounted above and below the sealing element 162. As seen in section in FIG. 15, the rings 168 and 170 have sloping surfaces 172 and 174 respectively to engage slips 158 and 159, respectively to help push out close wickers 176 and 178. The close wickers 176 and 178 are closer to rings 168 and 170 to insure that the rings 168 and 170 are firmly positioned to prevent extension of element 162 despite changing loads amounts or load direction. At the same time, the internal pressure in the sealing element 162 working against rings 168 and 170 pushes their respective sloping surfaces 172 and 174 under slips 158 and 159 so as to enhance the bite of not only the close wickers 176 and 178 but also the remaining wickers 180 and 182.

[0064] FIG. 16 illustrates the use of a tube or pipe 184 to carry signal lines or fluid pressure to locations beyond the packer P. Line 184 runs inside the mandrel 150 and through the sealing element 162 and between sets of slips such as 158 or 159. Line 184 can alternatively run through a portion of the body of mandrel 150. Other types of electric lines can be put in line 184 to control downhole equipment or gather data from below the packer P.

[0065] FIGS. 17 and 18 show the limitation of prior art systems in the ability to radially load the slips. Slipping surfaces 186 and 188 on cones 190 and 192 have limited contact with slips 194 and 200. As seen in FIG. 18 that contact is limited between points 194 and 196 of slip 186 for example. The spacing between the points 194 and 196 can't be increased because the taper angle must stay in a preferred range to transmit sufficient radial force in a slip such as 192 and making the spread between points 194 and

196 longer can effectively be done at the expense of decreasing the internal bore of the packer for a given exterior run in dimension. Accordingly, the prior art packers set by relative longitudinal movement, whether initiated by mechanical force or hydraulic pressure, were limited in the length of the slips 190 and 200 to which radial loading could be applied. This limitation forced higher stresses to be applied to the tubular against which the slips 190 and 200 were actuated. The packer P of the present invention solves this problem using the expansion technique. As shown in FIG. 19, mandrel 190 expands below a slip such as 158 by applying a radial force between points 202 and 204, with point 204 being on surface 172 of ring 168. This spacing between points 202 and 204 can be as long as desired and much longer than the design parameters of the prior art designs illustrated in FIGS. 17 and 18 would allow. As a result, the desired contact force is applied over a substantially greater contact area, extending to a substantial portion of the length of longer slips, to greatly reduce the stress applied to the surrounding tubular or the formation if in open hole. As previously stated, in a cased hole, for example, the surrounding tubular need not be deformed as the wellbore stress as 176-182 dig in for a bit. The present invention allows for the use of more wellbore to decrease the stress on the tubular from the penetration. Even if all the wellbore bottom into the surrounding tubular, the resulting stress is reduced, when compared to the prior art, because the contact area over which radial force is transmitted has been dramatically increased. The radial load can be applied to over 90% of the length of the slips that can be used in any desired length.

[0066] FIGS. 20-23 show an application of the packer P to drilling out a well plug 206 with a bit 208, with the packer P mounted right above on the drill string 210. After the plug is drilled out the annulus 212 can be isolated when the packer P is expanded. In FIG. 21, the plug 206 is fully milled out. In FIG. 22, the bit 208 is released. In FIG. 23, the packer P is expanded into contact with the wellbore W, isolating the annulus 212 around the drill string 210. Production can start through string 210 with the annulus 212 sealed off by packer P. The advantage is the robustness of the packer to allow cuttings to be circulated around it. The prior art technique dispensed with annulus isolation and allowed communication into annulus 212 as the well was produced into string 210. In gas wells, potentially corrosive gases could migrate into the annulus damaging the wellbore W, which could be causing of a material incompatible with the migrating gas. Even circulating or reverse circulating mud of a predetermined weight into the annulus, in the past, fluids would not migrate into the annular space. The packer P of the present invention can be used to provide positive annulus isolation in such applications, as illustrated in FIGS. 20-23.

[0067] FIG. 24 illustrates a liner 214 suspended from a liner hanger 216 with the packer P serving as the first top packer in wellbore W, which can be cased or uncased.

[0068] FIGS. 25-28 illustrate the use of the packer P initially as an isolation packer and subsequently as a production packer. As shown in FIG. 25, the packer P is expanded into a sealing position. The packer P is shown schematically. It may have a removable plug 218 that sits below its body. Plug 218 can be in with the packer P and portions of the packer above the plug 218 can be expanded

into sealing position with the wellbore W. As shown in FIG. 26, an assembly comprising of tubing 220, seal assembly 222, retrieving device 224, and a sucker bar 226 are lowered into position adjacent the plug 218. In FIG. 27, the plug 218 has been knocked out and the seal assembly 222 is in seal bore 223 of the packer P. FIG. 28 illustrates the release tool and retrieving device 224, as previously described, stretching the packer P to get it to release and retaining a grip on it after release so it can be removed.

[0069] FIGS. 29-32 illustrate a one trip hydraulically set packer P that is run in and set using a pressure intensifier 228. Mounted inside body 230 is a piston 232. A port 234 communicated into annular space 236 defined by lower sub 238. Seals 240-248 isolate annular space 236 so that applied pressure after ball 250 lands on seat 252 puts a downward force on piston 232, which moves in tandem with sleeve 254. Seal 256 allows pressure to be built up on landed ball 250 until a predetermined value, at which point the shear pin or pin 258 breaks to release ball 250, as shown in FIG. 31b. As shown in FIG. 29c, annular space 260 is defined between piston 232 and mandrel 262. Seals 264-268 and 240-244 isolate the annular space 260. Piston 232 has a shoulder 266, which decreases the volume of annular space 260 as the piston 232 is moved downwardly. The pressure is intensified because the radius of seal 248 is larger than the radius of seals 242-244 and 264-266. The downward force on ring 254 is converted to a greater force applied to a smaller radius, where shoulder 266 is located. As a result, the mandrel 262 expands radially to push out the sealing element 270 and the slips 272-274 in the manner previously described. After the packer P is set, a further buildup of pressure on ball 250 breaks shear pin 258 to release ball 250 downward. FIG. 32 shows an alternative way to set the packer P using a slick line plug, not shown, that lands in the groove 276 and seals adjacently using seals carried on the plug. The packer P is then set using the pressure intensification as described with respect to FIGS. 29-31. At the conclusion of the setting process, the plug is captured with a fishing tool on a fishing neck, in a known manner and hoisted out. No matter how the packer is set, the intensifier 228 is built into it and stays in position after the packer P is set to become a part of the central passage through the packer P. The packer P is run in on one trip and pressured up after the object such as ball 290 or a slick line plug (not shown) is quickly placed in position to allow pressure buildup to initiate expansion. If using the slickline plug, multiple packers can be run on a single string and set in a predetermined order or in any random order.

[0070] Referring to FIGS. 33a-33c, an alternative embodiment is disclosed. The slips 300 and 302 now each have at least one inwardly oriented depression 304 and 306 respectively. The expansion mandrel 308 is preferably cylindrical in the region of slips 300 and 302 but may have slight indentations 310 and 312 to orient the slips 300 and 302 in the run in position. As shown in FIG. 33a, a seal 314 accepts the run in position. Seals 320 and 322 and inner seals 324 and 326 between outer seals 320 and 322 and inner seals 324 and 326 to reduce the volume of cavity 328. Because the area of cavity 328 is smaller than the piston area at seat 314 with ball 316 landed on it, there is a magnification of applied pressure on the ball 316 that acts to expand the expansion mandrel 308. FIGS. 34a-34c show what happens as the expansion mandrel 308 expands. It not only pushes the slips 300 and 302 outwardly to make supporting contact with the

wellbore or tubular 330 but it also assumes the interior shape of the slips 300 and 302 by expanding into their respective depressions 304 and 306. These skilled in the art will appreciate that the depressions 304 and 306 may be on the mandrel 308 and that slips 300 and 302 can be cylindrical or have outward projections on their inwardly oriented surfaces. The advantage to the embodiment in the FIGS. 33-35 is that it is simpler to put recesses 304 and 306 into the slips than to prepare an expansion mandrel and matching slips with mating undulating surfaces. Since there is some shrinkage in length during the expansion process, getting the mandrel 308 to stay meshed throughout the expansion process can become an issue. Using the preferred embodiment of a depression on the slips not only better secures the slips 300 and 302 to the expansion mandrel 308 but it takes better advantage of the shrinkage during expansion to hold the slips 300 and 302 in position. The number, shape and depth of depressions 304 and 306, as well as their location on the slips or the expansion mandrel can be varied depending on the application. FIG. 35f shows the seal 314 and the ball 316 being blown out of the way after the set position is obtained. A plug or some other object can be used instead of ball 316 to temporarily obstruct the interior passage to allow pressure buildup to set the packer P.

[0071] Apart from reducing stress on a surrounding tubular or wellbore, the packer P of the present invention also conforms to a well shaped casing, as well as provides increased collapse resistance in the set position. The packer P can be delivered into casing on wireline or slickline or on wireline or slickline through tubing. Alternatively, coiled tubing can deliver the packer P into casing or through tubing. The packer P can be set hydraulically in one trip as described or in two trips when combined with an intensifier that needs to be removed after expansion. The retrieving tool for the packer P can be delivered into the packer P in the variety of ways the packer P can be delivered. The release tool preferably stretch the packer P sufficiently until it releases and can be combined with a pressure intensifier. The releasing can be done with one trip or additional trips. The packer P can be used in a variety of applications apart from those described in detail above. Some examples are fracturing, production, feed through, dual bore, zone isolation, anchored seal bore, floating seal bore, lodge set, combined with sliding sleeve valves, and setting in a multilateral junction.

[0072] The simplicity of the packer P lends itself to rapid development with less testing than other prior art designs because its behavior under expansion forces is more predictable. Prior art packers were compressed radially to expand radially and that many parts that moved relatively to one another, it was difficult to predict how the seal would react to an axial compressive force. As a result, complex programs were developed to predict seal behavior under compression forces. With the packer P, on the other hand, the compression forces to expand the packer P are directly related. Additionally, the designed testing to see that they would deploy before extrusion had actually taken place. With the packer P sealing up from one size to another is also simplified.

[0073] The packers P can be introduced quickly at different levels in the wellbore and set or released selectively with ease. In another application the packer P can be run in on

tubing and then pumping cement through the tubing and out around the packer, followed by setting the tubing and the packer P can be used as a velocity string hanger below a safety valve. The packer P can have multiple bores and it can be set in not only out of round casing but also in the reformed leg of a multilateral junction. The packer P either assumes the oval shape or conforms the oval tubing back to a round shape. The expansion technique enhances not only collapse resistance but also corrosion resistance. The reason is that by using a swage to expand, the result being a loss imposed than if pressure is used, with the result being a loss in corrosion resistance and collapse resistance. As an alternative to releasing by arching, release can be accomplished by isolation of the expanded segment and pulling a vacuum to collapse the mandrel sufficiently so that it will release for removal.

[0074] The rings 168 and 170 keep the wellbore 176-182 engaged despite increases in load direction lateral pressure in the sealing element 162 creates a radial force on the slips 158 and 159 through the tapered surfaces on rings 168 and 170. The nodes 164-166 allow the use of a non-elliptic seal. Pressure one end of seal element 162 transfers load to another node on the lower pressure end of the seal element 162. The presence of multiple nodes increases the internal pressure to help maintain the seal as loading conditions shift.

[0075] Another distinction from the prior art packers is the use of even harder collar type slips that are urged into greater contact with the casing when uphole or downhole pressures increase. Due to the undulating contact between the slips and the mandrel, such axial loading from pressure is not transmitted to the sealing element; rather it just causes the slips to grab harder.

[0076] The above description is illustrative of the preferred embodiment and many modifications may be made by those skilled in the art without departing from the invention whose scope is to be determined from the literal and equivalent scope of the claims below.

We claim:

1. An expandable packer for sealing a wellbore, comprising:
an expandable mandrel movable radially outwardly by an applied force from a run in position to a set position;
a sealing element mounted to said mandrel, said mandrel comprises at least one surface irregularity in contact with said sealing element;
The packer of claim 1, wherein:
said surface irregularity comprises at least one depression on the mandrel that dips into the sealing element when said mandrel is to said set position;
3. The packer of claim 2, wherein:
said projection increases the internal pressure in said sealing element when said mandrel is in said set position;
4. The packer of claim 1, wherein:
said surface irregularity comprises at least one depression on the mandrel that allows said sealing element to engage the mandrel as said sealing element is forced into said depression when said mandrel is in said set position.

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5. The packer of claim 1, further comprising:
at least one slip mounted to said mandrel;
said slip is retained to said mandrel by virtue of at least one surface irregularity on at least one of said mandrel and said slip.

6. The packer of claim 1, further comprising:
at least one slip mounted to said mandrel;
at least one anti-extrusion ring mounted to said mandrel adjacent said sealing element, said anti-extrusion ring mounted in contact with said slip.

7. The packer of claim 5, wherein:
said slip comprises a surface irregularity and said mandrel conforms to the shape of said surface irregularity on said slip when in its said set position.

8. The packer of claim 5, wherein:
said slip and said mandrel both comprise surface irregularities that conform to each other in the run in position of said mandrel.

9. The packer of claim 8, wherein:
said surface irregularities comprise matching undulating surfaces.

10. The packer of claim 5, wherein:
shrinkage of said mandrel as it is forced to said set position in the region of said surface irregularity enhances the grip between the wellbore and said slip.

11. The packer of claim 5, wherein:
said surface irregularity creates a radial component of force into said slip into contact with the wellbore in response to an uphole or downhole directed force on said mandrel with said mandrel in said set position.

12. The packer of claim 6, wherein:
said slip contacts said ring in a manner that provides a wedging of said ring toward said sealing element.

13. The packer of claim 12, wherein:
said ring contacts said slip by way of contacting sloping surfaces such that movement of said mandrel to said set position creates a reaction force through said slip and said sloping surfaces to urge said ring toward said sealing element.

14. The packer of claim 13, wherein:
said sloping surfaces create a longitudinal component of force, acting in the direction of the wellbore, on said sealing element.

15. The packer of claim 6, wherein:
said ring has a generally triangular cross-section when taken in alignment with the wellbore.

16. An expandable downhole tool for use in a wellbore, comprising:
an expandable mandrel movable radially outwardly by an applied force from a run in position to a set position;
at least one slip mounted to said mandrel;
said slip, upon expansion of said mandrel, is retained to said mandrel by virtue of at least one surface irregularity on at least one of said mandrel and said slip.

17. The tool of claim 16, wherein:
said slip comprises a surface irregularity and said mandrel conforms to the shape of said surface irregularity on said slip when in its said set position.

18. The tool of claim 16, wherein:
said slip and said mandrel both comprise surface irregularities that conform to each other in the run in position of said mandrel.

19. The tool of claim 18, wherein:
said surface irregularities comprise matching undulating surfaces.

20. The tool of claim 16, wherein:
shrinkage of said mandrel as it is forced to said set position in the region of said surface irregularity enhances the grip between said mandrel and said slip.

21. The tool of claim 16, wherein:
said surface irregularity creates a radial component of force into said slip into contact with the wellbore in response to an uphole or downhole directed force on the mandrel with said mandrel in said set position.

22. The packer of claim 17, further comprising:
at least one anti-extrusion ring mounted to said mandrel adjacent said sealing element, said anti-extrusion ring mounted in contact with said slip.

23. An expandable packer for sealing a wellbore, comprising:
an expandable mandrel movable radially outwardly by an applied force from a run in position to a set position;
at least one slip mounted to said mandrel;
a sealing element mounted to said mandrel;
at least one anti-extrusion ring mounted to said mandrel adjacent said sealing element, said anti-extrusion ring mounted in contact with said slip.

24. The packer of claim 23, wherein:
said slip contacts said ring in a manner that provides a wedging of said ring toward said sealing element.

25. The packer of claim 24, wherein:
said ring contacts said slip by way of contacting sloping surfaces such that movement of said mandrel to said set position creates a reaction force through said slip and said sloping surfaces to urge said ring toward said sealing element.

26. The packer of claim 25, wherein:
said sloping surfaces create a longitudinal component of force, acting in the direction of the wellbore, on said sealing element.

27. The packer of claim 23, wherein:
said ring has a generally triangular cross-section when taken in alignment with the wellbore.

28. The packer of claim 23, wherein:
said slip is retained to said mandrel by virtue of at least one surface irregularity on at least one of said mandrel and said slip.

29. The packer of claim 28, wherein:
said mandrel comprises at least one surface irregularity in contact with said sealing element.

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30. The packer of claim 17, wherein:
said surface irregularity comprises at least one rounded depression on said slip.

31. The packer of claim 23, wherein:
force transmitted to the anti-extrusion ring from the sealing element enhances the grip between the slip and the well bore.

32. The packer of claim 23, wherein:
said slip comprises a first end closer to said anti-extrusion ring and a plurality of wickers thereon, said wickers being more closely spaced near said first end.

33. A method of well completion, comprising:
running in a bit and an expandable packer on tubing;
expanding the packer to close off an annular space around said tubing after drilling.

34. The method of claim 33, comprising:
dropping the bit;

35. The method of claim 33, comprising:
producing through said tubing after expanding said expandable packer.

36. The method of claim 33, comprising:
drilling out a plug in the wellbore.

37. A method of well completion, comprising:
running an expandable packer into a wellbore;
pumping sealing material around the outside of said packer; and
expanding said packer.

* * * * *

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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

2020

Abogado
GERMAN CASTILLO GRAU
Apoderado

ASUNTO	Radicación	06-109581
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	
	Folios	012

Patente de Invención	☒	Patente de Modelo de Utilidad	☐
Vía Nacional	☐		
Vía PCT (fase nacional)	☒	Cap. I	☐ Cap. II

No. Sol. Internacional	<u>PCT/IB2005/051366</u>
Fecha de Presentación Internal.	<u>25 de abril de 2005</u>

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1. Documentos estudiados

- | | | |
|------|--------------------------|--|
| 1.1. | <u>Descripción:</u> | Folios: 4 a 13 |
| 1.2. | <u>Reivindicaciones:</u> | Folios: 14 a 17 |
| 1.3. | <u>Dibujos:</u> | Folios: 18 a 26 |
| 1.4. | <u>Prioridad:</u> | 27 de abril de 2004, US No. 60/565.576 |

2. Objeto de la invención

- El Título de la solicitud es: **“DESPLIEGUE DE UN ENSAMBLE EN UN POZO”** (Folio 1).
- La presente invención se refiere al despliegue de un ensamble, tal como un ensamble de criba.

En la **Reivindicación Independiente 1** se plantea un método para utilizar en un pozo, que comprende:

Correr un dispositivo de aislamiento dentro de un pozo;

Utilizar el dispositivo de aislamiento para formar un retenedor para crear una primera región del pozo aislando la superficie del pozo de una segunda región de presión más alta del pozo.

Correr un ensamble dentro de la primera región.

Acoplar el dispositivo de aislamiento con el ensamble para remover el retenedor; y

Una vez se retire el retenedor, seguir corriendo dentro del pozo el dispositivo de aislamiento junto con el ensamble.

En la **Reivindicación Independiente 10** se plantea un método para usar en un pozo, que comprende:

Correr un dispositivo de aislamiento dentro de un pozo.

Montar un dispositivo de aislamiento para crear una primera región del pozo aislando la superficie del pozo de una segunda región del pozo de presión más alta;

Correr un ensamble de criba dentro de la primera región hasta que el ensamble de la criba alcance el dispositivo de aislamiento;

Acoplar el dispositivo de aislamiento con el ensamble de la criba para desmontar el dispositivo de aislamiento; y

Seguir corriendo el ensamble de la criba y el dispositivo de aislamiento dentro del pozo.

En la **Reivindicación Independiente 15** se plantea un sistema para usar con un pozo, que comprende:

Una columna que comprende un ensamble de criba; y

Una herramienta de aflojamiento conectada a un extremo inferior del ensamble de la criba para aflojar un retenedor formado por un dispositivo de aislamiento.

En la **Reivindicación Independiente 20** se plantea un sistema para usar con un pozo, que comprende:

Una columna que comprende un ensamble; y

Una herramienta de aflojamiento conectada a un extremo inferior del ensamble para aflojar un retenedor formado por un dispositivo de aislamiento.

- Se afirma que típicamente se presentan retos en la instalación de la criba en un pozo que tenga presión positiva de superficie. Las técnicas convencionales para instalar la criba incluyen "matar" el pozo introduciendo un fluido pesado en el pozo para equilibrar la presión que ejerce el pozo. Otra técnica implica usar ensambles de criba relativamente cortos e insertar estos ensambles de criba a través de un lubricador del pozo. Sin embargo, técnicas convencionales para instalar la criba pueden incluir una cantidad considerable de tiempo y el uso de fluidos de trabajo y equipo relativamente costosos. Por

lo tanto, existe la continua necesidad de un mejor sistema y/o técnica para instalar un ensamble, tal como un ensamble de criba en un pozo.

- El objeto de la invención definido se catalogó como **E21B 23/06, E21B 33/068, E21B 33/12**, según la Clasificación Internacional de Patentes (IPC).

3. De la solicitud de Patente

3.1. Método (artículo 14 D 486)

- En las reivindicaciones 1 a 9 se plantea un método para utilizar en un pozo que comprende: **correr un dispositivo** de aislamiento dentro de un pozo; **utilizar el dispositivo** de aislamiento para formar un retenedor para crear una primera región del pozo aislando la superficie del pozo de una segunda región de presión más alta del pozo; **correr un ensamble** dentro de la primera región; **acoplar** el dispositivo de aislamiento con el ensamble para remover el retenedor; y una vez se retire el retenedor, **seguir corriendo dentro del pozo el dispositivo de aislamiento junto con el ensamble**.

Al analizar los pasos del método, se puede observar que “correr un dispositivo...”, “utilizar el dispositivo...”, “correr un ensamble...”, “acoplar el dispositivo...” y “seguir corriendo dentro del pozo el dispositivo de aislamiento...” no son etapas de un proceso o método industrial de transformación de materia y/o energía que den como resultado un producto tangible, sino que por el contrario, son **acciones** conducentes a la **instalación de un equipo** dentro de un pozo.

También se puede observar que las reivindicaciones 2 a 9 contienen materia que **no corresponde a los procedimientos industriales a los cuales se pueda otorgar el privilegio de patente** porque también hacen referencia a acciones de instalación y **no corresponden a procedimientos industriales para la fabricación de productos**.

En el artículo 14 de la Decisión 486 se establece claramente la naturaleza de la materia que es sujeto de protección mediante las patentes: *“Los Países Miembros otorgarán patentes para las invenciones, sean de producto o de **procedimiento** [...]”* (Negrita Personal)

Aunque la misma normativa no establece la forma como se deben definir las reivindicaciones de procedimiento (sinónimo de proceso o método), el Tribunal de Justicia de la Comunidad Andina tradicionalmente sí se ha pronunciado sobre el tema de los procedimientos que sí son patentables. Para ilustrarlo, en el proceso 36-IP-98, fijó unas pautas acerca de lo que es un procedimiento **en el contexto de las patentes**. En el punto 4.1 de la sentencia dictada en dicho proceso, se establece que:

“[...] Una invención de procedimiento, en general, es una solución consistente en una secuencia de etapas conducentes a la fabricación de un producto [...]”

Dado lo anterior, las reivindicaciones de procedimiento siempre deben plantearse como una secuencia de etapas (pasos) que conduzcan a la **fabricación** de un producto.

Teniendo en cuenta esto, las reivindicaciones 1 a 9 de la solicitud en estudio **no corresponden a la definición de procedimientos de fabricación** sino a una manera de colocar las partes de una herramienta, que no lleva a la obtención de un producto sino a la instalación de una serie de elementos dentro de un pozo y por lo tanto, no corresponde a los procedimientos a los que se hace referencia en el artículo 14 de la Decisión 486. Por ello, las reivindicaciones 1 a 9 no podrían ser aceptadas como materia que pueda ser patentable.

- En las reivindicaciones 10 a 14 se plantea un método para usar en un pozo que comprende: **correr un dispositivo** de aislamiento dentro de un pozo; **montar el dispositivo** de aislamiento para crear una primera región del pozo aislando la superficie del pozo de una segunda región del pozo de presión más alta; **correr un ensamble de criba** dentro de la primera región hasta que el ensamble de la criba alcance el dispositivo de aislamiento; **acoplar** el dispositivo de aislamiento con el ensamble de la criba para desmontar el dispositivo de aislamiento; **seguir corriendo el ensamble de la criba y el dispositivo de aislamiento dentro del pozo**.

En las reivindicaciones citadas también se plantea una manera de realizar un montaje o instalación en lugar de un proceso industrial para la obtención de un producto tangible. De tal manera que en dichas reivindicaciones ocurre lo mismo que en las reivindicaciones 1 a 9 y por lo tanto no podrían ser aceptadas como materia que pueda ser patentable.

- En conclusión, las reivindicaciones 1 a 14 no podrían ser patentables puesto que no son materia que caiga dentro de la definición de proceso patentable según el artículo 14 de la Decisión 486.

3.2. Reivindicaciones (artículo 30 D 486)

- En las reivindicaciones independientes **1 y 10** se plantea “**Un método para utilizar en un pozo...**” (Negrita Personal). Sin embargo dicho preámbulo es ambiguo y no define qué tipo de método es el que se utiliza en el pozo.

El preámbulo debería indicar la definición del objeto de la invención, es decir, la clase técnica general de aparato, procedimiento, etc., a la que se refiere la invención, seguido de una indicación de las características técnicas que sean necesarias para la definición del objeto reivindicado pero que en combinación formen parte del estado de la técnica. Por lo tanto, se recomienda modificar el preámbulo de la reivindicación independiente 1 teniendo en cuenta estas anotaciones.

- En la reivindicación independiente **15** se plantea “**Un sistema para usar con un pozo...**” (Negrita Personal). Sin embargo dicho preámbulo es ambiguo y no define qué tipo de sistema es el que se usa en el pozo. Se recomienda entonces modificar el preámbulo atendiendo a las anotaciones del punto anterior.
- Dado que un capítulo reivindicatorio es claro cuando se entiende por sí solo sin la necesidad de acudir a la descripción, en las reivindicaciones **15 a 24** se recomienda mejorar la inteligibilidad de la invención incluyendo números entre paréntesis luego de mencionar cada una de las partes del equipo según lo señalado en los dibujos.

- En conclusión, las reivindicaciones **1, 10, 15 a 24** no cumplirían con el requisito de claridad requerido según el artículo 30 de la Decisión 486.

4. Determinación del Estado de la Técnica

- La fecha que se ha tenido en cuenta para determinar el Estado de la Técnica es:

Fecha de presentación de la solicitud prioritaria: **27 de abril de 2004**

- Teniendo en cuenta la fecha indicada se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud encontrándose los siguientes documentos relevantes:

Nº	Documento	Título	Fecha de publicación
D1	US20030141079	"EXPANDABLE PACKER WITH ANCHORING FEATURE"	31 de Julio de 2003

5. Análisis de patentabilidad (artículo 14 D 486)

5.1. Novedad (artículo 16 D 486)

Respecto a la invención de la solicitud:

En la **Reivindicación Independiente 20** se plantea un sistema para usar con un pozo, que comprende:

Una columna que comprende un ensamble; y

Una herramienta de aflojamiento conectada a un extremo inferior del ensamble para aflojar un retenedor formado por un dispositivo de aislamiento.

Respecto al Estado de la Técnica:

En el documento **US20030141079** (D1 de aquí en adelante) se divulga un empaquetador expandible con características de anclaje utilizado en pozos.

En D1 se divulga un sistema utilizable en un pozo que comprende:

Un tubo (W) que se extiende hacia abajo en el pozo desde una zona de superficie.

Un aparato de aislamiento (P) que comprende un conjunto de empaquetador liberable con el tubo (Ver Figura 25). El empaquetador liberable crea temporalmente una región aislada relativa a la presión del pozo (Párrafo 68).

Una sarta comprende un ensamble colocado en una región aislada (Ver Figura 26); y una **herramienta de liberación 224** conectada a un borde del fondo del ensamble para liberar un sello formado entre el conjunto de empaquetador liberable y el entorno de la tubería.

En D1 se discute una herramienta que es capaz de conectar el dispositivo de aislamiento (P) al ensamble para permitir que el dispositivo de ensamble y aislamiento sea corrido junto dentro del pozo.

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Comparación:

Como puede observarse, la columna que comprende un ensamble y la herramienta de aflojamiento conectada a un extremo inferior del ensamble para aflojar un retenedor o empaquetador formado por un dispositivo que permite aislamiento temporal respecto a la presión es algo que ya es conocido en el estado de la técnica.

Es importante mencionar que al encontrarse afectada la novedad de la Reivindicación independiente 20, la cual encierra el objeto de patentabilidad; sus correspondientes reivindicaciones dependientes, estarían señalando características particulares de un proceso que no es novedoso, por consiguiente carecen de novedad.

En conclusión, el sistema de las reivindicaciones 20 a 24 no cumpliría con el requisito de Novedad como se requiere según el artículo 16 de la Decisión 486.

6. Conclusión

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	US20030141079	20 – 24	Novedad

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de **60 días** contados a partir de la fecha de notificación de la presente comunicación. **En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.**

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista, de fecha _____

CONCEPTO TÉCNICO No. 1659	EXAMINADOR TÉCNICO Código No. 202042
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24/07/09