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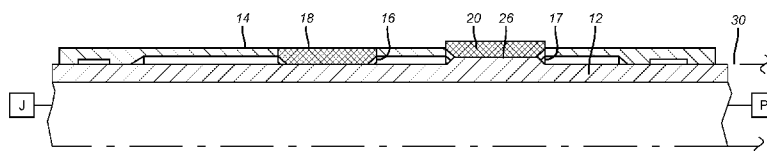
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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- with international search report (Art. 21(3))

(54) Title: ONE TRIP CLEANING AND TOOL SETTING IN THE CLEANED LOCATION



(57) Abstract: A combination tool allows delivery of a tool such as a packer or bridge plug with a variety of well cleanup tools that are retracted for running in. Once in the vicinity of where the plug or packer is to be set or if an internal diameter is to be targeted using clean up tools after passing a restriction, an inner mandrel can be activated such as in conjunction with a j-slot to selectively extend one or more cleaning tools against the force of a return spring out through openings in an outer housing. Circulation is established either through an open port or by opening a circulation port with mandrel movement. Just the zone near where the packer or bridge plug is to be set is cleaned. The cleaning tools retract after use with further mandrel movement. The packer or plug is picked up into position and set and the bottom hole assembly is removed. The plug or packer can be set in a variety of ways.

ONE TRIP CLEANING AND TOOL SETTING IN THE CLEANED LOCATION

FIELD OF THE INVENTION

[0001] The field of the invention is methods for cleaning a hole in the intended location for setting a tool and more particularly where the cleaning can be selectively accomplished in the vicinity of where the tool is to be set in the same trip as the setting of the tool in the cleaned location.

BACKGROUND OF THE INVENTION

[0002] Saving trips into the hole saves time and money. For that reason service companies have been emphasizing one trip tools that combine tasks. Restrictions through which such tools have to traverse makes the creation of multi-function tools very challenging. In essence simplicity of design is made necessary by the limited space available and yet design durability and the harsh environmental conditions can at times dictate a more robust component design. These design and operational requirements can be at odds. Some designs that work well in reasonably vertical wells are not so advantageous and at times unworkable in highly deviated applications. In addition, advanced cleanup tools with proven track record in the industry usually operate within the parameters of the casing drift and passing through restrictions to expand and target a casing internal diameter is not an option.

[0003] Tubular cleaning is typically done in a separate trip with devices such as blades, brushes or magnets. Typically these tools have picoting members that are extended with flow or pressure and have a spring return to keep the cleaning tools retracted for running in. One example of integrating scraping and drilling is shown in US 2015/0027780. In this reference a drill bit is run through existing casing to make more hole through a formation that can leave a fair amount of debris on the existing casing as the returns are brought to the surface. The tool combines scrapers that can be extended as the bit is brought out from the hole to clean the length of the casing on the way out. This is done with balls landing on a sleeve to extend the scrapers and to open a circulation port. In this design drilling is done before the circulation port opens because pressurized fluid to the bit nozzles

can no longer be provided with the circulation port open above the bit. The scraping continues as the bit moves out of the hole.

[0004] References that show scrapers, brushes and magnets are US 7513303, US 8387700 and US 8511375. These patents show similar ideas of clean up assemblies, but do not have the option to expand and retract.

[0005] There are other applications that lend themselves to one trip operations to save time and money. One of those is the plugging of a well with a bridge plug for abandonment. Current regulations specify procedures for abandoning wells that involve inserting and setting a plug such as a bridge plug or a cement plug or both. The current state of the art in this procedure is an initial trip to clean up the hole before setting a bridge plug for isolation. The present invention incorporates in a single trip the ability to deploy one or more wellbore cleanup tools such as scraper blades, brushes or magnets and selectively deploy them with a ported sub open. Just the intended region where the bridge plug is to be set is cleaned. The cleaning tools are retracted and the bridge plug is positioned at the desired depth in the zone already cleaned. The bridge plug is then set in a variety of ways such as mechanically, hydraulically or with a known setting tool that can be wireline operated. These and other aspects of the present invention will be more readily apparent to those skilled in the art from a review of the description of the preferred embodiment and the associated drawings while recognizing that the full scope of the invention can be determined from the appended claims.

SUMMARY OF THE INVENTION

[0006] A combination tool allows delivery of a tool such as a packer or bridge plug with a variety of well cleanup tools that are retracted for running in. Once in the vicinity of where the plug or packer is to be set, or if an internal diameter is to be targeted using clean up tools after passing a restriction, an inner mandrel can be activated such as in conjunction with a j-slot to selectively extend one or more cleaning tools against the force of a return spring out through openings in an outer housing. Circulation is established either through an open port or by opening a circulation port with mandrel movement. Just the zone near where the packer or bridge plug is to be set is cleaned. The cleaning tools retract after use with further mandrel

movement. The packer or plug is picked up into position and set and the bottom hole assembly is removed. The plug or packer can be set in a variety of ways.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a section view of the tool in a run in position;

[0008] FIG. 2 is the view of FIG. 1 showing a first cleaning tool extended with mandrel movement;

[0009] FIG. 3 is the view of FIG. 2 with another cleaning tool extended.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] FIG. 1 illustrates an assembly 10 having a mandrel 12 in an outer housing 14 that has axially spaced openings 16 and 17 through which are extendible cleaning devices 18 and 20 that are biased inwardly toward mandrel 12 as schematically illustrated by arrows 20 and 24. Preferably the openings 16 and 17 are axially aligned between adjacent rows to provide flow channels for circulating fluid when the cleaning devices 18 and 20 are both extended together. Cleaning devices or members 18 and 20 can also be extended one row at a time. The mandrel 10 is relatively movable with respect to the outer housing 14 with one way such relative movement can be accomplished is holding the outer housing 14 to a surrounding tubular that is not shown using drag blocks DB and manipulating the mandrel 12 using a j-slot mechanism J. FIGS. 2 and 3 show different relative positions of the raised surface 26 under device 18 and overcoming bias force 22 and then the raised surface 26 moving to under device 20 to overcome bias force 24 for sequential extension of devices 18 and 20.

[0011] Device 18 could be brushes and device 20 could be scraping members with exterior profiles and hardened components to release caked on debris from a surrounding tubular. Although two different devices are shown, fewer or greater numbers of devices can be used that are either all the same or all different or with some duplication to act as spares. Mandrel profiles such as 26 can occur singly to extend a single row of devices at a time or can have multiple raised surfaces 26 so that more than a single row of devices are extended at a given time. While the cleaning devices can be forced out by a

raised surface such as **26** there are other ways such as using magnets in the mandrel **12** that align opposed poles with magnets on the back of the devices to be repelled so that the devices are extended. In any given row of devices there can be one or more than one device and where there is more than one device in a single row the devices in that row can be the same or different. The devices can also be magnets to grab any magnetic debris clinging to the wall of a surrounding tubular that is not shown. The cleaning of a particular location can be accomplished with reciprocal axial movements of the mandrel **12** with the outer housing **14** or with tandem rotation while fluid circulates through passage **28** through lateral ports **30** to help in circulating out some of the debris that is dislodged by the cleaning devices.

[0012] After the cleaning is completed for a short zone whose location can be determined with casing collar locators or other tools known to communicate depth of the bottom hole assembly, the packer **P** is positioned in the zone just cleaned and set in a variety of known ways. Some of those ways can be with mechanical manipulation of the string, with a powered setting tool or with applied pressure if the ports **30** are closed off. The packer **P** is then released and the running string that is not shown pulls the mandrel **12** and the outer housing **14** away from the packer **P** and to the surface so that the well abandoning process can be completed.

[0013] Although a packer **P** is schematically illustrated, other types of tools are contemplated such as anchors with associated other tools or bridge plugs. The advantage of the method is that the cleaning devices can be extended and retracted multiple times and are preferably biased to retract with leaf springs or the like. Only a short section of the wellbore is cleaned and in the same trip as the running in of a tool that will ultimately be set in the cleaned zone. The actuation system for the cleaning devices is simple and reliable using drag blocks and a j-slot mechanism however other devices that selectively place an actuation device by a cleaning device could also be used, such as magnets that have been previously mentioned. The cleaning devices are released from the set packer or plug or other tool and retrieved in a retracted condition to the surface of the borehole. Typically, clean up assemblies include brushes, scrapers or magnets and these assemblies will be used with the mechanism mentioned above. The cleanup tools such as scrapers

and magnets can be retracted to pass through restrictions. The cleanup tools can then be extended with pressure or mechanical manipulation to clean a larger diameter that exists beyond the tubing through which the tools were initially delivered and that represent the location of the setting of the plug that has also passed through existing tubing to the set location.

[0014] 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. A completion method for a subterranean location, **characterized by:**
running in a bottom hole assembly of a tool (P) and a cleaning assembly (18,20) into a borehole to the subterranean location defined by an existing tubular;
actuating (26) the cleaning assembly (18,20) to clean a portion of the existing tubular;
positioning said tool (P) in said cleaned portion;
actuating said tool in said cleaned portion.
2. The method of claim 1, comprising:
retracting (26) said cleaning assembly after extending (26) said cleaning assembly for said cleaning of a portion of said tubular.
3. The method of claim 1, comprising:
biasing (18,24) said cleaning assembly toward a retracted position in an outer housing (14) of said bottom hole assembly.
4. The method of claim 1, comprising:
actuating said cleaning assembly with relative movement of a mandrel (12) with respect to an outer housing (14) of said bottom hole assembly, said outer housing having at least one opening (16) through which said cleaning assembly (18,16) selectively extends.
5. The method of claim 4, comprising:
aligning at least one projection (26) on said mandrel with at least one cleaning member (18, 20) of said cleaning assembly to forcibly push said cleaning member through said opening (16).
6. The method of claim 5, comprising:
providing multiple openings (16,17) as said at least one opening in at least one row with each opening having an associated cleaning member (18,20).
7. The method of claim 6, comprising:
making said at least one row a plurality of rows.
8. The method of claim 6, comprising:
axially aligning openings in adjacent rows to provide flow channels for fluid delivered through said outer housing taking debris to a surface location

when cleaning members (18,20) in multiple rows are extended through respective openings (16,17).

9. The method of claim 7, comprising:

sequentially extending cleaning members (18,20) in one row after allowing cleaning members previously extended in another said row to retract under said bias (22,24).

10. The method of claim 4, comprising:

aligning at least one magnet on said mandrel with at least one cleaning member of said cleaning assembly to forcibly push said cleaning member (18,20) through said opening.

11. The method of claim 4, comprising:

extending and retracting said cleaning assembly with only radial movement.

12. The method of claim 1, comprising:

providing a packer or bridge plug as said tool.

13. The method of claim 2, comprising:

releasing said cleaning assembly from said tool when said tool is set; removing said cleaning assembly (18,20) from the subterranean location in a retracted position.

14. The method of claim 4, comprising:

initiating circulation through a port in said outer housing for debris removal from the subterranean location during said actuation said cleaning assembly.

15. The method of claim 14, comprising:

opening said port during said actuation of said cleaning assembly.

16. The method of claim 15, comprising:

closing set port after said opening of said port to allow pressure buildup in said mandrel for setting said tool;

providing a packer or bridge plug (P) as said tool.

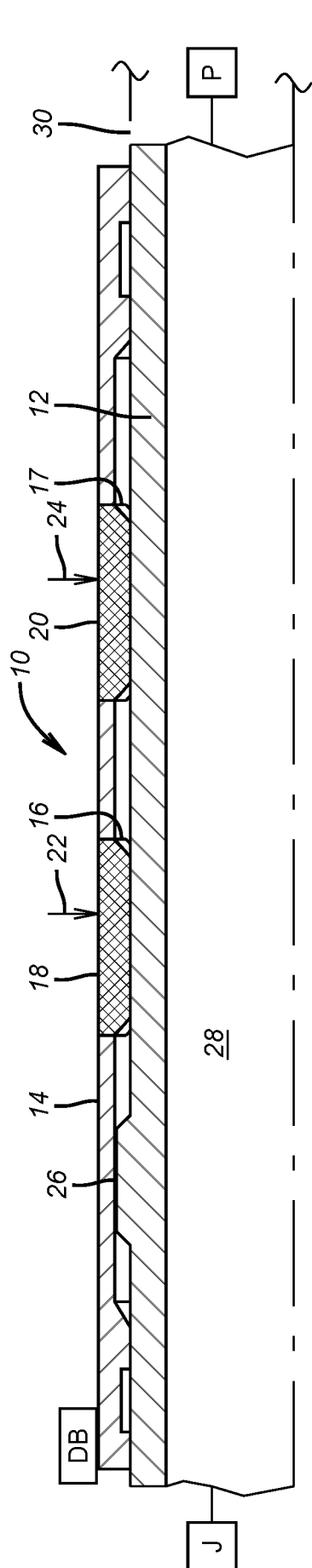


FIG. 1

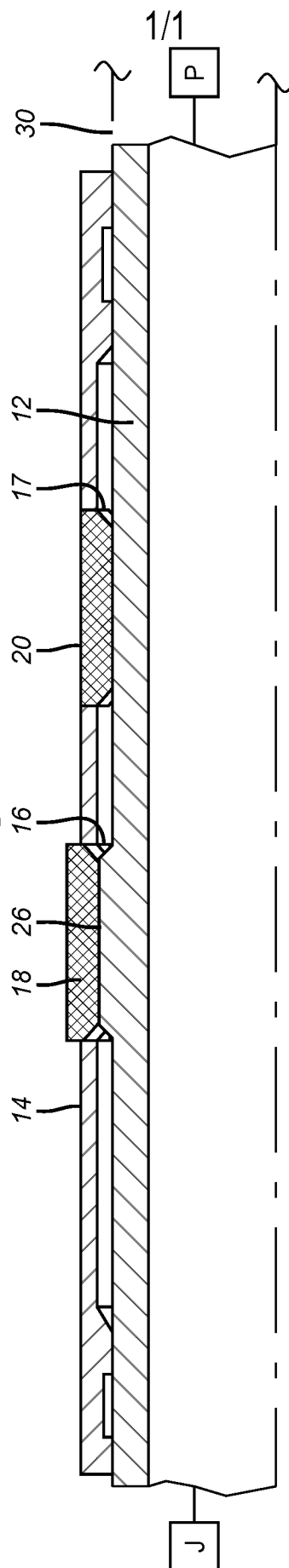


FIG. 2

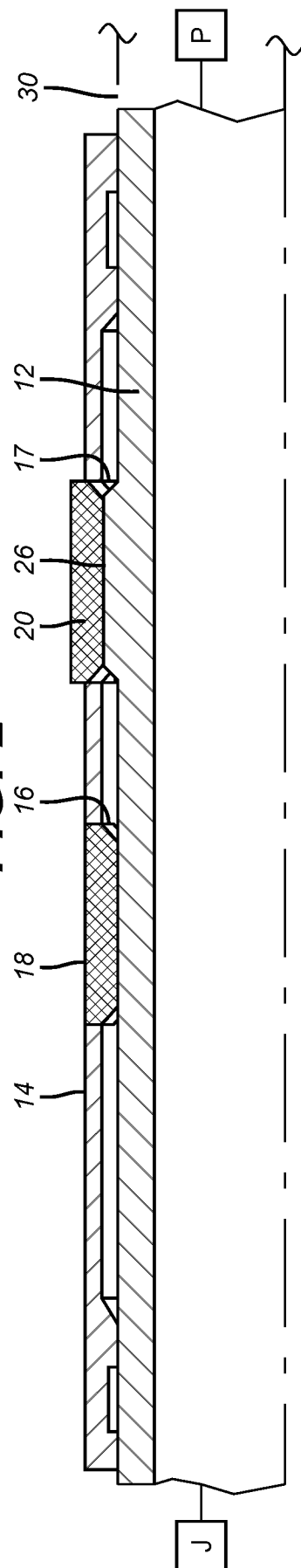


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/028612**A. CLASSIFICATION OF SUBJECT MATTER****E21B 37/00(2006.01)i, E21B 33/12(2006.01)i, E21B 23/06(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E21B 37/00; E21B 12/06; E21B 37/02; E21B 33/13; E21B 23/00; E21B 43/10; E21B 33/12; E21B 23/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: clean, bias, mandrel, packer, debris and tool

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012-0211229 A1 (FIELDER et al.) 23 August 2012 See paragraphs [0004]-[0022], claim 1 and figures 1-2.	1-2, 12-13
Y		3-11, 14-16
Y	US 2009-0272524 A1 (VOTH, RICKEY C.) 05 November 2009 See paragraphs [0010]-[0038] and figures 1-2.	3-11, 14-16
Y	US 2011-0168404 A1 (TELFER et al.) 14 July 2011 See paragraph [0005].	10
A	US 2014-0246239 A1 (BAKER HUGHES INCORPORATED) 04 September 2014 See paragraphs [0019]-[0027] and figures 1-7.	1-16
A	US 2012-0222861 A1 (ERIKSEN, ERIK PETER) 06 September 2012 See paragraphs [0032]-[0040] and figures 1A-3C.	1-16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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Name and mailing address of the ISA/KR

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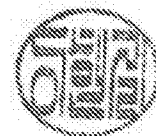
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/028612

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012-0211229 A1	23/08/2012	None	
US 2009-0272524 A1	05/11/2009	None	
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