US Patent & Trademark Office
Patent Public Search | Text View

United States Patent	12385368
Kind Code	B2
Date of Patent	August 12, 2025
Inventor(s)	Langlais; Michael Dean

Shroud-embedded control line clamp

Abstract

A sand screen joint for use with a control line. The sand screen joint may include a shroud having a channel extending longitudinally across the shroud and a control line clamp coupled to the shroud. The control line clamp may include a base having a profile that aligns with the channel of the shroud and a lid that engages with the base to retain the lid in a closed position and to retain the control line within the control line clamp.

Inventors: **Langlais; Michael Dean (Houston, TX)**

Applicant: **SCHLUMBERGER TECHNOLOGY CORPORATION** (Sugar Land, TX)

Family ID: **1000008749851**

Assignee: **Schlumberger Technology Corporation (Sugar Land, TX)**

Appl. No.: **18/682979**

Filed (or PCT Filed): **August 30, 2022**

PCT No.: **PCT/US2022/042030**

PCT Pub. No.: **WO2023/043611**

PCT Pub. Date: March 23, 2023

Prior Publication Data

Document Identifier	Publication Date
US 20240426195 A1	Dec. 26, 2024

Related U.S. Application Data

us-provisional-application US 63261303 20210917

Publication Classification

Int. Cl.: **E21B43/10** (20060101); **E21B43/08** (20060101)

U.S. Cl.:

CPC **E21B43/10** (20130101); **E21B43/08** (20130101);

Field of Classification Search

CPC: E21B (43/10); E21B (43/08); E21B (17/1035); E21B (17/026)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
5379836	12/1994	Jordan	166/241.6	E21B 17/1035
6023027	12/1999	Neff	174/136	E21B 17/1035
6681854	12/2003	Danos	N/A	N/A
6805202	12/2003	Gillespie	N/A	N/A
10197190	12/2018	Neff	N/A	E21B 17/1035
12098598	12/2023	Ortiz	N/A	E21B 17/026
12215805	12/2024	Gill	N/A	B63B 21/27
2010/0018697	12/2009	Richards	166/227	E21B 43/08
2011/0297376	12/2010	Holderman	N/A	N/A
2017/0260815	12/2016	Levie	N/A	N/A
2022/0195816	12/2021	Bardo	N/A	F16L 33/035
2023/0039223	12/2022	Ortiz	N/A	F16B 7/182
2023/0110686	12/2022	Gill	405/172	E21B 17/02
2023/0295990	12/2022	Vannetzel	166/242.6	E21B 17/026

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
0125015	12/1983	EP	N/A

OTHER PUBLICATIONS

Search Report and Written Opinion of International Patent Application No. PCT/US2022/042030 issued on Dec. 13, 2022; 9 pages. cited by applicant

Primary Examiner: MacDonald; Steven A

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is the National Stage Entry of International Application No. PCT/US2022/042030, filed Aug. 30, 2022, which claims the benefit of U.S. Provisional Application No. 63/261,303 entitled “Shroud-Embedded Control Line

Clamp," filed Sep. 17, 2021, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

(1) In many oil and gas well applications, a borehole is drilled into the earth and subsequently completed with equipment, i.e. a completion, to facilitate production of desired fluids from a reservoir. The completion may comprise various types of sand control equipment, e.g. sand screen filters, which block the inflow of sand as the oil and/or gas flow into the completion.

(2) The completion may be assembled by connecting sand screen joints and deploying the sand screen joints downhole into the wellbore to a desired well zone. In a variety of applications, the wellbore may comprise multiple well zones and several sand screen joints may be disposed along each of the well zones. Within each well zone, the individual sand screen joints may comprise inflow ports through which the well fluid flows into the interior of the completion equipment for production to the surface.

(3) Additionally, control lines may be run along the completion from the surface to the toe of the well. While the control lines may be clamped to some sections of the completion, the control lines positioned within channels formed in or coupled to sand screens or shrouds of the sand screen joints to prevent damage to the control lines. Accordingly, it is necessary to retain the control lines within the channels of the sand screen joints.

SUMMARY

(4) A sand screen joint for use with a control line according to one or more embodiments of the present disclosure includes a shroud having a channel extending longitudinally across the shroud and a control line clamp coupled to the shroud. The control line clamp includes a base having a profile that aligns with the channel of the shroud and a lid that engages with the base to retain the lid in a closed position and to retain the control line within the control line clamp.

(5) A completion system according to one or more embodiments of the present disclosure includes a control line and a sand screen joint. The sand screen joint includes a shroud having a channel extending longitudinally across the shroud and a control line clamp coupled to the shroud. The control line clamp includes a base having a profile that aligns with the channel of the shroud and a lid that engages with the base to retain the lid in a closed position and to retain the control line within the control line clamp.

(6) A method for completing a well according to one or more embodiments of the present disclosure includes positioning a control line within a channel of a shroud of a sand screen joint. The method also includes positioning the control line within a base of a control line clamp, the base having a profile that aligns with the channel of the shroud. The method further includes rotating a lid of the control line clamp to a closed position to retain the control line within the control line clamp, wherein the lid engages with the base to retain the lid in a closed position. The method also includes running a completion comprising the sand screen joint into the well.

(7) However, many modifications are possible without materially departing from the teachings of this disclosure. Accordingly, such modifications are intended to be included within the scope of this disclosure as defined in the claims.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) Certain embodiments of the disclosure will hereafter be described with reference to the accompanying drawings, wherein like reference numerals denote like elements. It should be understood, however, that the accompanying figures illustrate the various implementations described herein and are not meant to limit the scope of various described technologies. The drawings are as follows:

(2) FIG. **1** is a schematic view of a well system according to one or more embodiments of the present disclosure;
(3) FIG. **2** is a sand screen joint according to one or more embodiments of the present disclosure;
(4) FIG. **3** is a partial, cross-sectional view of a shroud according to one or more embodiments of the present disclosure;
(5) FIG. **4** is a partial, cross-sectional view of a shroud according to one or more embodiments of the present disclosure;
(6) FIG. **5** is an isometric view of the clamp of FIG. **4** prior to the control line being installed;
(7) FIG. **6** is an isometric view of the clamp of FIG. **4** with the control line installed;
(8) FIG. **7** is an isometric view of the clamp of FIG. **4** in the closed position;
(9) FIG. **8** is a side view of the clamp of FIG. **4** in the closed position;
(10) FIG. **9** is a side view of the clamp of FIG. **4** with the pins retracted; and
(11) FIG. **10** is a side view of the clamp of FIG. **4** with the pins retracted and the lid removed.

DETAILED DESCRIPTION

(12) In the following description, numerous details are set forth to provide an understanding of some embodiments of the present disclosure. However, it will be understood by those of ordinary skill in the art that that embodiments of the present disclosure may be practiced without these details and that numerous variations or modifications from the described embodiments may be possible.
(13) In the specification and appended claims: the terms “connect,” “connection,” “connected,” “in connection with,” “connecting,” “couple,” “coupled,” “coupled with,” and “coupling” are used to mean “in direct connection with” or “in connection with via another element.” As used herein, the terms “up” and “down,” “upper” and “lower,” “upwardly” and “downwardly,” “upstream” and “downstream,” “uphole” and “downhole,” “above” and “below,” and other like terms indicating relative positions above or below a given point or element are used in this description to more clearly describe some embodiments of the disclosure.
(14) Referring now to FIG. **1**, FIG. **1** is a well system **100** that includes a wellbore **102** having a deviated wellbore section **104** extending into a formation **106** containing hydrocarbon fluids. Depending on the application, the wellbore **102** may comprise one or more deviated wellbore sections **104**, e.g. horizontal wellbore sections, which may be cased or un-cased. In the example illustrated, a tubing string **108** is deployed downhole into wellbore **102** and comprises a downhole well completion **110** deployed in the deviated, e.g. horizontal, wellbore section **104**.
(15) The downhole well completion **110** may be constructed to facilitate production of well fluids and/or injection of fluids. By way of example, the downhole well completion **110** may comprise at least one sand screen joint **112**, e.g. a plurality of screen assemblies **112**. Each sand screen joint **112** may include a shroud, e.g. a sand screen, **114** that cover a screen filter through which fluid may enter the corresponding sand screen joint **112** for production to a suitable location, e.g. a surface location. For example, hydrocarbon well fluids may flow from formation **106**, into wellbore **102**, and into the screen assemblies **112** via the shrouds **114**. In some embodiments, the downhole well completion **110** also may comprise a plurality of packers **116** which may be used to isolate sections or zones **118** along the wellbore **102**.
(16) Turning now to FIG. **2**, FIG. **2** is a sand screen joint **212**, according to one or more embodiments of the present disclosure. The sand screen joint **212** includes control line clamps **200** embedded in the shroud **202** of the sand screen joint **212**. The control line clamps **200** retain control lines **204** (e.g., conduits for electrical wires, hydraulic fluid, or fiber optic lines) in a channel of the shroud, shown more clearly below in FIG. **2**, to prevent the control lines **204** from protruding outside of the shroud **202**. Additionally, as described in more detail below, the control line clamps **200** may support at least a portion of the weight of the control lines **204** and/or reduce axial movement of the control lines **204**.
(17) Turning now to FIGS. **3** and **4**, FIGS. **3** and **4** are partial, cross-sectional views of a shroud **202**

of FIG. **2**. As discussed above, the shroud **202** includes a channel **300** that extends longitudinally across the shroud **202** to allow control lines **204** to pass across the sand screen joint **212** to areas of the wellbore that are downhole of the sand screen joint **212**. In one or more embodiments of the present disclosure, the control line clamps **200** are coupled to the shroud **202** via removing a portion of the shroud **202** and welding the control line clamp **200** in place of the removed portion of the shroud **202**. In other embodiments, the control line clamps **200** may be sized to be positioned within the channel **300** and are welded, bolted, or otherwise coupled to the shroud **202** once positioned within the channel **300**.

(18) As shown in FIG. **4** the include a base **400** that has profile that aligns with the channel **300** of the shroud **202**, shown in FIG. **3**, to allow the control lines **204** to pass across the control line clamps **200**. The base **400** may also include a tooth profile **402** that engages with the control lines **204** or a material coupled to and/or surrounding the control lines **204** when the lid **404** is closed to support at least a portion of the weight of the control lines **204** and/or reduce axial movement of the control lines **204**. Further, supporting at least a portion of the weight of the control lines **204** via the control line clamps **200** also reduces axial sag of the control lines, which, if left unaddressed, may cause the control lines **204** to extend outside of the channel. The control line clamps also include a lid **404** having a hinged edge portion **406** that is rotatingly coupled to the base **400** and a toothed edge portion **408** that engages with a ratchet profile **410** formed in the base **400** to retain the lid **404** in a closed position.

(19) Turning now to FIGS. **5-7**, in operation, control lines **204**, shown within plastic encapsulation **500**, are positioned within the control line clamp and the lid **404** is rotated to a closed position, shown in FIG. **7**, to retain the control lines **204** within the plastic encapsulation **500** within the control line clamp **200**, thereby retaining the control lines **204** within the channel **300**. Additionally, the tooth profile **402** engages with the plastic encapsulation **500** when the lid **404** is closed to support at least a portion of the weight of the control lines and encapsulation **500** and/or reduce axial movement of the control lines and encapsulation **500**. In one or more embodiments, the control line clamps **200** are spaced between approximately 4 feet and approximately 8 feet apart. In other embodiments, the control line clamps **200** may be closer than approximately 4 feet apart or further than 8 feet apart, depending on the requirements of the system.

(20) In one or more embodiments, pins **800** biased in closed direction via springs **802** or similar mechanisms are used to removably couple the hinged end portion of the lid **404** to the base **400**, as shown in FIGS. **8-10**. In other embodiments, another removable securing mechanism may be used to couple the lid **404** to the base **400**. The pins **800** are biased in the extended position to extend through the base **400** and into the lid **404**, as shown in FIG. **8**. Additionally, as shown in FIG. **8**, the pins **800** may be biased in opposite directions. When a pressure is applied to the pins **800** in a direction opposite the bias direction, the pins **800** are retracted from the lid **404**, as shown in FIG. **9**. The lid **404** can then be removed from the base **400**, as shown in FIG. **10**. Removing the lid **404** allows control lines **204** to be removed from within the control line clamp **200**.

(21) As used herein, a range that includes the term between is intended to include the upper and lower limits of the range; e.g., between 50 and 150 includes both 50 and 150. Additionally, the term “approximately” includes all values within 5% of the target value; e.g., approximately 100 includes all values from 95 to 105, including 95 and 105. Further, approximately between includes all values within 5% of the target value for both the upper and lower limits; e.g., approximately between 50 and 150 includes all values from 47.5 to 157.5, including 47.5 and 157.5.

(22) Although a few embodiments of the disclosure have been described in detail above, those of ordinary skill in the art will readily appreciate that many modifications are possible without materially departing from the teachings of this disclosure. Accordingly, such modifications are intended to be included within the scope of this disclosure as defined in the claims. It is also contemplated that various combinations or sub-combinations of the specific features and aspects of the embodiments described may be made and still fall within the scope of the disclosure. It should

be understood that various features and aspects of the disclosed embodiments can be combined with, or substituted for, one another in order to form varying modes of the embodiments of the disclosure. Thus, it is intended that the scope of the disclosure herein should not be limited by the particular embodiments described above.

Claims

1. A sand screen joint for use with a control line, the sand screen joint comprising: a shroud having a channel extending longitudinally across the shroud; and a control line clamp coupled to the shroud and comprising: a base having a profile that aligns with the channel of the shroud, the base further having a ratchet profile; and a lid that engages with the base to retain the lid in a closed position and to retain the control line within the control line clamp, the lid including a tooth profile that engages with the ratchet profile to retain the lid in the closed position.
2. The sand screen joint of claim 1, wherein the base further comprises a tooth profile that engages with the control line when the lid is in the closed position to at least one of support at least a portion of a weight of the control line or reduce axial movement of the control line.
3. The sand screen joint of claim 1, wherein the base is coupled to the lid via a removable pin.
4. The sand screen joint of claim 3, wherein the removable pin is biased in an extended position to couple the lid to the base.
5. The sand screen joint of claim 4, wherein the removable pin is biased via a spring.
6. The sand screen joint of claim 1, wherein the base is coupled to the lid via two removable pins, the removable pins biased in opposite directions to couple the lid to the base.
7. A completion system comprising: a control line; and a sand screen joint comprising: a shroud having a channel extending longitudinally across the shroud; and a control line clamp coupled to the shroud and comprising: a base having a profile that aligns with the channel of the shroud, the base further having a ratchet profile; and a lid that engages with the base to retain the lid in a closed position and to retain the control line within the control line clamp, the lid including a tooth profile that engages with the ratchet profile to retain the lid in the closed position.
8. The completion system of claim 7, wherein the base further comprises a tooth profile that engages with the control line when the lid is in the closed position to at least one of support at least a portion of a weight of the control line or reduce axial movement of the control line.
9. The completion system of claim 7, wherein the base is coupled to the lid via a removable pin.
10. The completion system of claim 9, wherein the removable pin is biased in an extended position to couple the lid to the base.
11. The completion system of claim 10, wherein the removable pin is biased via a spring.
12. The completion system of claim 7, wherein the base is coupled to the lid via two removable pins, the removable pins biased in opposite directions to couple the lid to the base.
13. A method for completing a well, the method comprising: positioning a control line within a channel of a shroud of a sand screen joint; positioning the control line within a base of a control line clamp, the base having a profile that aligns with the channel of the shroud; rotating a lid of the control line clamp to a closed position to retain the control line within the control line clamp, wherein a tooth profile of the lid engages with a ratchet profile of the base to retain the lid in the closed position; and running a completion comprising the sand screen joint into the well.
14. The method of claim 13, wherein retaining the control line within the control line clamp further comprises engaging the control line with a tooth profile of the base to at least one of support at least a portion of a weight of the control line or reduce axial movement of the control line.
15. The method of claim 13, further comprising coupling the lid of the control line clamp to the base of the control line clamp via a removable pin.
16. The method of claim 15, wherein coupling the lid of the control line clamp to the base of the control line clamp via the removable pin comprises biasing the removable pin in an extended

position to couple the lid to the base.
17. The method of claim 16, wherein the removable pin is biased via a spring.