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(71) Applicant: **APOLLO ENERGY SERVICES CORP**
[CA/CA]; Building 1000, 10213 Township Road 284a, PO
BOX 469, Crossfield, Alberta T0M 0S0 (CA).

(72) Inventor: **GOWANLOCK, Matthew**; 2336 Baywater
Crescent SW, Airdrie, Alberta T4B 0T4 (CA).

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MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
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(54) Title: DRILLING RIG WITH ATTACHED LIGHTING SYSTEM AND METHOD

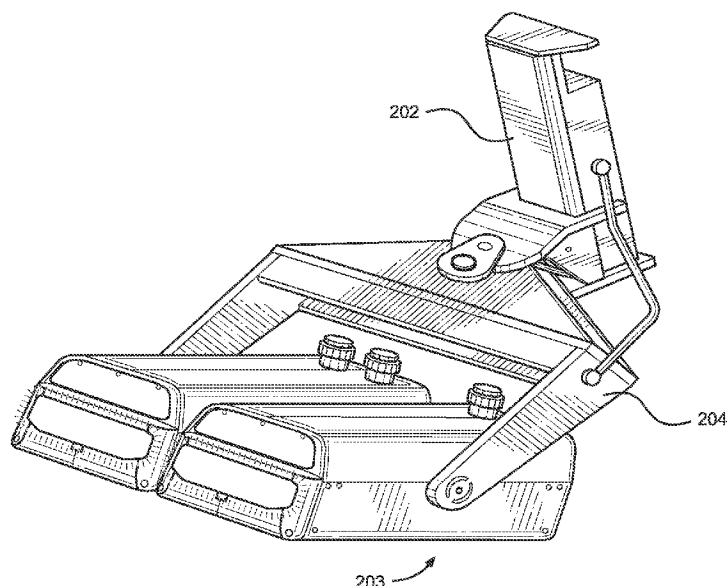


FIG. 2

(57) Abstract: An attachable lighting system for a drilling rig. A method of providing lighting to a drilling rig site comprising, attaching at least one light fixture directly to the crown of a drilling rig on each of at least two sides, wherein the light fixture contains a fixed or removable light fixture attachment connecting the light fixture to the crown, resulting in one or more of enhanced evenness of site lighting, reduced shadows, reduced light pollution, reduced power consumption and/or reduced diesel usage.



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))*

Published:

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DRILLING RIG WITH ATTACHED LIGHTING
SYSTEM AND METHOD

Cross-Reference to Related Applications

[0001] This international application claims the benefit of U.S. Provisional Application Ser. No. 62/381,941, filed August 31, 2016 which may relate to subject matter disclosed in one or more of U.S. Applications Ser. No. 62/366,377, filed July 25, 2016; Ser. No. 62/196,556, filed July 24, 2015; Ser. No. 14/093,097, filed November 29, 2013; Ser. No. 14/632,592, filed February 26, 2015; Ser. No. 62/109,966, filed January 30, 2015; and Ser. No. 62/127,020, filed March 2, 2015. The entirety of each of the aforementioned applications is specifically incorporated herein by reference for all purposes.

Field of the Invention

[0002] The present invention relates generally to the field of drilling apparatuses, such as oil drilling rig arrangements, and in particular to a lighting system for use on a drilling rig

Background of the Invention

[0003] Drilling rigs are used to form wellbores for the purpose of extracting oil, natural gas or other fluids from subsurface deposits. Drilling rigs can also be used for sampling subsurface mineral deposits, testing rock or ground fluid properties and for installing subsurface utilities, instrumentations, tunnels or wells. In implementation, drilling rigs may be mobile equipment transportable by truck, rail, trailers, or similar, rigs may also be semi-permanent and permanent fixtures as in the case for oil drilling of large wells. Marine-based structures are also widely known. Generally, the term drilling rig refers to an arrangement of equipment that is used to penetrate the subsurface of the earth's crust.

[0004] Drilling operations typically occur during daylight hours and visibility in and around the drilling rig has historically only been required when manual work is being done, inspection and calibration, for example. There is a desire to increase productivity by providing visibility during hours of low daylight, and this has thus far been accomplished by providing mobile lighting arrangements on vehicles proximate the drilling rig, or otherwise manually adding or providing impromptu lighting arrangements.

[0005] These arrangements are inadequate and not readily adaptable to systematic visibility improvements in appropriate locations around a drilling rig.

Summary of the Invention

[0006] A method of providing lighting to a drilling rig site is described herein including attaching at least one light fixture directly to the crown of a drilling rig on each of at least two sides of the crown, where the light fixture contains a fixed or removable light fixture attachment connecting the at least one light fixture to the crown, resulting in one or more of enhanced evenness of site lighting, reduced site shadows, reduced site light pollution, reduced site power consumption and/or reduced site diesel usage.

[0007] Additional embodiments described herein include: the method described above where the light fixture and light fixture attachment are a single piece; the method described above where the light fixture is fixed or adjustable; the method described above where the light fixtures are attached around the perimeter of the crown; the method described above where the light fixtures are attached to all sides of the crown; the method described above where more than one light fixture is attached to each side of the crown; the method described above where said each light fixture attachment holds one or more light fixture spaced vertically or horizontally from each other; the method described above where each lighting fixture can swivel and/or tilt; the method described above additionally including secondary containment; the method described above where the crown forms a generally rectangular shape; and the method described above where the lighting is provided to 180 degrees to 360 degrees around the drilling site.

[0008] A drilling rig is also described including a derrick or mast and crown, having a drilling site lighting system attached thereto, comprising at least one light fixture attached directly to the crown on each of at least two sides, wherein the light fixture contains a fixed or removable light fixture attachment connecting the light fixture to the crown, resulting in one or more of enhanced evenness of site lighting, reduced site shadows, reduced site light pollution, reduced site power consumption and/or reduced site diesel usage.

[0009] Additional embodiments described herein include: the drilling rig described above where the light fixture and light fixture attachment are a single piece; the drilling rig described above where the light fixture is fixed or adjustable; the drilling rig described above where the light fixtures are attached around the perimeter of the crown; the drilling rig described above where the light fixtures are attached to all sides of the crown; the drilling rig described above

where more than one light fixture is attached to each side of the crown; the drilling rig described above where said each light fixture attachment holds more than one light fixture spaced vertically or horizontally from each other; the drilling rig described above where each lighting fixture can swivel and/or tilt; the drilling rig described above additionally including secondary containment; the drilling rig described above where the crown forms a generally rectangular shape; and the drilling rig described above where the lighting is provided to 180 degrees to 360 degrees around the drilling site.

[0010] These and additional embodiments are further described below.

Brief Description of the Drawings

[0011] Embodiments will now be described, by way of example only, with reference to the attached Figures, wherein:

[0012] Figure 1A is a lighting system mounted on a drilling rig as described herein.

[0013] Figure 1B is a side view of one embodiment of a light fixture as described herein.

[0014] Figure 2 is a perspective view of one embodiment of a light fixture as described herein.

[0015] Figure 3 is a perspective view showing an embodiment of secondary containment as described herein.

Detailed Description

[0016] An embodiment of a conventional drilling rig 40 with the light fixtures described herein is illustrated in Figure 1A, where the drilling rig 40 includes a derrick 14, which provides a support structure for a majority of the equipment used to raise and lower drillstring 25 into and out of a wellbore. The drillstring 25 may be an assembled collection of drillpipe, drill collars, or any other assembled collection of assorted tools and equipment connected together and run into the wellbore to facilitate the drilling of a well. The drillstring 25 may be raised and lowered into and out of the wellbore by the draw-works 7, which includes a spool powered by a motor or other power source 5. A drill line 12, which may be a thick, stranded metal cable, is run through a travelling block 11. Typically, the crown block 13 remains stationary while travelling block 11 moves vertically with the drillstring 25. The combination of the crown block 13 and the travelling block 11 provides a significant mechanical advantage for lifting the drillstring 25.

Further, a swivel 18 may be attached to the travelling block 11 to allow rotation of the drillstring 25 without twisting the travelling block 11. Drill pipes 16 and hole casing 26 are also shown.

[0017] The drilling rig 40 further includes a rotary table 20 mounted in a rig floor 21, which is used to rotate the drillstring 25 along with a kelly drive 19. Kelly drive 19, attached at an upper end to the swivel 18 and at a lower end to the drillstring 25, is inserted through the rotary table 20 to rotate the drillstring 25 (drillstring rotation shown by arrow "R"). Kelly drive 19 may be square, hexagonal, or any other polygonal-shaped tubing and is able to move freely vertically while the rotary table 20 rotates it. Alternatively, drilling rig 30 may include a top drive (not shown) in place of kelly drive 19 and rotary table 20. Additionally, blowout preventers ("BOPs") may be located below the rig floor 21 and installed atop a wellhead 27 to prevent fluids and gases from escaping from the wellbore. An annular BOP 23 and one or more ram BOPs 24 are shown and are commonly understood in the art.

[0018] During drilling operations, drilling fluid may be circulated through the system to carry cuttings away from the bottom of the wellbore as drilling progresses. Drilling fluid may be stored in mud tanks 1 before being drawn through suction line 3 by mud pumps 4. Drilling fluid (drilling fluid route is indicated by arrows "F") is then pumped from mud pumps 4 through a hose 6, up a stand pipe 8, through a flexible hose 9, and down into the wellbore. Drilling fluid returning from the wellbore is routed through a flow line 28 to shakers 2, which are used to separate drill cuttings from the drilling fluid before it is pumped back down the wellbore.

[0019] The light fixtures described herein (29) are shown attached directly to the crown, in this instance visible on three sides. The light fixture (101 and 203) as shown in this embodiment also in Figure 1B and in perspective view in Figure 2 is held by a bracket (102 and 204) which permits the light fixture to swivel both in a horizontal and vertical orientation. And in this embodiment, the light fixture is connected to the crown directly through the light fixture attachment (103 and 202). The light fixtures can be commercially purchased or custom designed with commercially available materials to suit the use and situation, including specific materials of use (e.g., carbon steel or aluminum, etc.) and light power needs or desired.

[0020] It should also be noted that the entire unit can also be built with secondary containment on all the equipment as demonstrated in Figure 3. For example, safety certified nets (302) around each light fixture (301) can be secured to lugs or other attachment points on the crown, safety certified cables can also be attached to each light fixture and likewise be secured to lugs or other attachment points on the crown, etc. so that nothing can drop off of or

fall from the unit, i.e., it is constructed to meet or exceed all industry “Drops standards” - the drop program standard to build equipment ensuring things don’t fall or get dropped from heights.

[0021] The scope of the claims should not be limited by the preferred embodiments set forth in description of the preferred embodiments or in the examples, but should be given the broadest interpretation consistent with the description as a whole.

CLAIMS:

1. A method of providing lighting to a drilling rig site comprising, attaching at least one light fixture directly to the crown of a drilling rig on each of at least two sides of the crown, wherein the light fixture contains a fixed or removable light fixture attachment connecting the at least one light fixture to the crown, resulting in one or more of enhanced evenness of site lighting, reduced site shadows, reduced site light pollution, reduced site power consumption and/or reduced site diesel usage.
2. The method of claim 1, wherein the light fixture and light fixture attachment comprise a single piece.
3. The method of claim 1, wherein the light fixture is fixed or adjustable.
4. The method of claim 1, wherein the light fixtures are attached around the perimeter of the crown.
5. The method of claim 1, wherein the light fixtures are attached to all sides of the crown.
6. The method of claim 1, comprising more than one light fixture attached to each side of the crown.
7. The method of claim 1, wherein said each light fixture attachment holds one or more light fixture spaced vertically or horizontally from each other.
8. The method of claim 1, wherein each lighting fixture can swivel and/or tilt.
9. The method of claim 1, additionally including secondary containment.
10. The method of claim 1 wherein the crown forms a generally rectangular shape.
11. The method of claim 1, wherein the lighting is provided to 180 degrees to 360 degrees around the drilling site.
12. A drilling rig including a derrick or mast and crown, having a drilling site lighting system attached thereto, comprising at least one light fixture attached directly to the crown on each of at least two sides, wherein the light fixture contains a fixed or removable light fixture attachment connecting the light fixture to the crown, resulting in one or more of enhanced evenness of site lighting, reduced site shadows, reduced site light pollution, reduced site power consumption and/or reduced site diesel usage.
13. The drilling rig of claim 12, wherein the light fixture and light fixture attachment comprise a single piece.
14. The drilling rig of claim 12, wherein the light fixture is fixed or adjustable.

15. The drilling rig of claim 12, wherein the light fixtures are attached around the perimeter of the crown.
16. The drilling rig of claim 12, wherein the light fixtures are attached to all sides of the crown.
17. The drilling rig of claim 12, comprising more than one light fixture attached to two or more sides of the crown.
18. The drilling rig of claim 12, wherein said each light fixture attachment holds more than one light fixture spaced vertically or horizontally from each other.
19. The drilling rig of claim 12, wherein each lighting fixture can swivel and/or tilt.
20. The drilling rig of claim 12, additionally including secondary containment.
21. The drilling rig of claim 12, wherein the crown forms a generally rectangular shape.
22. The drilling rig of claim 12, wherein the lighting is provided to 180 degrees to 360 degrees around the drilling site.

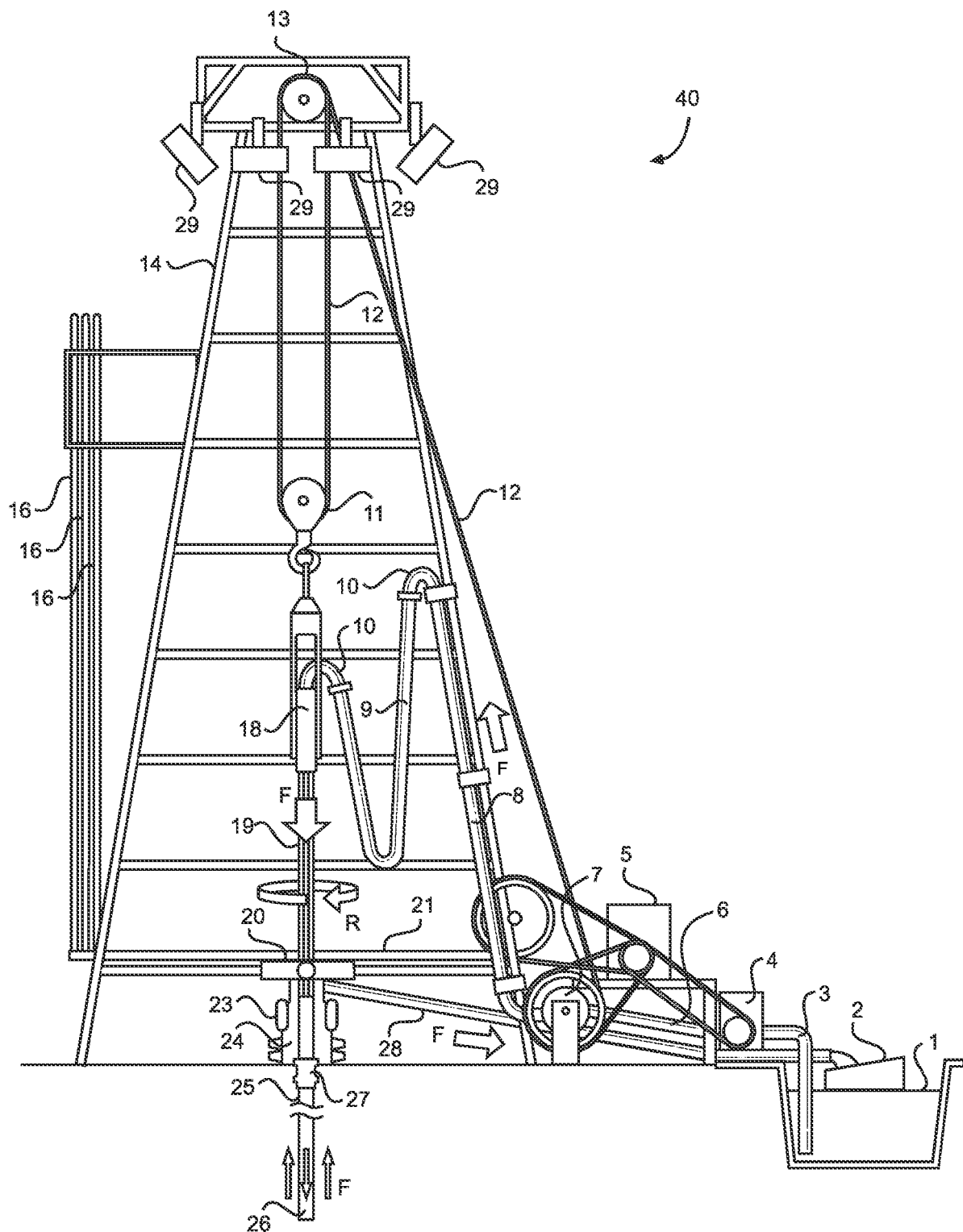


FIG. 1A

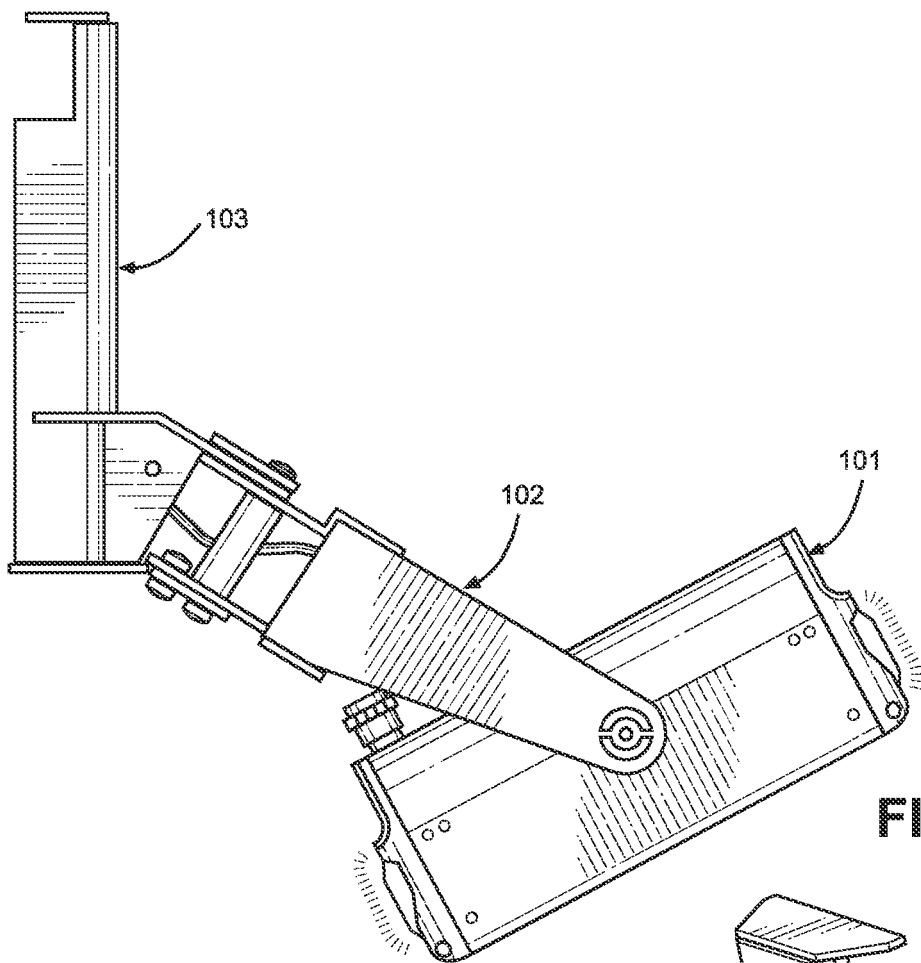


FIG. 1B

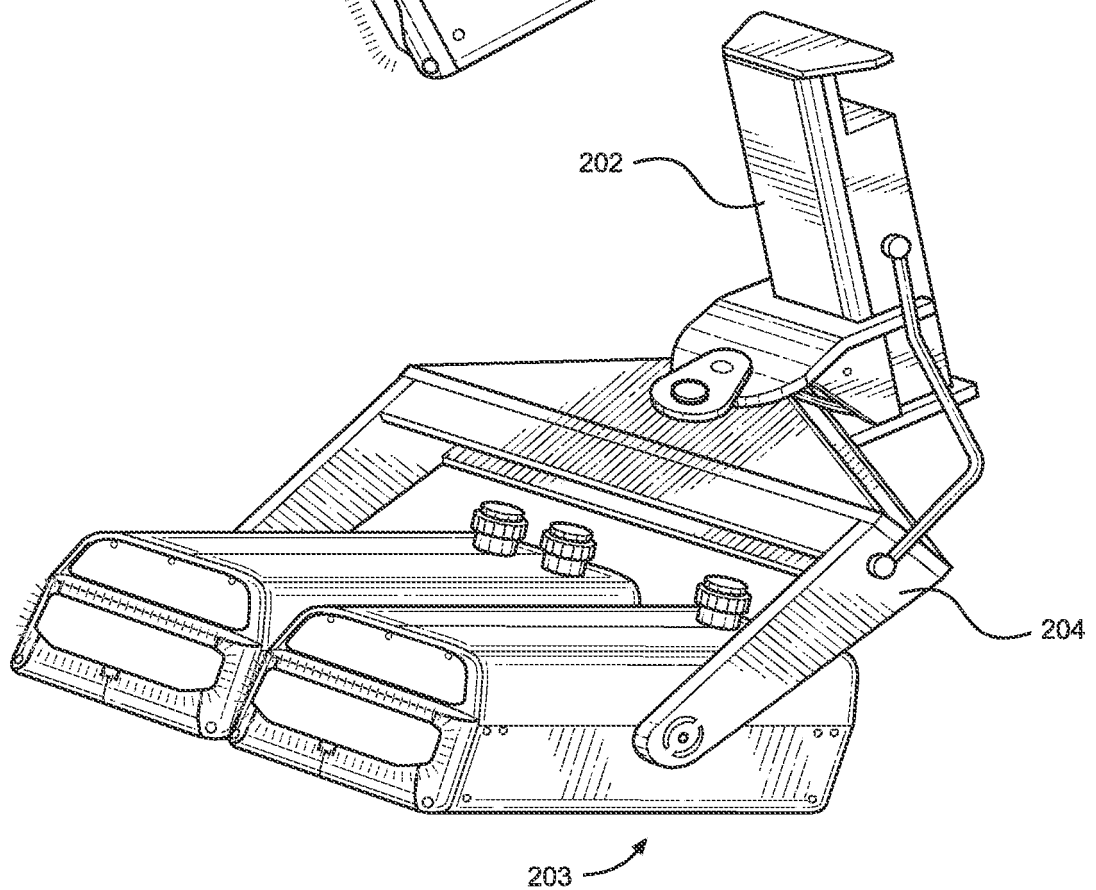
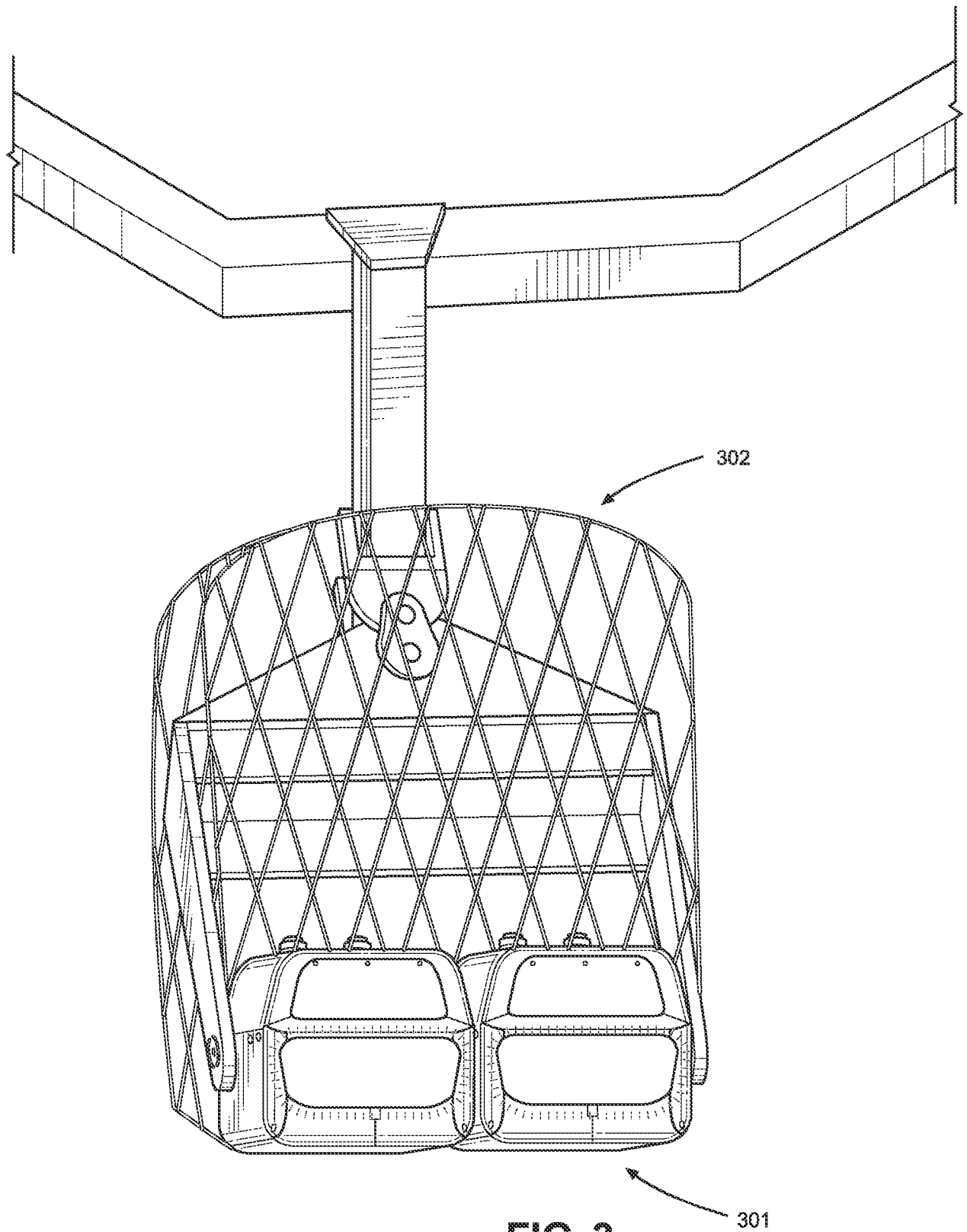


FIG. 2



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC: **E21B 41/00** (2006.01), **E21B 15/00** (2006.01), **E21B 7/00** (2006.01), **F21S 8/00** (2006.01)

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)

IPC: E21B 41/00 (2006.01), E21B 15/00 (2006.01), E21B 7/00 (2006.01), F21S 8/00 (2006.01)

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

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

Canadian Patents Database, Questel-Orbit (FamPat)

Keywords : lighting, drilling, fixture, crown, drill+, rig, reduc+, shadow?, evenness, power

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CA2928251A1 (GOWANLOCK, M. et al.) 04 June 2015 (04-06-2015) *Same Applicant and Inventor* *Abstract; Para[0041, 42, 44, 46, 47]; Fig. 1, 3, 4, 6*	1-22
Y	US2006/0176708A1 (GORDIN, et al.) August 10, 2006	1-22
Y	CN203215413U (DAI, H. et al.) 25 September 2013 (25-09-2013) *Machine translation from Chinese to English using Questel-Orbit* *Abstract; Fig. 1*	8, 19
Y	US2763466A (LEHR, P.E, et al.) 18 September 1956 (18-09-1956) *Col. 2, lines 19-25; Figs. 1, 2*	9, 20



Further documents are listed in the continuation of Box C.



See patent family annex.

* "A" "E" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international filing date 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) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&"	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 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 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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Date of mailing of the international search report
19 December 2017 (19-12-2017)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
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50 Victoria Street
Gatineau, Quebec K1A 0C9
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Authorized officer

William Tse (819) 639-7914

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CN203215413U	25 September 2013 (25-09-2013)	None	
US2763466A	18 September 1956 (18-09-1956)	None	