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(54) **Title**: SELF-PROPELLED SIMULTANEOUS PLATFORM

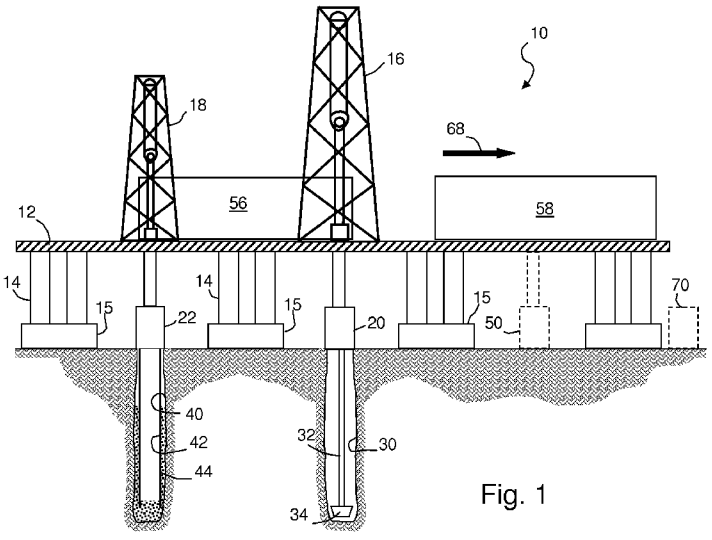

Fig. 1

(57) **Abstract**: A mobile drilling rig system comprises a self-propelled platform supporting a drilling rig at a first wellbore location and a completions rig at a second wellbore location, at least two blowout preventers, and a BOP transport means for transporting one of said blowout preventers to a third wellbore location. A method for drilling and completing a plurality of wellbores comprises: providing a mobile drilling rig system, installing a blowout preventer at a first wellbore location and installing another blowout preventer at a second wellbore location, using the drilling rig to drill a wellbore at said first location while using the completions rig to complete a wellbore at the second location, using the BOP transport means to transport one of the blowout preventers from the second location to a third wellbore location, and moving the platform such that the drilling rig is positioned at the third location.

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SELF-PROPELLED SIMULTANEOUS PLATFORM

RELATED CASES

Not Applicable.

FIELD OF THE INVENTION

[0001] The present invention relates to a method and system for drilling wellbores in the earth. More specifically, it relates to a method and system for performing drilling, completion, or other operations on multiple wellbores from a single platform. Still more particularly, the invention relates to performing multiple operations on multiple wellbores simultaneously from a single platform and advancing the platform between operations.

BACKGROUND OF THE INVENTION

[0002] It is not uncommon to have multiple wellbores at a drilling site. Because of the expense of the drilling rig and its operation, and in order to facilitate servicing of completed wells, it is often desirable to move a the rig, including all of its equipment, from one well to another. In the past, it has been necessary to disassemble the drilling structure, which requires laying down the mast, moving the drilling structure to an alternate well, and then reassembling the drilling structure. This process requires substantial cost and effort and results in downtime for expensive equipment.

[0003] Hence it remains desirable to provide a system that can reduce the cycle time between steps and thereby reduce the overall cost of the operation.

SUMMARY OF THE INVENTION

[0004] In accordance with preferred embodiments of the invention there is provided a mobile drilling rig system, comprising a self-propelled platform supporting a drilling rig at a first wellbore location and a completions rig at a second wellbore location, at least two blowout preventers, and BOP transport means for transporting one of the blowout preventers to a third wellbore location without moving the platform. In preferred embodiments, the BOP transport means transports a blowout preventer to the third wellbore location from the second wellbore location.

[0005] In other preferred embodiments, the invention includes a method for drilling and completing a plurality of wellbores, comprising the steps of a) positioning at a desired location a system in accordance with the preceding paragraph, b) installing one of the blowout preventers at said a

wellbore location and installing another of the blowout preventers at a second wellbore location, c) using the drilling rig to drill a wellbore at the first wellbore location while using the completions rig to run casing at the second wellbore location, d) using the BOP transport means to transport one of the blowout preventers from the second wellbore location to a third wellbore location, and e) moving the platform such that the drilling rig is positioned at the third wellbore location.

[0006] In some embodiments, the completions rig will be positioned at the first location after step e). The method may further include repeating steps b) – e) wherein second, third and fourth wellbore positions replace the first, second and third wellbore positions, respectively.

[0007] As used in this specification and claims the following terms shall have the following meanings:

[0008] "Drilling rig" shall refer to any system capable of supporting a drilling system during drilling operations;

[0009] "Completions rig" shall refer to any system capable of supporting completions operations, including but not limited to running casing, cementing, wireline operations, perforating and/or fracturing. "Completions" and "completing" shall likewise refer to any of the afore-mentioned operations. Similarly, references to completions will be understood to include open-hole completions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a more detailed understanding of the invention, reference is made to the accompanying wherein:

Figure 1 is a schematic side view of a system in accordance with one embodiment of the invention;

Figure 2 is a schematic bottom view of the substructure of a platform in accordance with an embodiment of the invention as viewed from the surface of the earth;

Figure 3 is a schematic top view of a platform in accordance with an embodiment of the invention; and

Figure 4 is a schematic end view of a platform in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0011] Referring initially to Figures 1 and 2, a system 10 in accordance with one embodiment of the invention comprises a platform 12 mounted on a plurality of supports 14. Supports 14 are preferably capable of moving system 10 laterally from one well to the next, as discussed below. A drilling rig 16 and a completions rig 18 are supported on platform 12, along with a control room or "doghouse" 56 and various ancillary equipment, which is represented schematically at 58. One or more catwalks 59 (Figure 3) can be provided as desired for allowing access between platform 12 and nearby equipment.

[0012] System 10 includes means 15 for moving platform 12, which are preferably mounted on or form a part of supports 14 such that platform 12 can be moved as one unit. Supports 14 and moving means 15 are preferably configured such that they do not interfere with the working area under the platform. Moving means 15 may be any suitable structure capable of supporting and advancing the weight of platform 12, rigs 16, 18, and any ancillary equipment. In some embodiments, means 15 may comprise hydraulic walking planks or beams, skids, sleds, rails, wheels, continuous or caterpillar tracks, or any other suitable mechanism. In some embodiments, platform 12 is advanced by supporting the entire platform as it is lifted and "walked" forward before being set down at the next location. Systems for "walking" a rig forward are known and commercially available, such as, for example the Columbia Rig Walking systems available from Columbia Industries LLC of Hillsboro Oregon and the Apex Walking™ Rig available from Patterson-UTI Energy, Inc. of Houston, Texas.

[0013] System 10 can be self-propelled or advanced by external drive systems. The platform preferably moves intact, preferably without requiring disassembly of any major structures. In preferred embodiments, platform 12 is self-propelled.

[0014] The ancillary equipment 58 that is normally associated with drilling and completion operations, such as mud tanks, separators, pumps, pipe handling equipment, and the like, is preferably mounted and configured so as to be mobile with the platform using a traditional layout for the ancillary equipment on the platform. In an alternative embodiment, an umbilical system may be employed, in which the ancillary equipment is housed in a main complex that is not mounted on the moving platform.

[0015] In preferred embodiments, the ancillary equipment is shared between the two rigs 16, 18, which allows approximately a 30-40% reduction in the amount of ancillary equipment required

as opposed the operation of to two complete rig systems. Thus, for example, the present system may require three pumps instead of four and one tank system instead of two. It should be noted, however, that two independent BOP systems, including accumulators etc., are typically required in most regulatory environments.

[0016] Drilling rig 16 may be any conventional drilling rig such as are known in the art. Drilling rig 16 is preferably capable of operating in an automated or semi-automated mode and is preferably equipped with all necessary operation and safety equipment, as is known in the art.

[0017] Completions rig 18 may be any rig such as are conventionally used for performing completions and/or workovers. Completions rig 18 is preferably capable of running casing and other tubulars, cementing, wireline operations, and the like and is preferably equipped with all necessary operation and safety equipment, as is known in the art

[0018] In some preferred embodiments, at least one of rigs 16, 18 are moveable with respect to the platform. Thus, in preferred embodiments, means (not shown) are provided for adjusting the position of completions rig 16, in case the spacing between wells is not identical. The positions-adjusting means may comprise rails or a track or skid system mounted on platform 12, or a sub-platform that is provided with a separate drive and movement system that allows its position to be adjusted relative to the main platform 12.

[0019] Referring again to Figure 1, system 10 also includes a first blowout preventer (BOP) 20 and a second BOP 22. First BOP 20 is associated with drilling rig 16 and is used in a conventional manner to provide backup control over a well drilled by drilling rig 16. Thus, for example, drilling rig 16 may be used to drill a wellbore 30 using a drillstring 32 and drillbit 34. Second BOP 22 is associated with completions rig 18 and is used in a conventional manner to provide backup control over a well being completed by completions rig 18. Thus, for example, completions rig 18 may be used to place a casing string 42 into a previously-drilled wellbore 40, to cement the annulus between wellbore 40 and casing 42, as at 44, and/or to perform other post-drilling operations in or on wellbore 40.

[0020] Referring now to Figure 2, from which moving means 15 are omitted for clarity, the substructure of platform 12 includes supports 14 as described above and a BOP management system 60. Second BOP 22 is positioned at a first BOP position so as to coincide with the location of borehole 40 (shown in Figure 1). First BOP 20 is positioned at a second BOP position that coincides with the location of rig 16 (shown in Figure 1). A third BOP position 50

lies on the opposite side of platform 12 from the first BOP position and a fourth BOP position 70 is indicated beyond position 50. It will be understood that BOPs 20, 22 are connected to and disconnected from to the drilling and completions rigs, respectively, in a conventional manner.

[0021] BOP management system 60 is preferably mounted on the underside of platform 12 and includes a pair of rails 62 that extend from the first BOP position to third BOP position 50. BOP management system 60 further includes a drive means for engaging BOP 22 and transporting it, via rails 62, around BOP 20 to BOP position 50, as illustrated in phantom in Figures 2 and 4. As shown in Figure 2, the drive means may be a tractor 64 that engages rails 60. Alternatively, the drive means may be housed at one end of the rails, as shown at 66. While one preferred embodiment of BOP management system 60 is shown and described, it will be understood that the drive and steering mechanism(s) can be any mechanism(s) capable of performing these functions.

Starting a Pass

[0022] It will be recognized that there will be more than one technique for commencing a pattern of wells. When starting a pass to create a line of wells, two BOPs will typically be nippled up and pressure tested at the first two well positions prior to the start of operations for that pass.

[0023] In one embodiment, the two BOPs are installed and pressure tested before the pass is begun. If surface casing doesn't require bops, then the first set up would be for intermediate or production tubing. In these embodiments, the balance of the surface casings can installed while the two BOPs are set up with lifting/pressure testing equipment. In instances where surface casing requires BOPs, platform 12 begins with rig 16 over the first conductor and first BOP, then, when rig 16 has finished drilling, it shifts to the second conductor and second BOP, leaving the first BOP at the first hole so that completions rig 18 can run casing there.

Mid-Pass

[0024] In mid-pass operation, i.e. after the first two holes have been drilled and completed, respectively, platform 12 is positioned at the next desired location and supports 14 are planted or locked so as to maintain platform 12 stable in a fixed position. Drilling operations are commenced using rig 16 and BOP 20, resulting in a new borehole, as at 30 in Figure 1. Concurrently with the drilling operations, completions rig 18 and BOP 22 may be used to complete the previous borehole, as at 40 in Figure 1. Once the completion work at borehole 40 is concluded, BOP 22 may be disconnected from borehole 40 and BOP management system 60

may be actuated to engage and transport BOP 22 to BOP position 50. Specifically, tractor 64 may pick up BOP 22 and propel it along rails 62 to its new position at 50, in effect "leapfrogging" the new borehole 30. Once at position 50, BOP 22 can detached from tractor 64 and can be prepared and tested for the next drilling operation.

[0025] Once drilling of the next borehole 30 is complete, supports 14 are unlocked and platform is again advanced laterally as indicated by arrow 68 in Figures 1 and 2. The distance and direction of the advance is preferably such that rig 16 moves into position over the next borehole location as at 50 in Figure 1. The distance of the advance is preferably a predetermined amount and may be on the order of 10 to 100 feet. While platform 12 is in transit, each BOP remains engaged with its respective borehole, ensuring that the wells are controlled throughout the operation. Supports 14 are preferably configured so as to not interfere with the BOPs during transit of platform 12.

[0026] In the next mid-pass cycle, drilling takes place at position 50 and completion at position 30. BOP 20 leapfrogs to position 70 (Figure 1) when well 30 has been completed. Once drilling of the new borehole is finished, supports 14 are again unlocked and platform is advanced laterally as indicated by arrow 68 in Figure 2 Once platform 12 has reached its next location, supports 14 are again planted or locked and platform 12 is ready to begin the next cycle.

[0027] The process can be repeated until a desired number of wells has been drilled and completed. The method and system allow optimal use of resources by ensuring that each BOP is advanced to the next drilling location as soon as it is no longer needed at its previous completion location.

[0028] In a typical operation on a two string (surface and production) well, the steps of running casing, cementing, and concluding BOP nipple down/up/pressure testing takes about 3 days per well. As drilling typically takes from 5 to 7 or more days, it is possible to save 2, 3, or more days per well by using the present system, as compared to performing the operations without leapfrogging. In preferred embodiments, the present system is operated as a batch setting system in which drilling and cementing are carried out, with leapfrogging, to place all the surface casings, followed by placement of all the intermediate strings (if required), followed in turn by placement of the production casings, with each placement involving a pass of the system across the pad. Thus, for example, in a field in which only surface and production tubing are desired, platform 12 would make two passes.

[0029] The system described herein saves time and resources as compared to other options. For instance, the desired well spacing typically is not large enough to accommodate two complete platforms. Also, by sharing ancillary systems, the amount of ancillary equipment can be reduced to approximately 1.25 x that of a single drilling or completion operation, rather than 2 x. The present system allows the casing running, cementing, and BOP nipple up/down and pressure testing steps to be carried out offline, i.e. without using two full rigs, crews, etc. Additionally, it is expected that, by reducing the amount of operating equipment, safety will be improved.

[0030] In preferred embodiments, platform is completely self-contained. Platform 12 preferably incorporates all currently employed drilling practices and technologies, which are integrated on platform 12 so as to complete all activities while enabling the entire assembly line to move each time the rig moves to the next well.

[0031] Recovery from the eventuality of a failure during the case and cement activity must be incorporated such that the drilling activity can efficiently be re-initiated on an already drilled well once casing has been recovered. In some preferred embodiments, this means that the completions rig can recover the casing and lay it down, then the platform can be cycled back and the drilled hole can be re-entered and fixed (reamed etc).

[0032] Inter-pad and inter-well relocation times are preferably on the order of 3 to 5 days, such as is currently known in the art.

[0033] In preferred embodiments, the system includes rig automation systems such as are known in the art so as to enable the dual functions to be performed using fewer personnel than would be required for two complete rig crews.

[0034] While the present invention has been shown and described in terms of a preferred embodiment, it will be understood that various modifications to the system described herein could be made without departing from the scope of the claims that follow. Thus, for example, the platform could support more than two rigs, the BOPs could be transported from one well location to the next via other routes and other mechanisms, and various automation, safety, and optimization techniques could be combined with the principles set out herein.

CLAIMS

What is claimed is:

1. A mobile drilling rig system, comprising:

a self-propelled platform, said platform supporting a drilling rig at a first wellbore location and a completions rig at a second wellbore location;

at least two blowout preventers, and

a BOP transport means for transporting one of said blowout preventers to a third wellbore location.

2. The system of claim 1 wherein the BOP transport means transports a blowout preventer to the third wellbore location from the second wellbore location.

3. The system of claim 1 wherein the platform includes a plurality of supports and said supports are configured so as to not interfere with a blowout preventer during transit of said platform.

4. A method for drilling and completing a plurality of wellbores, comprising the steps of:

a) positioning at a desired location a system comprising:

a self-propelled platform, said platform supporting a drilling rig at a first wellbore location and a completions rig at a second wellbore location;

at least two blowout preventers, and

a BOP transport means for transporting one of said blowout preventers to a third wellbore location;

b) installing one of said blowout preventers at said first wellbore location and installing another of said blowout preventers at the second wellbore location;

c) using the drilling rig to drill a wellbore at said first wellbore location while using the completions rig to complete a wellbore at the second wellbore location;

d) using the BOP transport means to transport one of said blowout preventers from the second wellbore location to a third wellbore location; and

e) moving the platform such that the drilling rig is positioned at the third wellbore location.

5. The method of claim 4 wherein after step e) the completions rig is positioned at the first location.

6. The method of claim 4, further including repeating steps b) – e) wherein second, third and fourth wellbore positions replace the first, second and third wellbore positions, respectively.

7. The method of claim 4 wherein step e) includes maintaining control of the well at the first wellbore location.

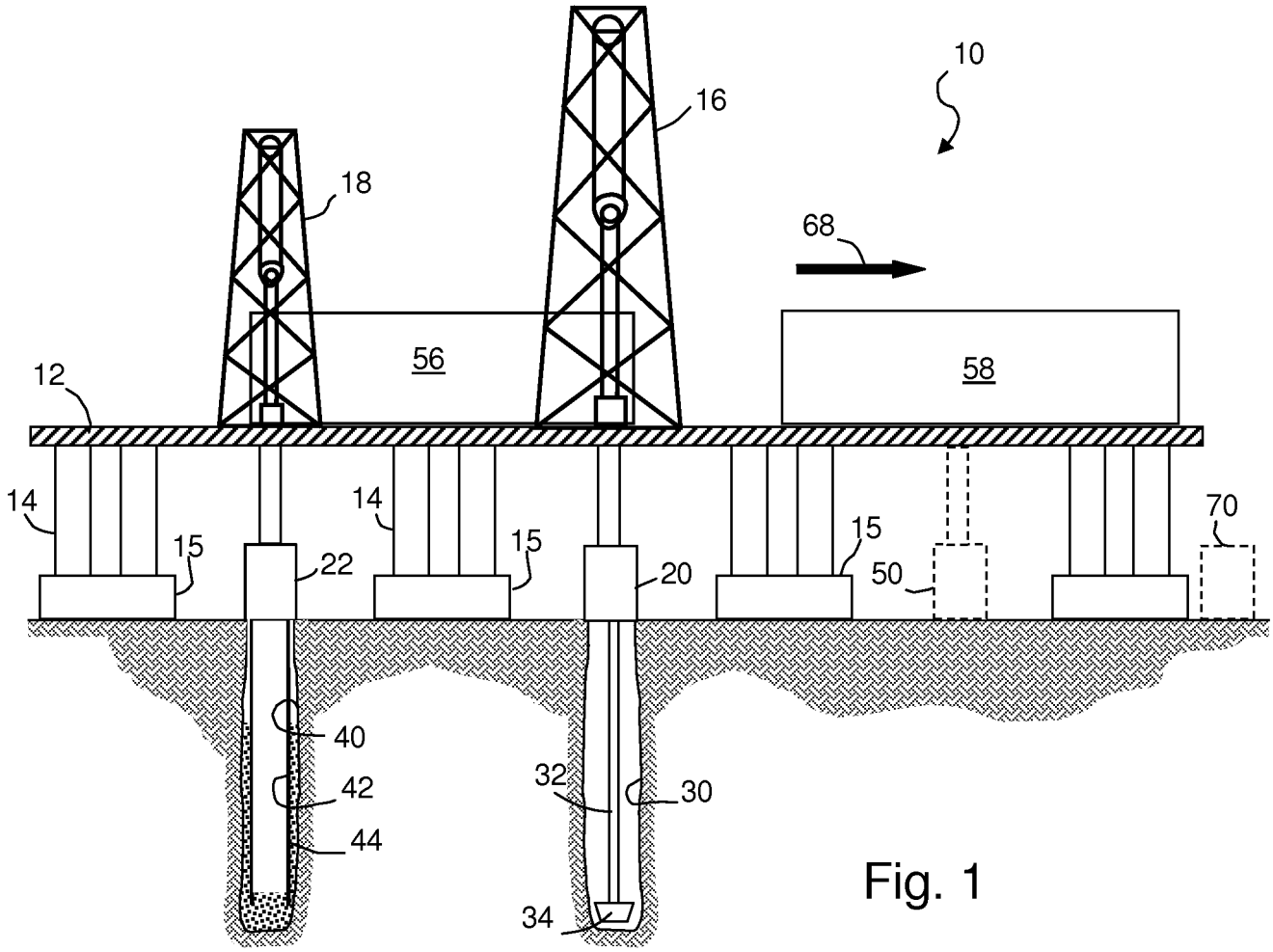
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Fig. 1

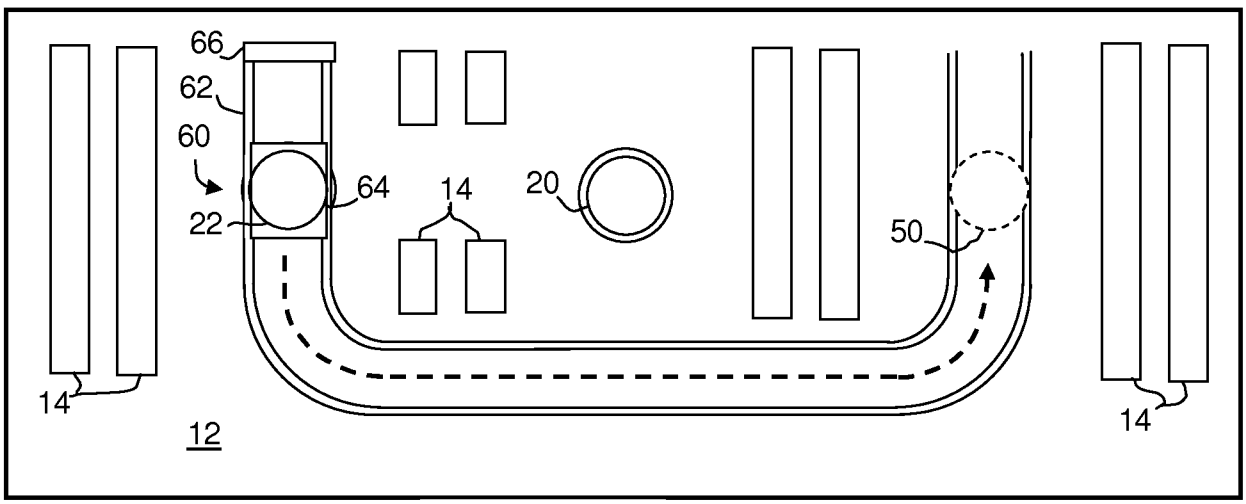
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Fig. 2

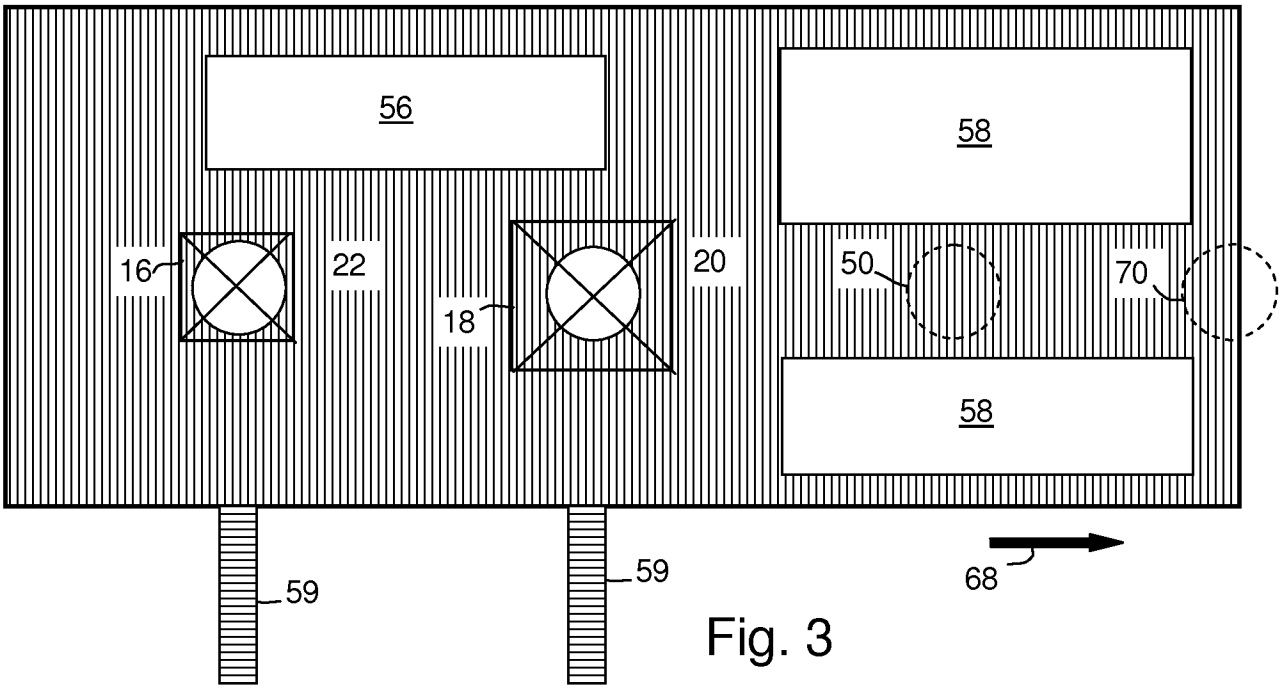

Fig. 3

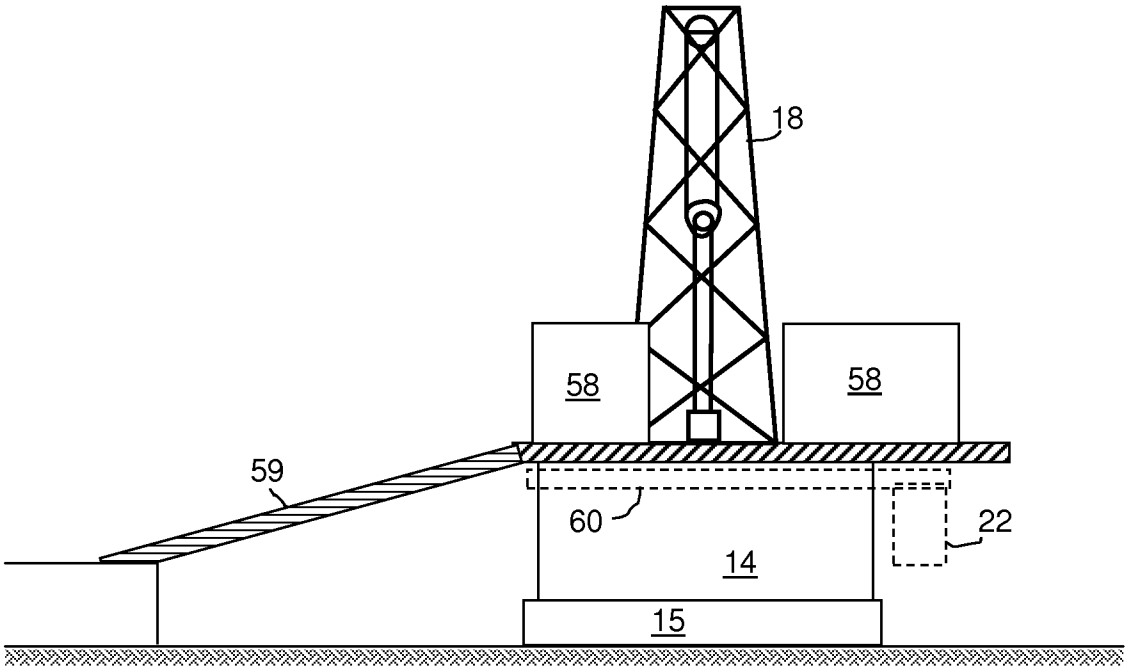

Fig. 4