MOVABLE WELLHEAD PLATFORM

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ABSTRACT

A movable platform system for performing workover tasks on a wellhead includes a platform base with a base wellhead access gap at its front end. At least one track is fixed to the upper surface of the platform base and extends from the rear of the platform base to a position near the rearward edge of the base wellhead access gap. A platform support frame with a wellhead access gap at its front end is coupled to the track and configured for movement along the length of the track. An upper platform is connected to the platform support frame and also has a platform wellhead access gap at its front end. The three wellhead access gaps at the three levels of the platform system are substantially aligned when the movable platform support frame is disposed and locked in the working position above the wellhead. Workers on the upper platform have access to equipment surrounding the wellhead.
MOVABLE WELLHEAD PLATFORM

CROSS-REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] This invention relates generally to the field of temporary work platforms for oil and gas wellheads and more particularly to transportable elevated platforms for supporting workers and equipment to facilitate work being performed on or around wellheads in the absence of drilling rigs.

BACKGROUND OF THE INVENTION

[0003] Producing oil and natural gas wells occasionally requires major repairs or modifications, called “workovers.” Workover services are occasionally carried out with the same type of rig used to perform maintenance services, although the rig often is outfitted with specialized equipment including rotary drilling equipment, mud pumps, mud tanks and blow-out preventers. In many cases it is convenient to perform workovers in the absence of drilling rigs. Such workover examples may require the use of equipment such as endless tubing units, wire line units, snubbing units, fracture stimulation units, and other heavy equipment. In addition to workover of an existing well, in other cases various “completion” tasks need to be performed to plug a well whose useful lifetime is finished. These tasks can include selectively perforating the well casing at the depth of discrete producing zones and installing down-hole equipment.

[0004] In most cases when such workover completion work is being performed on a wellhead, ordinary modular-type scaffolding is erected around the wellhead so that workers can access equipment at the wellhead at an elevated position. Scaffolding is inconvenient for several reasons. It takes significant time to assemble and certify for safety, it can be unstable on frozen ground that is subject to thawing, and is not easily moved to accommodate exchange of equipment at the wellhead. In addition, this type of scaffolding is accessed by ladders which represent an additional safety hazard. Other types of platform configurations include:

[0005] U.S. Pat. No. 6,681,894 discloses a portable wellhead platform that provides access of personnel to the wellhead during workover and snubbing operations which is coupled directly to the wellhead with a pipe flange adaptor.

[0006] U.S. Pat. No. 6,848,539 also discloses a demountable wellhead platform that is supported above the wellhead by an armature connected to a blow-out preventer stack.

[0007] U.S. Patent Application 20070193749 discloses a mobile transport platform for a snubbing system which has substantially all of the equipment mounted thereon as required for snubbing operations. The system comprises a snubbing structure with work platforms pivotally mounted at the rear of an equipment bed of a truck.

[0008] PCT publication WO2006019880 discloses a truck mounted, self propelled unit that includes a self-erecting mast that includes a work platform supported in the horizontal position over the wellhead. The work platform is typically mounted to the rear of the truck.

[0009] In general, prior attempts to provide a convenient work platform for workover and completion operations at oil and gas wellheads, apart from scaffolding-based platforms, have provided platforms that are connected to equipment disposed at the wellhead itself, or integrally connected to a vehicle. There is a need for a more flexible and inexpensive workover platform that allows convenient access to the wellhead for exchange or repair of equipment disposed thereon.

SUMMARY OF THE INVENTION

[0010] According to one aspect, the invention relates to a platform system to permit workover tasks to be performed on a wellhead which comprises an upstanding aboveground wellhead component. According to this aspect, the system comprises:

a) a base for resting on a ground surface, having front and rear ends defining a central longitudinal axis extending from said front end to said rear end, said base comprising two spaced apart portions on opposing sides of said longitudinal axis defining a recess therebetween open to said front end and a ground-contacting surface configured to support said base on said ground surface to permit said base to slide along said surface;

b) a platform frame supported on said base;

c) said base and platform frame including first and second cooperating means respectively which permit said frame to be moved along said base along said longitudinal axis between a forward position adjacent to said front end of said base and a retracted position adjacent to said rear end of said base;

d) an upper platform supported by said platform frame and moveable therewith, said upper platform comprising two spaced apart portions on opposing sides of said longitudinal axis defining a recess therebetween open to the front end thereof; and

e) said base, frame and platform being configured to permit said base and platform recesses to be at least partially aligned when said frame and platform are in said forward position, wherein said wellhead component may be received within the respective recesses such that the platform recess at least partially surrounds said component to locate said spaced apart portions of said platform on opposing sides of said wellhead component to permit worker access thereto.

[0011] Persons skilled in the art will appreciate that various cooperating means may be adapted to permit the frame (and platform supported thereby) to move along the base. In one embodiment, these means comprise a track mounted to said base extending parallel to said longitudinal axis, and flanged wheels mounted to said frame configured to ride on said rails. Preferably, the truck comprises spaced apart rails located on opposing spaced apart portions of said base.

[0012] The platform may be elevated or lowered to improve access to the wellhead component. This may be provided by various means, such as including in the frame one or more vertically extendible members configured to elevate or lower said upper platform relative to said base. These may consist of one or more telescoping support members and one or more jacks, rams, or other actuators to elevate or lower the platform.

[0013] The frame may be locked in position along the base to maintain the platform in a selected horizontal position relative to the base, such as a forward position to provide access to the wellhead component, a retracted position away from said wellhead component, or an intermediate position. For this purpose, the system may include a stop member such
as alignable openings within the frame and base and a removable pin that can be inserted through the respective openings when aligned. For example, the base may include a row of openings, located between the fully forward and fully retracted positions, that can be aligned with one or more openings in the frame. The frame opening is conveniently located in a housing which partly surrounds one of the rail-contacting wheels.

The system may further comprise an outrigger configured to contact the ground surface when said base is resting thereon to stabilize said platform system. The outrigger can be removably mounted to said base.

Preferably, the system further comprises a secondary platform mounted to said frame at a position beneath said upper platform to provide an additional location for a worker.

The system may further comprise additional components, including various safety features such as removable or collapsible guard rails, safety tether anchoring posts and stairs extending from the upper platform to the ground or to the platform base. The system may also comprise at least one wheel or roller mounted to said base to permit said base to be rolled along said ground surface.

The method further relates to a method of providing worker access to permit workover tasks to be performed on a wellhead, said wellhead comprising an upstanding above-ground wellhead component. The method includes providing a system as generally defined above and assembling said base, frame and platform. The base can be positioned adjacent to said wellhead component wherein said portions of said base are located on opposing sides of said component and said component protrudes through said recess in said base. The frame is then moved along said base to position said platform adjacent to said component wherein said component protrudes through the recess of said upper platform. The base, frame and platform may be delivered as discrete separate units to the location of said wellhead and then assembled at said location.

When equipment repair or exchange is necessary at the wellhead, the frame is unlocked from the track and can be moved rearwardly along the track to provide free space in the vicinity of the wellhead. The platform support frame can then be locked in its rearward position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective view of the platform system according to an embodiment of the present invention.

FIG. 2 is a top perspective view of the platform base and the platform support frame.

FIG. 3 is a side view of the platform base and the platform support frame.

FIG. 4 is a front perspective view of the platform system, with the upper platform omitted for clarity.

FIG. 5 is a front perspective view of the upper platform.

FIG. 6 is a rear perspective view of the upper platform.

FIG. 7 is a perspective view, from the front, of a second embodiment of the invention.

DETAILED DESCRIPTION

Referring to FIGS. 1-5, platform system 10 includes base 11, support frame 12 which is movable with respect to the platform base 11 and upper platform 13 which is connected to support frame 12 and moves cooperatively therewith. Optionally, the system includes a lower platform to provide an additional location for a worker. Platform system 10 comprises front and rear ends 2 and 4 respectively, and left and right lateral sides 6 and 8 respectively. An elongate axis is defined as extending from the front to the rear ends, parallel to sides 6 and 8.

Base 11 is composed of an open framework of rigid members which includes elongate runners 14 which extend parallel to the elongate axis of the system. Runners 14 consist of side runners 14a and located adjacent to sides 6 and 8, and central runner 14c located between runners 14a and 14b. Runners 14 have a smooth lower surface and include upturned tips to permit a user to slide platform system 10 over a ground surface, such as a rough or irregular surface around the wellhead. Although the present embodiment relates to elongate relatively narrow runners to serve this purpose, other configurations or members that provide a smooth lower surface may be provided to serve the same function.

Base 11 includes transverse bars 16 connecting runners 14. Gussets 18 provide additional rigidity and support where bars 16 join runners 14. One or more wheels 20 are mounted to the rearward bar 16 and are located at the rear end of the base. Wheels 20 are mounted at a position to be elevated slightly above the ground, or to just contact the ground, when the base is level and located on a flat surface with the runners 14 resting on the surface. Wheels 20 are configured to permit platform system 10 to be rolled on a flat hard surface when the forward edge 22 of base 11 is raised to tilt the system rearwardly, thereby elevating runners 14 and permitting the full weight of the system to be carried on wheels 20. Wheels 20 are sufficiently robust to support the weight of the system 10, as well as equipment which would be expected to be carried by system 10 during its normal operation. It will be seen that in place of wheels 20, the system may include any suitable wheel means, or rotating member can serve essentially the same function as wheels 20, such as a rotatably journalled cylinder (not shown).

Base 11 further comprises a track 24, consisting of a pair of rails 24a and b, which are mounted to the outer runners 14a and 14b and extend substantially the length thereof, parallel to the elongate axis of the system.

Support frame 12 is supported on base 11 and can be displaced relative to base 11 between the front and rear ends thereof, along the elongate axis thereof. In the present embodiment, frame 12 is rolled along base 12 by means of flanged wheels 26 mounted to the frame 12, which roll on a track 24 on base 11. Each wheel 26 contains within a housing composed of spaced apart plates 30, and is journalled on an axle (not shown) extending between housing plates 30. Housing plates 30 include aligned openings 31 which extend transversely across the housing. Advantageously, the construction of the platform support frame 12 permits one or two workers to push it along track 24 manually. Optionally, the frame may be winched along the track, in particular if the ground is sloping or heavy equipment is being borne by the system. A hydraulic ram or a jack may also be employed to move the frame along the base.

In general terms, frame 12 is carried on base 11 by a means which supports frame 12 on an elongate surface of base 12, and permits movement of frame 12 along the surface. It will be seen that various means are known per se or may be readily adapted to permit frame 12 to move along base 11. One such means, not illustrated, is a rack and pinion gear system, wherein the rack is disposed along the surface of the platform base 11 and pinions are mounted to the frame 12.
Such means may also take the form of one or more wheels or other rotatable members, which ride on a suitable surface on the base such as a track, a flat surface, a toothed surface, or other surface configuration.

Frame 12 may be fixed in a selected position along base 11 to selectively prevent the platform from moving. A series of holes 28 extend transversely through rails 14 (best seen in FIG. 3). Holes 28 can be aligned with openings 31 within wheel housings 30. When the respective openings are aligned, a locking pin (not shown) may be inserted to lock wheel housings 30 to track 24 to fix the position of frame 12 on base 11 in a desired location. It will be seen that the lock means are optional, although it is preferred that such means be provided for greater security when using the platform to perform work on the wellhead components.

Frame 12 includes four upstanding legs 32 that support one of the four corners of the platform support frame 12. Wheel housings 30 are mounted to the base of legs 32.

The base 11 has a generally C-shaped configuration which is open to the front, characterized by forwardly-projecting portions 15a and 15b of runners 14a and 14b that are spaced apart to form a central recess 34. Recess 34 is configured to receive a conventional wellhead by sliding the system 10 forwardly such that portions 15a and 15b lie on either side of the wellhead. The upper platform 13 has a similar C-shaped configuration which includes an open-fronted recess 38 which has a similar configuration to recess 34 to accommodate the wellhead components and their associated equipment in a similar fashion. Recess 38 is defined by spaced apart portions 13a and 13b of platform 13. Portions 13a and 13b are preferably configured with a relatively wide side-to-side distance (which may be the same or different) to accommodate a worker and equipment. The platform support frame 12 likewise includes a recess 36 aligned with recess 38. Rails 24a and 24b extend into projections 15a and 15b to permit frame 12 and upper platform 13 to be placed in a position partially surrounding the wellhead so that workers can carry out workover or completion tasks thereupon. When frame 12 is positioned in its forwardmost position (seen in FIG. 1), the respective recesses 34, 36 and 38 are substantially aligned.

Returning now to the platform support frame 12, attached generally at each corner is an upper platform vertical extension means, such as a screw jack 40 which may be operated through hydraulic power via a sprocket and chain drive, for example. Any suitable actuating means may be provided to elevate the platform, such as hydraulic cylinders (not illustrated). The platform support frame 12 further has connection points 42 for insertion of vertically-adjustable extension members 44 which may be each made up of sections that are added after the screw jacks 40 vertically extend the upper platform 13.

The upper platform 13 may be fitted with removable railing sections 46 along its outer edges. Advantageously, one such section is of a size convenient for removal and attachment in its place of a set of self-leveling stairs 47 that extend to the ground or to the platform base. Railing sections 46 are mounted to the platform by means of sleeves 49 to permit the railing sections to be removed for transport or if it desired to remove one section to permit access where a ladder attaches to the platform.

An upstanding post 48 is mounted to each corner of platform 13. The post is useful for attachment of one or more safety tethers to prevent workers from injury by falling off the upper platform 13. Post 48 is mounted by a pivot mount 60 to be collapsible into a horizontal position wherein it rests against the upper surface of the upper platform 13. This collapsed position may be advantageous for situations where the platform system 10 is transported.

The tracks 24 is optionally fitted with a removable outrigger bar 50 attachable at a plurality of locations along the tracks and locked to the tracks at one or more holes 28 in the tracks 24. The outrigger bar is used to stabilize the platform for windy conditions and to help stabilize the unit when it is fully telescoped. The outrigger is located at the front end of the opening just behind the support leg 32 and a turnbuckle would be installed from the outrigger to the top of the platform support frame approximately to connection point 42.

The platform support frame 12 may be additionally fitted at its forward end with a secondary or lower platform 52 which can be connected by a spaced apart pair of horizontal supports 54 mounted to the platform support frame 11. Supports 54 are L-shaped, and include an array of horizontal openings in both the horizontal and vertical portions thereof. Supports 54 are mounted to frame 12 by way of insertion into sleeves 55, which permit supports 54 to slide in the fore and aft direction to permit fore and aft adjustment of the position of platform 52. Supports 54 are mounted to platform 52 by means of similar sleeves 57, having vertical openings to permit adjustment in the vertical plane. Sleeves 55 and 57 include horizontal openings that may be aligned with the openings in the supports 54. The position of platform in the respective horizontal and vertical planes is fixed by inserting pins (not shown) through the respective aligned openings. Supports 54 are readily removable from frame 12, to allow platform 52 to be removed. Platform 52 when installed spans recess 36 so as to provide a platform which is located at the front side of the wellhead components. The structure 10 thus provides platforms which substantially surround the wellhead to permit worker access to all sides thereof. Platform 52 and its associated supports 54 may be removed from frame 12 until frame 12 is in its fully forward position for working on the wellhead components, at which time platform 52 is mounted to frame 12, thereby permitting worker access to all sides of the wellhead.

FIG. 6 illustrates a second embodiment of the invention. The outrigger bar 50 includes adjustable levers 72, consisting of a screw-threaded shaft with a handle for rotation. A removable surface, consisting of slats 74 may be placed over recess 38 so as to partially cover recess 38 to minimize the gap between platform 13 and the wellhead component. Slats 74 can be placed over the entirety of recess 38, as shown in FIG. 6, when the wellhead component is not present, for safety purposes. An additional ladder 76 is provided to access platform 52. An additional platform 78 is provided, mounted to frame 12 beneath upper platform 13. Platform 78 provides additional access to a lower, rear portion of the wellhead. Platform 78 is accessed by ladder 80. A still further platform 82 is provided, located above platform 13. Platform 82 is located across the front side of the structure and spans recess 38. Platform 82 is removably mounted to frame 12, and may be removed in order to position the frame 12 such that the wellhead is within recess 38, following which platform 82 may be reinstalled to provide access to an upper portion of the wellhead. Platform 82 provides an additional level for accessing lubricators on a wire line unit or endless tubing unit or any service needed for working on the wellhead. Also shown in
FIG. 6 are engineered fall arrest tie-off anchors 84, protruding from posts 48, for anchoring of persons working on platform 13.

[0040] In the foregoing embodiments, all of the auxiliary platforms can be adjustable in height relative to frame 12.

[0041] The foregoing description is intended to illustrate the concepts of the invention with emphasis upon the preferred embodiment or embodiments. The above description is not exhaustive of all options or mannerisms for practicing the disclosed principles of the invention, the full scope of which includes this patent specification as a whole, including the claims thereof. The full scope of the invention also includes functional and mechanical equivalents of elements set forth herein, including elements described explicitly or by implication as being a means for carrying out of a defined task or end.

1. A platform system to permit workover tasks to be performed on a wellhead, said wellhead comprising an upstanding aboveground wellhead component, said system comprising:
   a base having front and rear ends defining a central longitudinal axis extending from said front end to said rear end, said base comprising two spaced apart recesses on opposing sides of said longitudinal axis defining a recess therebetween open to said front end; a ground-contacting surface configured to support said base on a ground surface to permit said base to slide along said surface; a platform frame supported on said base;
   said base and platform frame including first and second cooperating means respectively to permit said frame to be moved along said base along said longitudinal axis between a forward position adjacent to said front end of said base and a retracted position adjacent to said rear end of said base;
   an upper platform supported by said platform frame and moveable therewith, said upper platform comprising two spaced apart portions on opposing sides of said longitudinal axis defining a recess therebetween open to the front end thereof;
   said base, frame and platform being configured to permit said base and platform recesses to be at least partially aligned when said frame and platform are in said forward position, wherein said wellhead component may be received within said base and recesses wherein said platform recess at least partially surrounds said component to locate said spaced apart portions of said platform on opposing sides of said component to permit worker access thereto.

2. The system of claim 1 wherein said cooperating means comprises a track on said base extending parallel to said longitudinal axis, and rotatable wheels mounted to said frame configured to ride on said rails.

3. The system of claim 2 wherein said track comprises spaced apart rails located on said opposing spaced apart portions of said base respectively.

4. The system of claim 1 wherein said frame comprises vertically extendible members configured to elevate or lower said upper platform relative to said base.

5. The system of claim 4 wherein said vertically extendible members comprise at least one screw jack.

6. The system of claim 1 wherein said cooperating means includes a stop member to selectively prevent movement of the frame along said base.

7. The system of claim 6 wherein said cooperating means comprises at least one wheel within a wheel housing mounted to said frame, said housing and said base having alignable openings, said stop member comprising a removable pin insertable into said openings when aligned to prevent movement of said frame relative to said base.

8. The system of claim 1 wherein said base further comprises an outrigger configured to contact the ground surface when said base is resting thereon to stabilize said platform system.

9. The system of claim 8 wherein said outrigger is removably mounted to said base.

10. The system of claim 1 further comprising at least one secondary platform removably mounted to said frame at a position above or beneath said upper platform, said secondary platform when mounted to said frame being aligned across the recess of said upper platform to provide access to a front side of said wellhead component.

11. The system of claim 10 wherein said secondary platform is mounted to said frame for fore and aft or vertical adjustment, or both fore and aft and vertical adjustment.

12. The system of claim 1 wherein said upper platform comprises a railing extending around at least a portion of the periphery thereof; said railing being removable.

13. The system of claim 1 further comprising at least one post configured for engagement of a safety line thereto, said post being collapsible for transport of said system.

14. The system of claim 1 further comprising at least one wheel means mounted to said base to permit said base to be rolled along said ground surface.

15. The system of claim 1 further comprising a removable surface which may be positioned to at least partially cover the recess within said upper platform.

16. A method of providing worker access to permit workover tasks to be performed on a wellhead, said wellhead comprising an upstanding aboveground wellhead component, said method comprising providing a system as defined in claim 1; assembling said base, frame and platform; positioning said base adjacent to said wellhead component wherein said portions of said base are located on opposing sides of said component and said component protrudes through said recess in said base; moving said frame along said base to position said platform adjacent to said component wherein said component protrudes through the recess of said upper platform.

17. A method as defined in claim 16 further comprising the step of delivering said base, frame and platform as discrete separate units to the location of said wellhead and assembling said units at said location.

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