PIPE DEPLOYMENT TRAILER

BACKGROUND

[0001] Flexible pipe is useful in a myriad of environments, including in the oil and gas industry. Flexible pipe may be durable and operational in harsh operating conditions and can accommodate high pressures and temperatures. Flexible pipe may be bundled and arranged into one or more coils to facilitate transporting and using the pipe.

[0002] Coils of pipe may be positioned in an "eye to the side" or "eye to the sky" orientation. When the flexible pipe is coiled and is disposed with its interior channel facing upwards, such that the coil is in a horizontal orientation, then the coils of pipe are referred to as being in an "eye to the sky" orientation. If, instead, the flexible pipe is coiled and disposed such that the interior channel is not facing upwards, such that the coil is in an upright or vertical orientation, then the coils of pipe are referred to as being in an "eye to the side" orientation.

[0003] The flexible pipe may be transported as coils to various sites for deployment (also referred to as uncoiling or unspooling). Different types of devices and vehicles are currently used for loading and transporting coils of pipe, but usually extra equipment and human manual labor is also involved in the process of loading or unloading such coils for transportation and/or deployment. Such coils of pipe are often quite large and heavy. Accordingly, there exists a need for an improved method and apparatus for loading and unloading coils of pipe.

SUMMARY

[0004] This summary is provided to introduce a selection of concepts that are further described below in the detailed description. This summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used as an aid in limiting the scope of the claimed subject matter.

[0004a] In one aspect, the present disclosure refers to a trailer, comprising: a trailer base; a trailer bed mounted to the trailer base; a lifting head protruding in an outwardly direction from the trailer bed and the trailer base when the lifting head is in a first orientation, wherein: a position of the lifting head is adjustable along a

longitudinal axis of the trailer bed; and the lifting head comprises more than one arm members that are adjustable about a central axis extending outwardly from the trailer bed and through the lifting head; and at least one actuator coupled to the trailer base, wherein, when the at least one actuator is in an actuated state, the lifting head is raised to a second orientation by the at least one actuator, and when the at least one actuator is in a non-actuated state, the lifting head is in the first orientation.

[0004b] In another aspect, the present disclosure refers to a method for manipulating a coil of pipe, comprising: providing a trailer, comprising: a trailer bed mounted to a trailer base, wherein the trailer bed comprises a set of rollers positioned at a surface of the trailer bed and extending along the trailer bed in a radial direction from a central reference point along a length of the trailer bed to one or more edges of the trailer bed; and a lifting head disposed on the trailer bed, the lifting head comprising one or more arms protruding in an outwardly direction from the trailer bed; positioning the coil of pipe on the lifting head, wherein the coil of pipe and the trailer bed are in a vertical orientation, positioning comprising: adjusting a position of the lifting head along the trailer bed to align the one or more arms of the lifting head with an interior channel extending through the coil of pipe; inserting the one or more arms of the lifting head through the interior channel of the coil of pipe; and lowering the trailer bed to a horizontal orientation while the coil of pipe is positioned on the lifting head; and adjusting the position of the lifting head while the coil of pipe is positioned on the lifting head to move the lifting head to the central reference point, wherein the coil of pipe is rotatable along the set of rollers when the coil of pipe is positioned on the lifting head and when the lifting head is moved to the central reference point.

[0004c] In another aspect, the present disclosure refers to a method for spooling pipe, comprising: providing a trailer, comprising: a trailer base; a trailer bed mounted to the trailer base; a lifting head protruding in an outwardly direction from the trailer bed and the trailer base when the lifting head is in a first orientation, wherein: a position of the lifting head is adjustable along a longitudinal axis of the trailer bed; and the lifting head comprises more than one arm members that are adjustable about a central axis extending outwardly from the trailer bed and through the lifting head; and at least one actuator coupled to the trailer base for moving the lifting head to a second orientation; securing an end of the pipe to the lifting head; and rotating the

lifting head to wind the pipe around the lifting head.

[0005] In one example, embodiments of the present disclosure relate to a trailer, which may be used for loading, unloading, and deploying a coil of pipe. The trailer may

include a trailer base, a trailer bed pivotally mounted to the trailer base, at least one hydraulic actuator coupled to the trailer bed and the trailer base that raise and lower the trailer bed, the trailer bed being raised to a vertical position when the at least one hydraulic actuator is extended and the trailer bed being in a horizontal position when the at least one hydraulic actuator is retracted, and a lifting head protruding outwardly from the trailer bed, wherein a position of the lifting head is adjustable along a longitudinal axis of the trailer bed.

[0006] In another example, embodiments of the present disclosure relate to methods for manipulating a coil of pipe with a trailer that includes a trailer bed pivotally mounted to a trailer base and a lifting head disposed on the trailer bed, the lifting head having one or more arms protruding in an outwardly direction from the trailer bed. Methods may include adjusting a vertical position of the lifting head along the trailer bed to align the one or more arms of the lifting head with an interior channel extending through the coil of pipe and inserting the one or more arms of the lifting head through the interior channel of the coil of pipe to position the coil of pipe on the lifting head, wherein the coil of pipe and the trailer bed are in a vertical orientation during positioning the coil of pipe on the lifting head. The trailer bed may then be lowered to a horizontal orientation while the coil of pipe is positioned on the lifting head.

[0006a] In another example, embodiments of the present disclosure relate to methods for spooling pipe. A trailer comprises a trailer base, a trailer bed mounted to the trailer base, and a lifting head protruding in an outwardly direction from the trailer bed and the trailer base when the lifting head is in a first orientation. A position of the lifting head is adjustable along a longitudinal axis of the trailer bed. At least one actuator is coupled to the trailer base for moving the lifting head to a second orientation, securing an end of the pipe to the lifting head, and rotating the lifting head to wind the pipe around the lifting head.

[0007] Other aspects and advantages of the claimed subject matter will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a diagram of a coil of pipe and a trailer according to embodiments of the present disclosure.

[0009] FIG. 2 is a diagram of a trailer bed raised to a vertical orientation according to embodiments of the present disclosure.

[0010] FIG. 3 is a diagram of a trailer configured to load a coil of pipe according to embodiments of the present disclosure.

CLAIMS

What is claimed is:

1. A trailer, comprising:

a trailer base;

a trailer bed mounted to the trailer base;

a lifting head protruding in an outwardly direction from the trailer bed and the trailer base when the lifting head is in a first orientation, wherein:

a position of the lifting head is adjustable along a longitudinal axis of the trailer bed; and

the lifting head comprises more than one arm members that are adjustable about a central axis extending outwardly from the trailer bed and through the lifting head; and

at least one actuator coupled to the trailer base,

wherein, when the at least one actuator is in an actuated state, the lifting head is raised to a second orientation by the at least one actuator, and when the at least one actuator is in a non-actuated state, the lifting head is in the first orientation.

2. The trailer of claim 1, wherein the at least one actuator is coupled to the lifting head, and when the at least one actuator is in the actuated state, the lifting head is raised to the second orientation apart from the trailer base and the trailer bed.

3. The trailer of claim 1, wherein the at least one actuator is coupled to the trailer bed, and when the at least one actuator is in the actuated state, the trailer bed is raised together with the lifting head to the second orientation.

4. The trailer of claim 1, wherein the lifting head is coupled to a track extending along the longitudinal axis of the trailer bed, wherein the lifting head engages with and is movable along the track to adjust the position of the lifting head on the trailer bed.

5. The trailer of claim 1, further comprising a slide table with a set of rollers affixed to the slide table, wherein the slide table is connected to the trailer bed.

6. The trailer of claim 1, further comprising a set of rollers disposed along the trailer bed, wherein the set of rollers extend along the trailer bed in a radial direction from a

central reference point located a distance along a length of the trailer bed, the length of the trailer bed extending along the longitudinal axis of the trailer bed from a base edge at an end of the trailer bed to an upper edge at an opposite end of the trailer bed, wherein the distance is greater than a radius of a coil of pipe.

7. The trailer of claim 1, further comprising a turntable, wherein the lifting head comprises one or more arms protruding outwardly from the turntable.

8. The trailer of claim 1, further comprising a retention component coupled to the trailer and an energizing mechanism configured to apply a force to the retention component.

9. The trailer of claim 8, wherein the energizing mechanism is a hydraulic arm, energized by pressurized hydraulic fluid.

10. A method for manipulating a coil of pipe, comprising:

providing a trailer, comprising:

a trailer bed mounted to a trailer base, wherein the trailer bed comprises a set of rollers positioned at a surface of the trailer bed and extending along the trailer bed in a radial direction from a central reference point along a length of the trailer bed to one or more edges of the trailer bed; and

a lifting head disposed on the trailer bed, the lifting head comprising one or more arms protruding in an outwardly direction from the trailer bed;

positioning the coil of pipe on the lifting head, wherein the coil of pipe and the trailer bed are in a vertical orientation, positioning comprising:

adjusting a position of the lifting head along the trailer bed to align the one or more arms of the lifting head with an interior channel extending through the coil of pipe;

inserting the one or more arms of the lifting head through the interior channel of the coil of pipe; and

lowering the trailer bed to a horizontal orientation while the coil of pipe is positioned on the lifting head; and

adjusting the position of the lifting head while the coil of pipe is positioned on the lifting head to move the lifting head to the central

reference point, wherein the coil of pipe is rotatable along the set of rollers when the coil of pipe is positioned on the lifting head and when the lifting head is moved to the central reference point.

11. The method of claim 10, further comprising, transporting the coil of pipe to a location while the trailer bed is loaded with the coil of pipe in the horizontal orientation.

12. The method of claim 10, wherein positioning the coil of pipe on the lifting head further comprises adjusting one or more arms of the lifting head to fit within an inner diameter of the interior channel of the coil of pipe.

13. The method of claim 10, further comprising, hydraulically raising and lowering the trailer bed in the vertical orientation and the horizontal orientation, respectively, with respect to the trailer base to load and unload the coil of pipe.

14. The method of claim 10, further comprising, unloading the coil of pipe, wherein unloading the coil of pipe comprises:

raising the trailer bed from the horizontal orientation to the vertical orientation;

adjusting the position of the lifting head along the trailer bed for unloading the coil of pipe; and

disengaging the one or more arms of the lifting head from the interior channel of the coil of pipe.

15. The method of claim 10, wherein the coil of pipe is wound on a reel such that the interior channel of the coil of pipe is concentric with a central bore of the reel, and wherein during the positioning of the coil of pipe on the lifting head, the vertical position of the lifting head is adjusted to align the one or more arms of the lifting head with the central bore of the reel, and the one or more arms of the lifting head is inserted through the central bore of the reel.

16. The method of claim 10, further comprising:

deploying pipe from the coil of pipe, the deploying comprising pulling an end of the pipe from the coil of pipe to unwind the coil of pipe.

17. The method of claim 10, further comprising:

deploying pipe from the coil of pipe, the deploying comprising moving the trailer away from an end of the pipe, wherein the coil of pipe rotates about the lifting head during deploying to unwind the coil of pipe as the trailer moves away from the end of the pipe.

18. The method of claim 10, further comprising:

deploying pipe from the coil of pipe, the deploying comprising unwinding pipe from the coil of pipe; and

engaging a retention component with an outer diameter of the coil of pipe during deploying, wherein an energizing mechanism applies a force to the retention component to engage the retention component with the outer diameter of the coil of pipe during deploying.

19. The method of claim 10, further comprising:

deploying pipe from the coil of pipe, the deploying comprising unwinding pipe from the coil of pipe; and

providing tension to the coil of pipe to control speed of pipe deployment, to stop pipe deployment, or both.

20. A method for spooling pipe, comprising: providing a trailer, comprising:

a trailer base;

a trailer bed mounted to the trailer base;

a lifting head protruding in an outwardly direction from the trailer bed and the trailer base when the lifting head is in a first orientation, wherein:

a position of the lifting head is adjustable along a longitudinal axis of the trailer bed; and

the lifting head comprises more than one arm members that are adjustable about a central axis extending outwardly from the trailer bed and through the lifting head; and

at least one actuator coupled to the trailer base for moving the lifting head to a second orientation;

securing an end of the pipe to the lifting head; and

rotating the lifting head to wind the pipe around the lifting head.

21. The method of claim 20, wherein a motor is disposed at a base of the lifting head, wherein the motor rotates the lifting head.