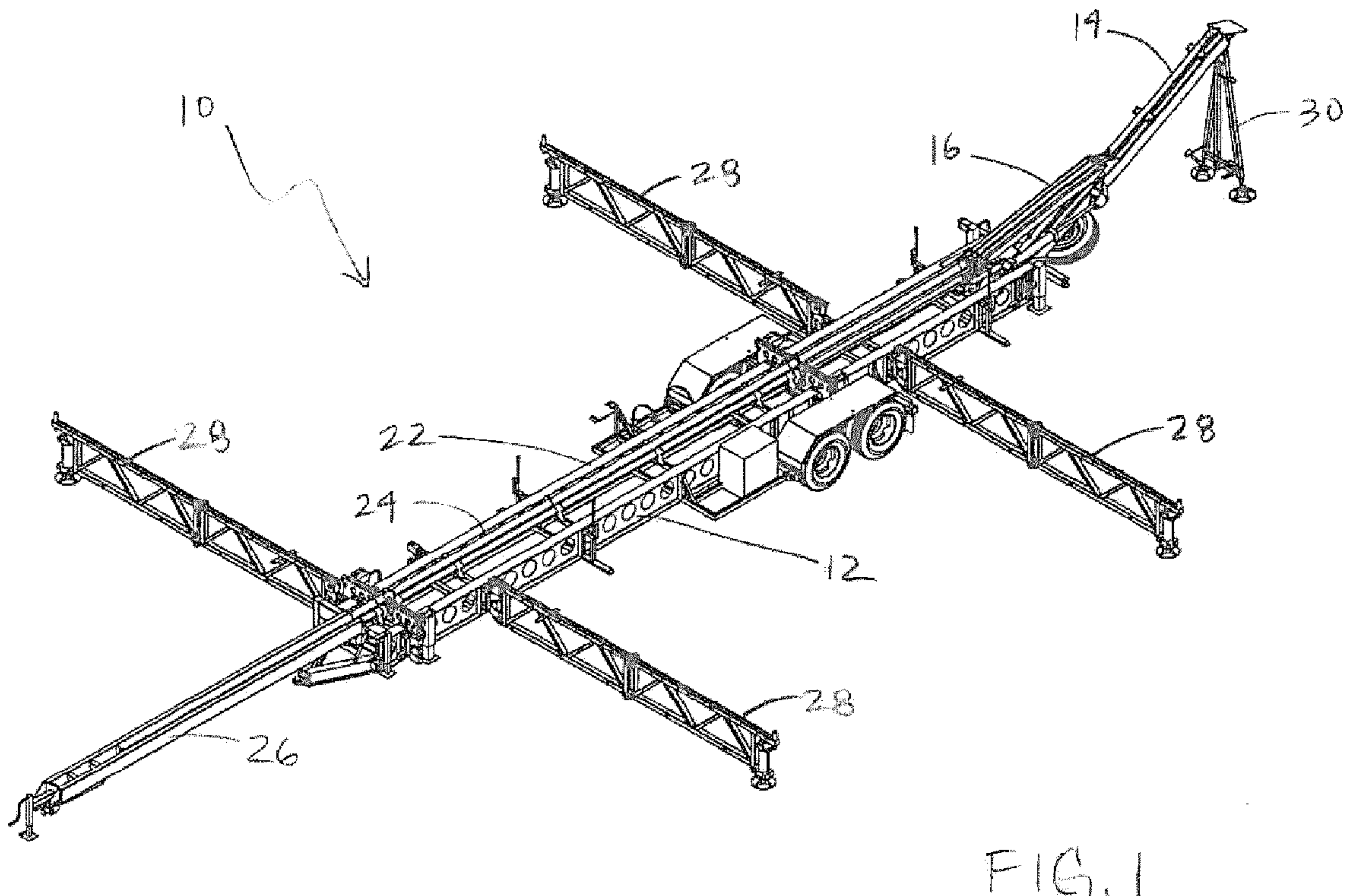




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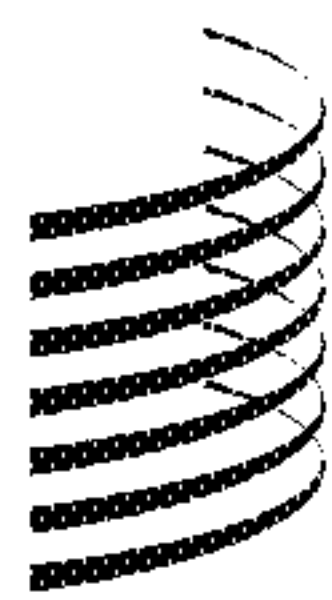
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An adaptable pipe transitioning system that can easily be used with drilling platforms varying in height is provided.

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(54) Title: TRANSITIONING PIPE HANDLER

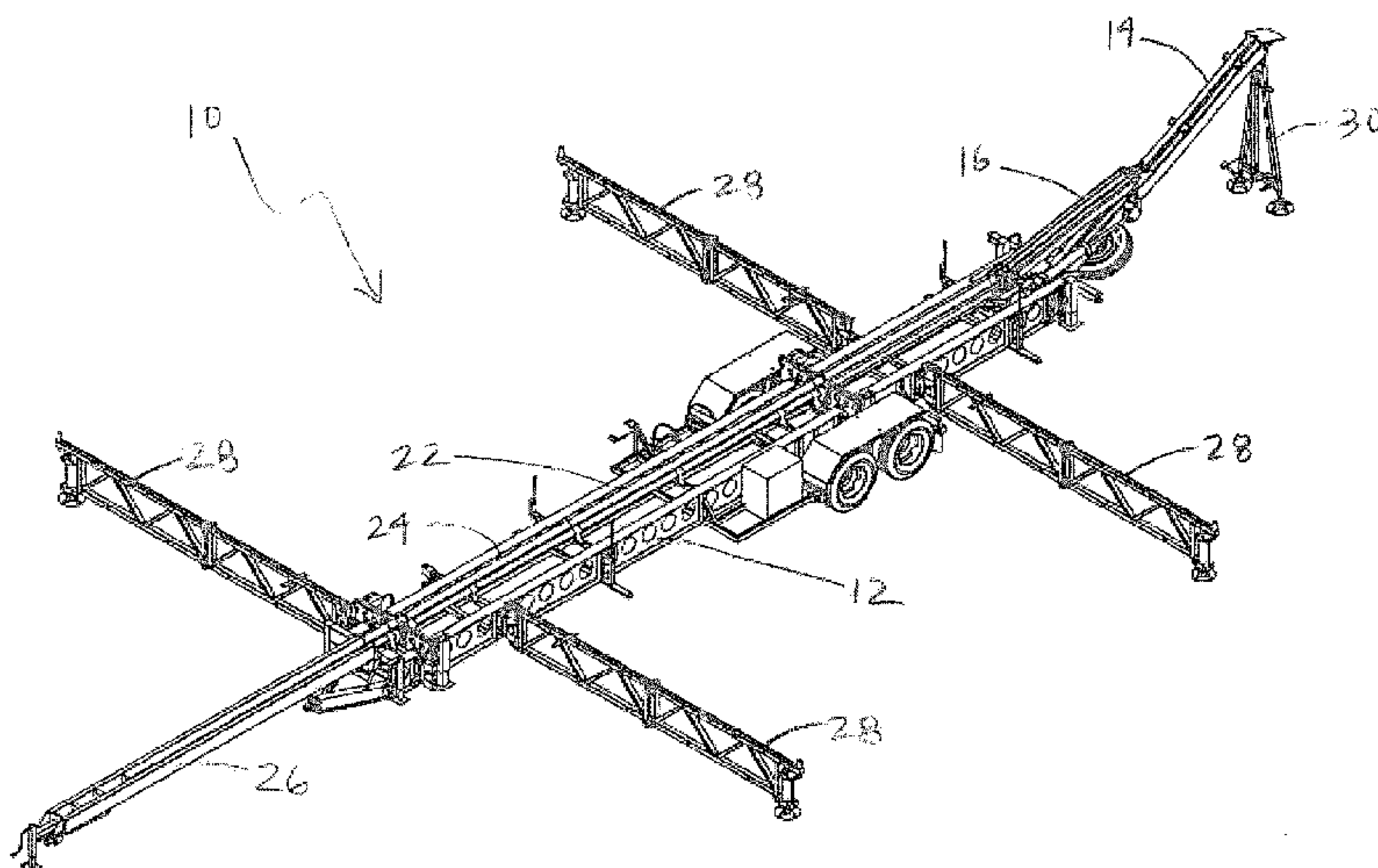


FIG. 1

(57) Abstract: An adaptable pipe transitioning system that can easily be used with drilling platforms varying in height is provided.

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TRANSITIONING PIPE HANDLER

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TECHNICAL FIELD

10 A pipe handling apparatus is provided. More specifically, a pipe handling
apparatus that may be used as a catwalk in the oil and gas industry is provided.

BACKGROUND

It is well known that drilling platforms, often referred to as derricks, are
positioned high above the ground to support and rotate long “strings” of pipe.
15 Depending upon the type of operation, the work floor of the derrick can be anywhere
from 5 to 30 feet above the ground, requiring that mechanical pipe handlers be used to
raise and lower very large, heavy sections of pipe between the ground and the
elevated derrick platform. During drilling operations, for example, tubular casing or
drill pipe “tubulars” are lifted up to the rig floor and threaded together end-to-end to
20 form the drill string. This process typically requires the reorientation of the tubulars
from a horizontal storage position on the ground to a nearly vertical drill string
position above the rig floor. Similarly, during break-down, each tubular must be
removed from the platform, and reoriented back to a horizontal position for storage on
the ground.

25 It is well known that the frequency of adding tubulars to the existing drills
string is high and can be time consuming. It is also well known that such processes
can involve manual handling of the piping and, therefore, can be quite dangerous to
personnel working on or near the drill rig floor. As such, many mechanical pipe
handlers have been designed to improve the efficiency of the process and to minimize
30 the risk of hazardous incidents. For example, some pipe handlers, or “catwalks”, for
transitioning tubulars from the ground level up to the derrick platform are disclosed in

United States Patent Nos. 8,764,368, 7,992,646, and United States Patent Application Nos. 11/689,279, 12/193,309, and 13/968,424.

There is a need, however, for an adaptable pipe transitioning system that can easily be used with drilling platforms varying in height. It is desirable that such a system be simple and efficient, and utilized in either drilling or servicing operations. It is further desirable that such a pipe transitioning system comprise a unitary kicker/indexer system.

SUMMARY

The present disclosure relates to an adjustable pipe handler for use in transitioning pipe, such as tubulars, to elevated platforms varying in height.

Broadly speaking, an adjustable pipe handler for transitioning pipe to an elevated platform is provided, the pipe handler comprising: a base, having a front, middle and rear section, and having a surface forming a track for receiving at least one pipe, a lift arm having a first end and a second end, said first end being pivotally mounted to the front section of the base and said second end resting against the elevated platform, the lift arm being positionable at an incline from the base, and forming a channel operably corresponding to the track of the base for receiving the at least one pipe therefrom, and a transitioning arm, movably connected to both the base and the lift arm, for positioning the lift arm, the transitioning arm also forming a channel operably corresponding to the track of the base for receiving at least one pipe therefrom and guiding the pipe along the lift arm to the elevated platform.

Broadly speaking, a method of transitioning pipe to an elevated platform is also provided, the method comprising providing a pipe handling system having a base forming a track capable of receiving at least one pipe, a lift arm, pivotally connected to the base, for receiving the at least one pipe and guiding same to the elevated platform, and a transitioning arm, movably connected to both the base and the lift arm for controllably positioning the lift arm at an incline from the base and configured to transfer the at least one pipe from the base to the lift arm.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the present apparatus in an extended or “open” position according to embodiments herein;

Figure 2 is a top down view of the present apparatus shown in Figure 1 according to embodiments herein;

5 Figure 3 is a side view of the present apparatus shown in Figures 1 and 2 according to embodiments herein;

Figure 4 is a perspective view of the present apparatus in a retracted or “closed” position according to embodiments herein;

10 Figure 5 is a side view of the present apparatus shown in Figure 4 according to embodiments herein;

Figure 6 is a top down view of the present apparatus shown in Figures 4 and 5 according to embodiments herein; and

Figure 7 is a perspective view of the unitary indexer and kicker of the present apparatus according to embodiments herein.

15

DESCRIPTION OF EMBODIMENTS

An adjustable pipe handler or “catwalk” and method of use is provided for transitioning pipe to and from an elevated platform. It is understood that the present apparatus and methodologies may be used in the oil drilling and rigging industries, and other appropriate industries to assist with the handling of large, heavy pipes that are raised to and lowered from elevated platforms. According to embodiments herein, the present apparatus and methodologies provide a mobile transitioning catwalk capable of transferring at least one piece of large, heavy pipe from a generally horizontal storage position at or near the ground level to a near-vertical position above elevated platforms varying in height. The present system will now be described having regard to Figs. 1 – 7.

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Having regard to Figs. 1 and 2, the present transitioning catwalk 10 generally comprises a base 12, a lift arm 14 and a transitioning arm 16. Catwalk 10 may be configured to be mobile (e.g. towed behind a vehicle) and conveniently transported between different elevated platforms, and can comprise anchoring means for securing base 12 (e.g. to uneven surfaces) during use. As will become apparent, it is an aspect of the present catwalk 10 that it may be utilized at elevated platforms varying in

30

height (not shown). In embodiments herein, the elevated platform may be at least five feet from the ground. In other embodiments, the elevated platform may be between approximately five and thirty feet from the ground. It is understood that the present transitioning catwalk may be automatically controlled, such that operating personnel
5 may control the system remotely.

Having regard Fig. 3, base 12 can comprise front, middle and rear sections. Without limitation, reference to the “front” section of the base 12 denotes the section of the base 12 closest to the elevated platform (not shown). Such reference to “front”, “middle” and “rear” sections is made for explanatory purposes only and in no way is
10 intended to limit the present apparatus and methodologies. Base 12 can further comprise a “U” or “V” shaped surface 22 forming a channel or “track” 24 for receiving at least one pipe element, such as a tubular pipe element. Track 24 may be arranged so as to generally extend the length of the surface 22 of the present pipe handler 10. Preferably, base 12 is configured without a platform or deck, enabling
15 personnel to reach pipe in the track 24 (if necessary) from the ground and preventing personnel from mounting the base 12.

In one embodiment, base 12 may comprise at least one extension arm 26, operative to extend the surface 22 of the base 12. Without limitation, the at least one extension arm 26 may be utilized where it is desirable to connect more than standard
20 pipe element end-to-end within the track 24 to make a longer pipe (e.g. where two range 2 tubulars are threaded together), or where longer tubulars (e.g. range 3, 45ft pipe) are being transitioned to/from the platform.

The at least one extension arm 26 may be positioned at or near the rear end of the base 12. In one embodiment, extension arm 26 may comprise a folding section
25 rotatable about a pivot joint connected to the base 12, such that extension arm 26 may swing out horizontally outwardly from a first “closed” position (e.g. stowed or nested against the side of the base 12) to a second “open” position co-axially aligned with longitudinal axis of the base 12. In another embodiment, extension arm 26 may comprise two diametrically opposed folding half-sections positioned on each side of
30 the base 12, such that each half section is rotatably mounted to the base 12 at a pivot joint and swings horizontally outwardly away from the base 12 (and in opposite directions from each other) until they connect together to form one unitary extension

arm 26 aligned with base 12. It is an aspect of the present apparatus and methodologies that the at least one extension arm 26 be configured so as to provide a small base 12 for easy transport. One or more extension arms 26 may comprise anchoring means as known in the industry for securing the extension arm 26 during
5 use.

In one embodiment, base 12 may further comprise at least two diametrically opposed pipe supply racks 28. Supply racks 28 may contain a supply of pipes positioned in parallel alignment with the base 12 and track 24. It is understood that pipes can be arranged on supply racks 28 to enable alignment of opposite male and
10 female pipe threading elements. In other words, pipes can be arranged so that all of the respective male, or as-called “pin” ends, and female ends are positioned in the same orientation.

The opposed pipe supply racks 28 may be positioned at or near the middle section of the base 12. In one embodiment, opposed pipe supply racks 28 are
15 positioned to allow pipes to roll from the rack onto the surface 22 of the base 12 and into the track 24. As would be understood, the height of the pipe supply racks 28 may be adjustable (e.g. using hydraulics) so as to raise and/or lower the racks relative to the height of the base 12. Adjusting the height of the pipe racks 28 may be automatically or manually controlled. In one embodiment, each diametrically opposed pipe rack 28
20 may comprise independently operated hydraulic lifts for raising/lowering the racks 28. It is contemplated that the present pipe handler 10 may comprise at least 2 diametrically opposed racks 28. In some embodiments, the present pipe handler 10 may comprise at least 4 or 6 diametrically opposed pipe racks 28, as determined by the length of pipe being used. Once positioned in the track 24, a skate may be used to
25 raise the pipe to the elevated platform.

As above, the present pipe handler 10 further comprises a lift arm 14 having a first end and a second end. Having regard to Figs. 4 – 6, the first end of lift arm 14 may pivotally mounted to the front section of the base 12, enabling the lift arm 14 to rotate from a “closed”, nested positioned against the surface 22 of the base 12
30 upwardly and away from the base 12 to an “open” position where the second free end of the lift arm 14 rests against and cooperates with the elevated platform floor (not shown). Lift arm 14 may comprise a top surface forming a channel operably

corresponding with track 24 of the base 12. In some embodiments, lift arm 14 may be extendable so as to reach the platform. For example, lift arm 14 may comprise at least one telescoping element enabling the second, “leading” end of the arm 14 to advance upwardly towards the platform floor. Extension of lift arm 14 may be driven by at least one hydraulic cylinder, such that the relative position of the telescoping elements may be locked at any desired position. Typically, the lift arm 14 is extendable up to heights desired in the industry, or as high as approximately 45 feet. It is understood that each telescoping element further comprises a surface forming a channel operably corresponding with track 24 of the base 12. Optionally, lift arm 14 may further comprise stabilizing arms 30 for supporting the lift arm 14 when in the raised, extended position.

As above, the present pipe handler 10 further comprises a transitioning arm 16 for controllably adjusting the pivotable transition of the lift arm 14 from the base 12 (i.e. from the closed to the open position). Transitioning arm 16 may comprise a first end and a second, wherein the first end may be connected to the base 12 and the second end may be connected to the lift arm 14. Transitioning arm 16 may be operative to controllably adjust the height of the lift arm 14, that is – to increase or decrease the incline of the lift arm 14 from base 12, enabling lift arm 14 to reach platforms of varying heights. As would be understood, transitioning arm 16 may be automatically controlled (i.e. via one or more hydraulic cylinders).

In one embodiment, the transitioning arm 16 is movably connected to both base 12 and lift arm 14. For example, in one embodiment, first end of transitioning arm 16 may be slidably connected to base 12, while second end of transitioning arm 16 may be pivotally connected to lift arm 14. It is understood that any movable connection of the transition arm 16 operative to enable controllable transition of the lift arm 14 from the base 12 is contemplated. It is further understood that transitioning arm 16 may further have a surface forming a channel operably corresponding with track 24 of the base 12 and lift arm 14, enabling smooth and uninterrupted guidance of a pipe element from the base 12 along the lift arm 14 and ultimately to the elevated platform, or in reverse from the lift arm 14 back to the base 12.

Having specific regard to Fig. 5, first end of transitioning arm 16 may be slidably connected to base 12 via a roller and track system 32, or any other such

means for enabling smooth movement of the first end of the transitioning arm 16 back-and-forth along the surface 22 of the base 12. Second end of transitioning arm 16 may be rotatably connected to lift arm 14 by pivot 34, or any other such means as to enable smooth movement of the second end of the transitioning arm 16 and the lift arm 14. It would be understood that the location of the pivot 34 is determined for optimum movement of the lift arm 14. It is an aspect of the present apparatus that the lift arm 14 may extend at any desired angle from the base 12 to reach the elevated platform. Without limitation, as shown in Fig. 3, in some embodiments, it is contemplated that the lift arm 14 may extend from the base 12 at an angle of approximately 155° (or approximately 25° from the horizontal plane of the ground). In other embodiments, it is contemplated that the lift arm 14 may extend from the base 12 at an angle of approximately 40° from the base 12 (or approximately 50° from the horizontal plane of the ground).

Having regard to Fig. 7, the present pipe handler 10 may further comprise a modified indexer and kicker elements 40. As is understood, an indexer is provided in conventional pipe handlers to move the pipe elements into the track 24 smoothly from the pipe supply racks 28, while kickers are provided to “kick” the pipe out of the track 24 for placement back on the supply racks 28 for storage.

According to embodiments herein, the base 12 of the present pipe handler 10 may be configured with at least one gap within which are provided combined indexer/kicker 40 for loading and unloading pipe. Each indexer/kicker 40 may be configured to provide mirrored indexing elements 42 and kicking elements 44 (i.e. on opposite sides of track 24), such that pipes within the indexer/kicker 40 can be smoothly transitioned into or out of track 24 in either direction, that is – to pipe racks 28 on either side of the pipe handler 10. Indexer/kicker 40 can comprise a frame enabling each indexer/kicker 40 to be removably attached to the pipe handler 10 for easy handling by those skilled in the art.

Although a few embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications can be made to these embodiments without changing or departing from their scope, intent or functionality. The terms and expressions used in the preceding specification have been used herein as terms of description and not of limitation, and there is no

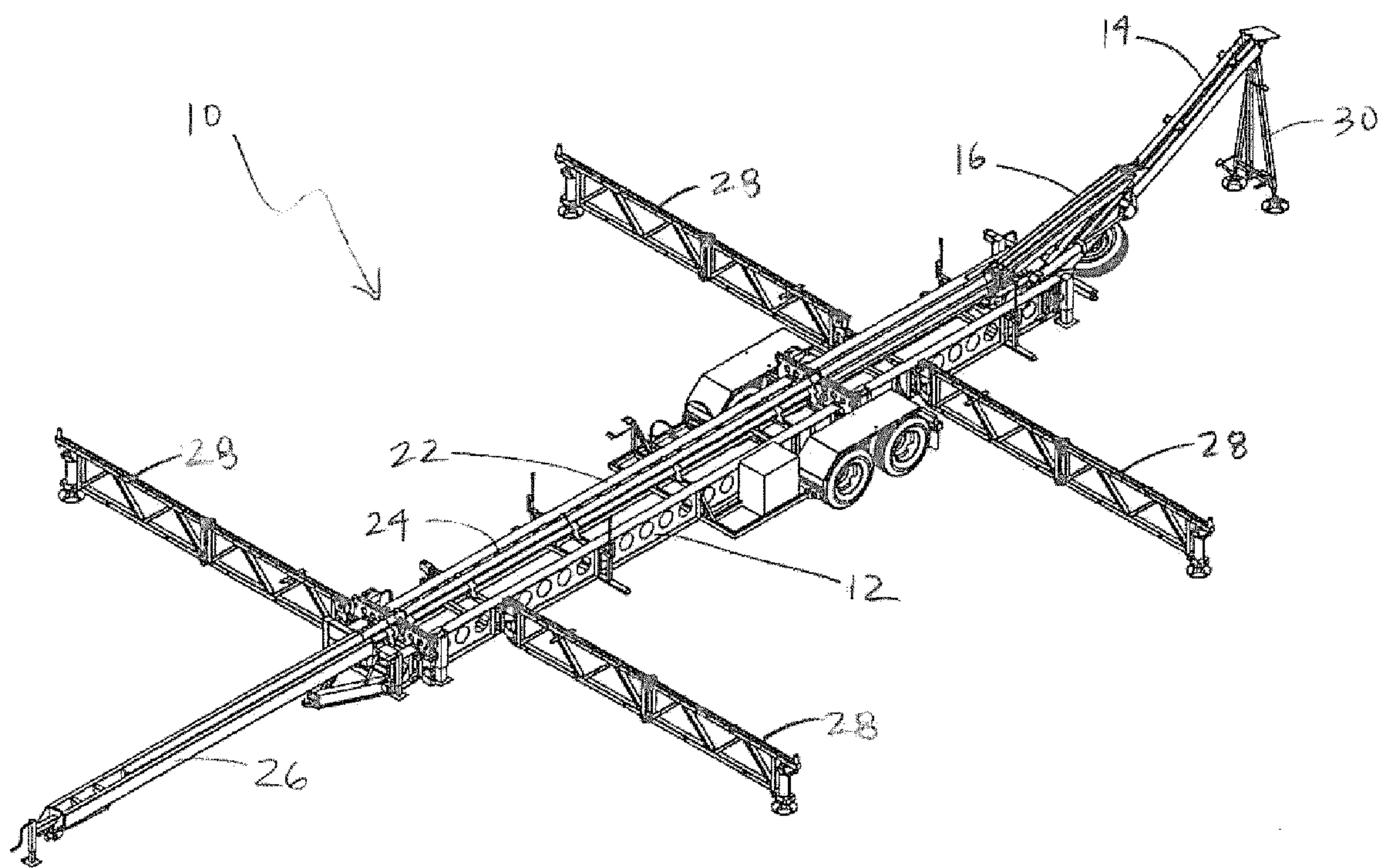
intention in the use of such terms and expressions of excluding equivalents of the features shown and described or portions thereof, it being recognized that the invention is defined and limited only by the claims that follow.

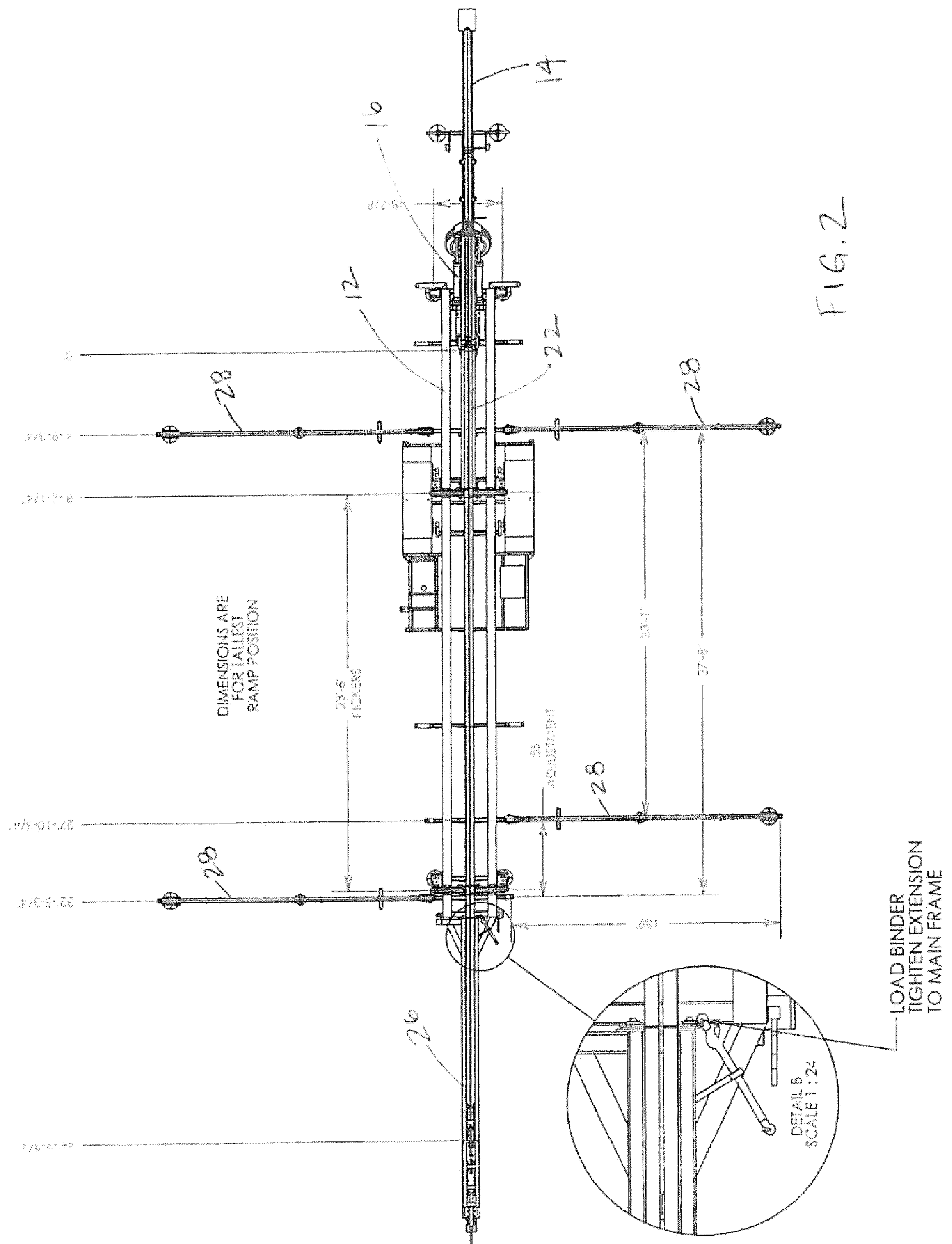
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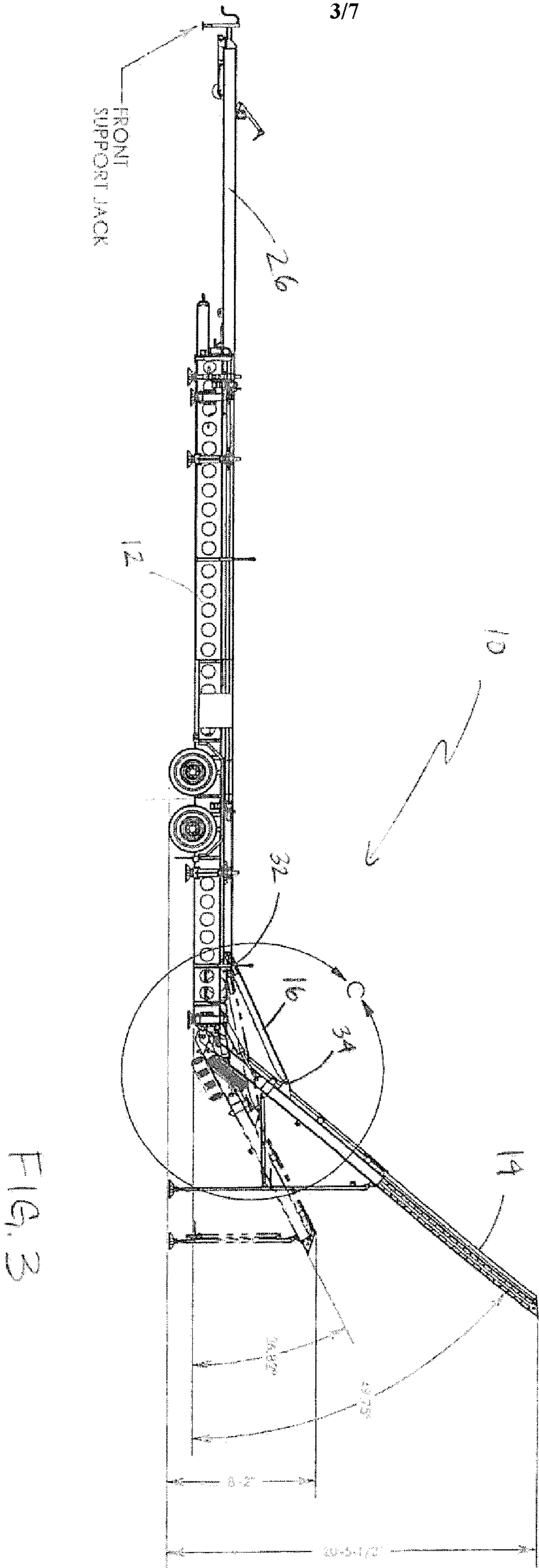
1. An adjustable pipe handler for transitioning pipe to an elevated platform, the pipe handler comprising:
 - 5 a base, having a front, middle and rear section, and having a surface forming a track for receiving at least one pipe,
 - 10 a lift arm having a first end and a second end, said first end being pivotally mounted to the front section of the base and said second end resting against the elevated platform, the lift arm being positionable at an incline from the base, and forming a channel operably corresponding to the track of the base for receiving the at least one pipe therefrom, and
 - 15 a transitioning arm, movably connected to both the base and the lift arm, for positioning the lift arm, the transitioning arm also forming a channel operably corresponding to the track of the base for receiving at least one pipe therefrom and guiding the pipe along the lift arm to the elevated platform.
- 20 2. The pipe handler of claim 1, wherein the lift arm further comprises at least one telescoping element for extending the length of the lift arm.
3. The pipe handler of claim 1, wherein the base further comprises at least one extension arm for extending the length of the base and the track.
- 25 4. The pipe handler of claim 3, wherein the extension arm comprises at least one folding section rotatable about a pivot joint connected to the base.
5. The pipe handler of claim 3, wherein the extension arm comprises at least two opposed folding sections rotatable about a pivot joint connected to the base.
- 30 6. The pipe handler of claims 3 - 5, wherein the extension arm is connected to the rear section of the base.
- 35 7. The pipe handler of claim 1, wherein the pipe handler further comprises at least two diametrically opposed pipe supply racks.
8. The pipe handler of claim 1, wherein the elevated platform is approximately at least 5 feet in height.
- 40 9. The pipe handler of claim 8, wherein the elevated platform is between approximately at 5 – 30 feet in height.
- 45 10. The pipe handler of claim 1, wherein the incline of the lift arm may be at least approximately least 40° from the base.
11. The pipe handler of claim 1, wherein the incline of the lift arm may be between 40° – 155° from the base.

12. The pipe handler of claim 1, wherein the pipe handler further comprises at least one unitary indexer and kicker.
- 5 13. A method of transitioning pipe to an elevated platform, the method comprising providing a pipe handling system having a base forming a track capable of receiving at least one pipe, a lift arm, pivotally connected to the base, for receiving the at least one pipe and guiding same to the elevated platform, and a
10 transitioning arm, movably connected to both the base and the lift arm for controllably positioning the lift arm at an incline from the base and configured to transfer the at least one pipe from the base to the lift arm.

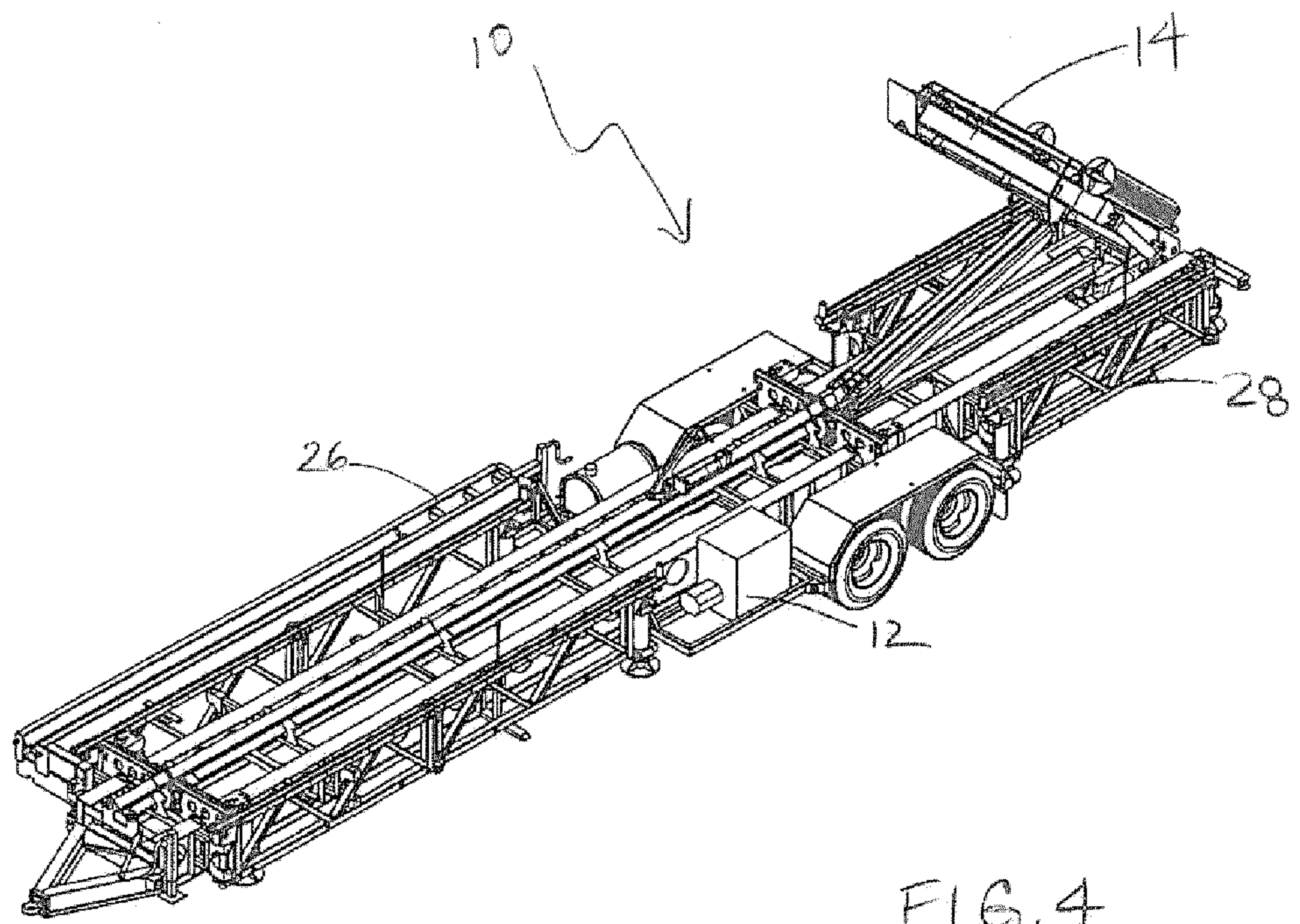
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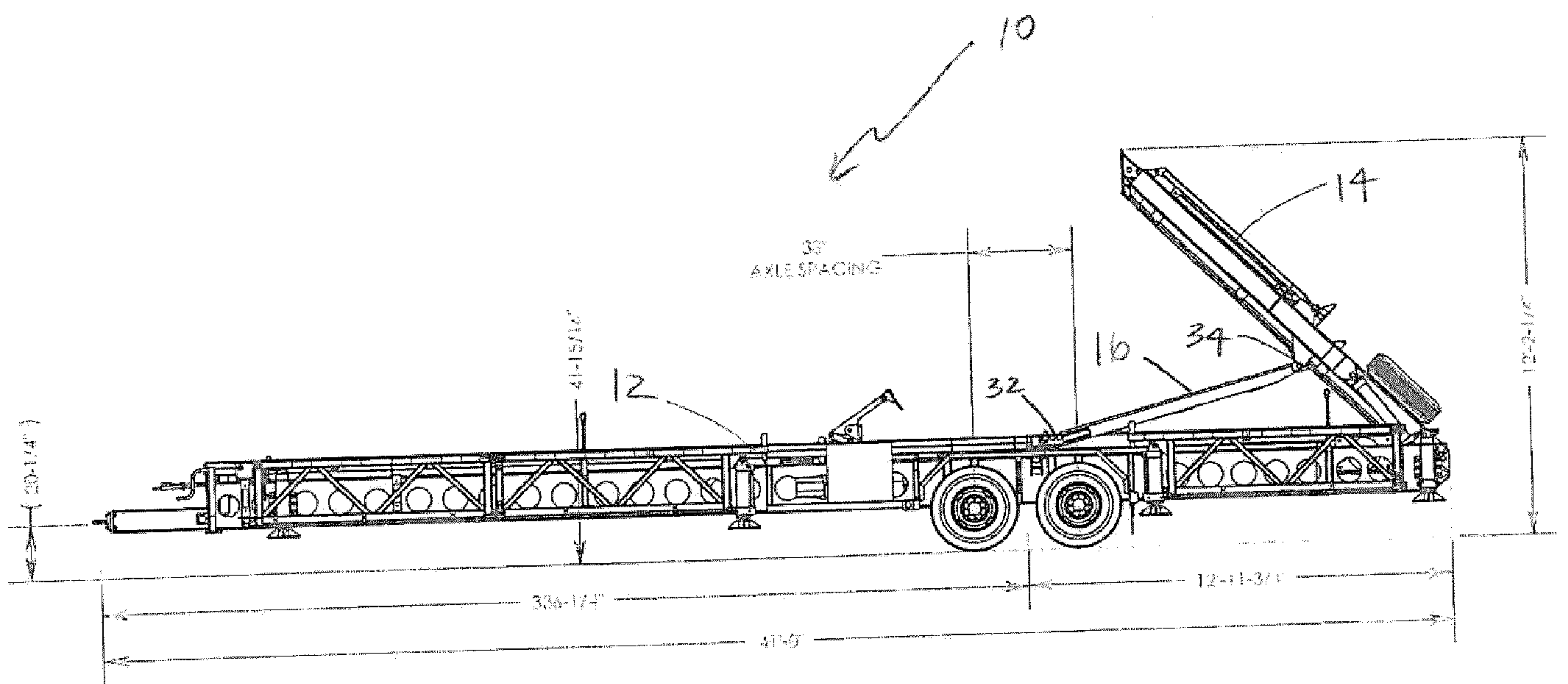


FIG. 5

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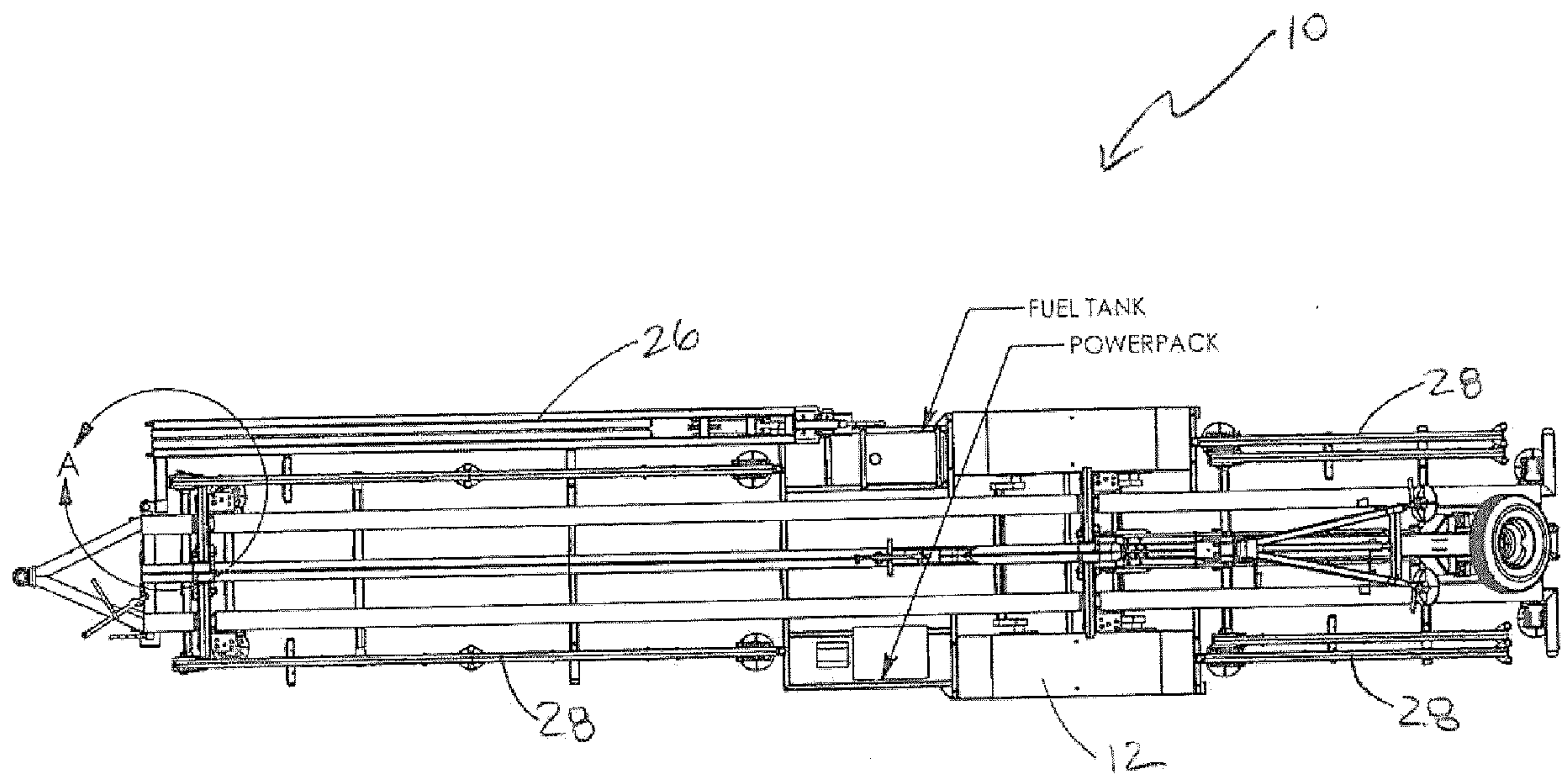
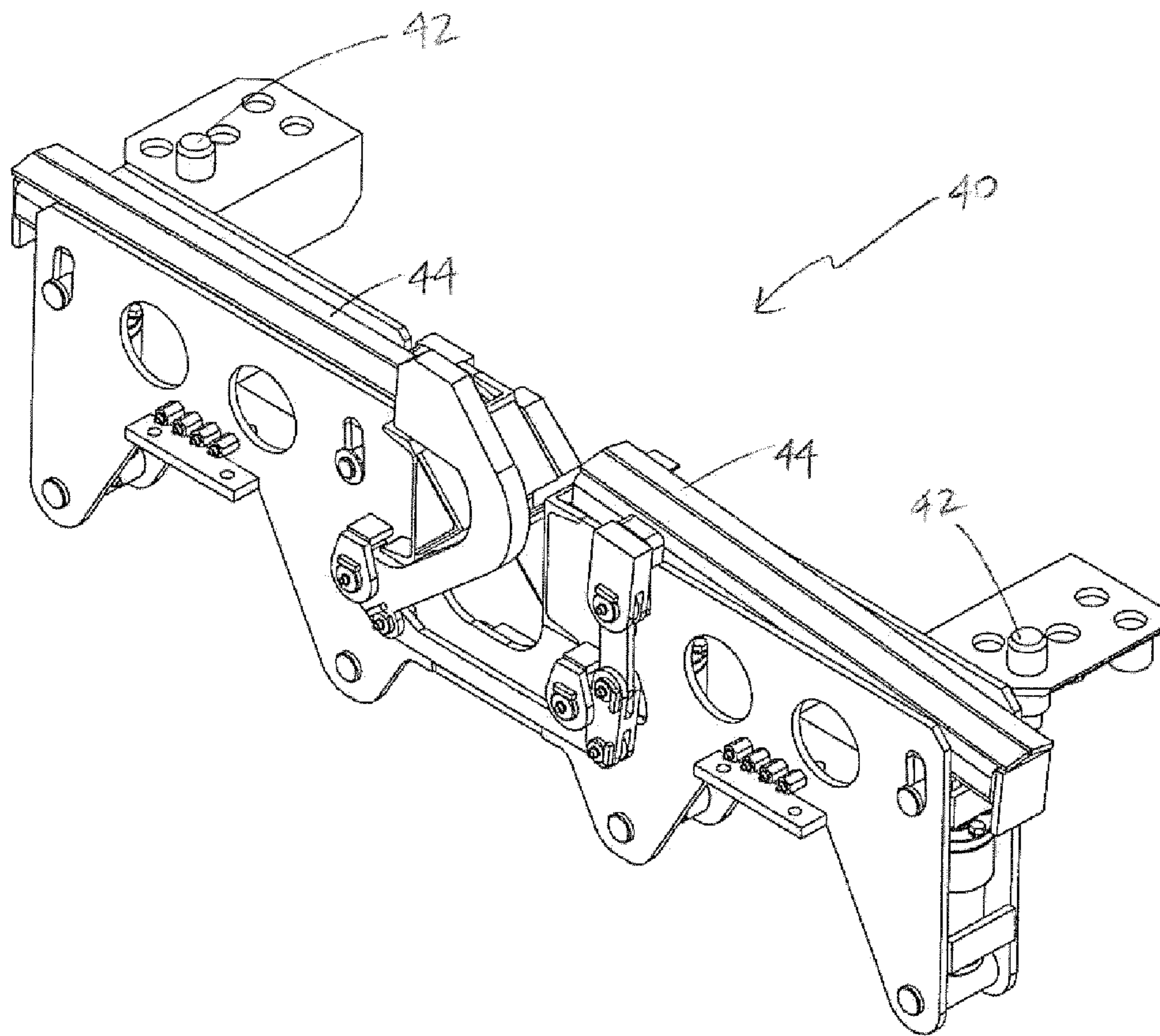


FIG. 6



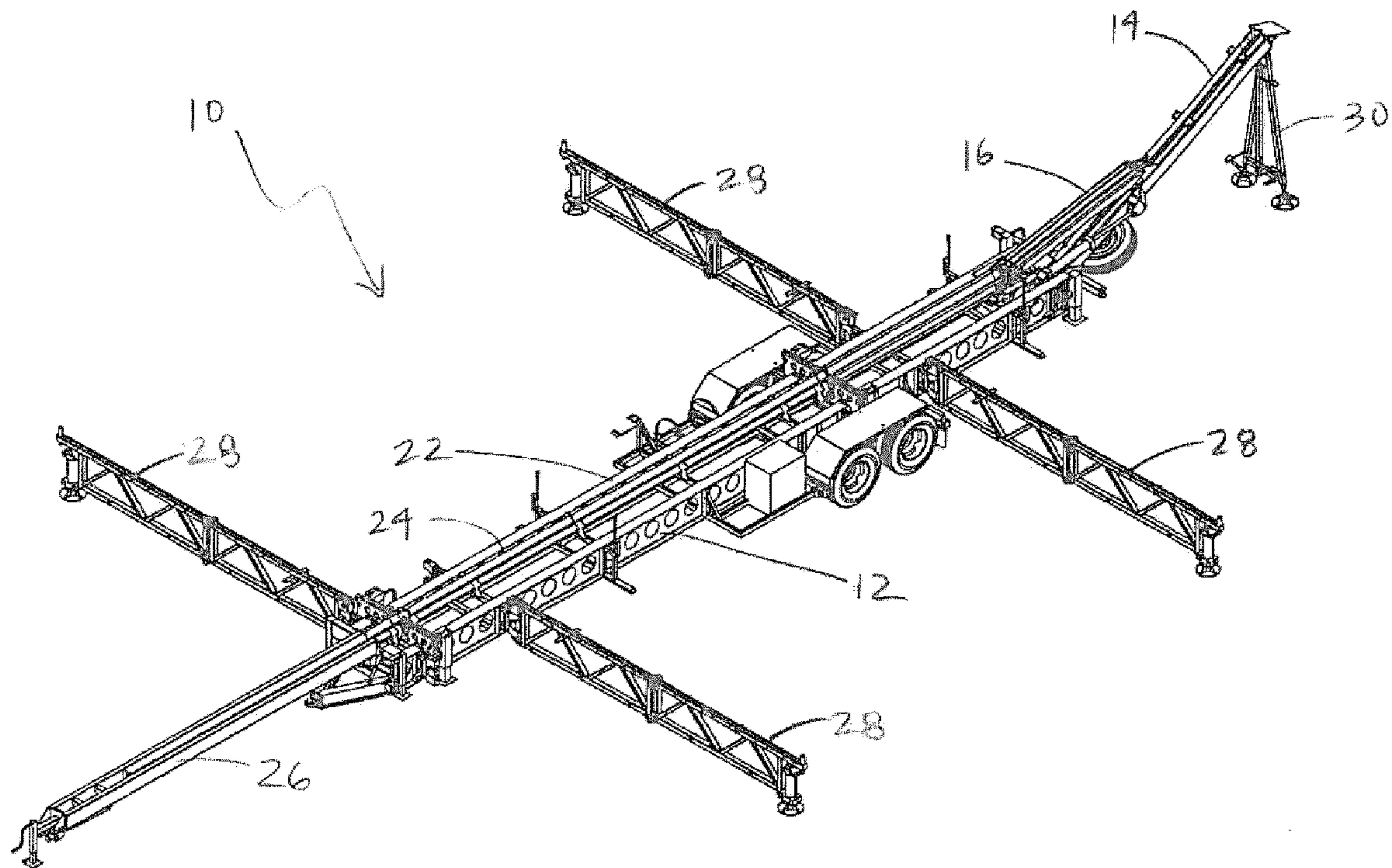


FIG. 1