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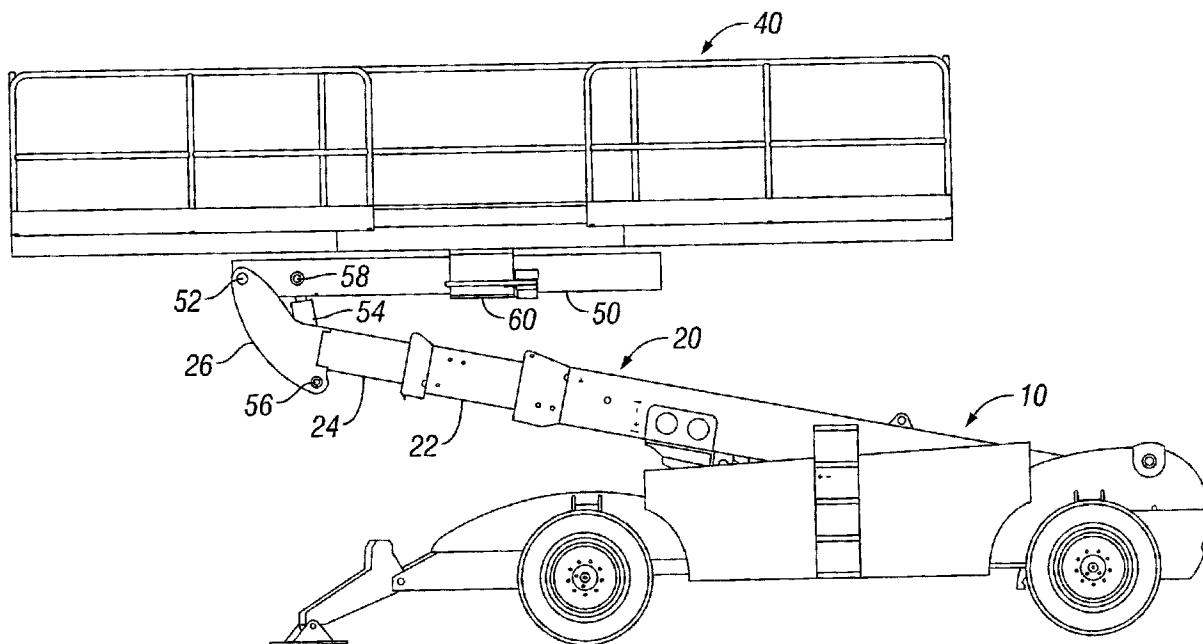
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(54) **Titre : APPAREIL DE LEVAGE ET DE POSITIONNEMENT DE PLATE-FORME DE TRAVAIL**

(54) **Title: APPARATUS FOR ELEVATING AND POSITIONING A WORK PLATFORM**



(57) **Abrégé/Abstract:**

Apparatus for elevating, laterally and rotationally positioning an aerial work platform relative to a support structure such as a mobile vehicle. In one embodiment a platform supporting carriage is mounted for sliding movement along a support beam affixed to a boom and the platform is mounted on the carriage permitting rotation of the platform about a substantially vertical axis. In a second embodiment a four bar linkage is used for longitudinally moving a rotatable platform. One or more powered means may be provided for elevating, leveling and longitudinally and rotationally positioning the work platform.

ABSTRACT OF THE DISCLOSURE

Apparatus for elevating, laterally and rotationally positioning an aerial work platform relative to a support structure such as a mobile vehicle. In one
5 embodiment a platform supporting carriage is mounted for sliding movement along a support beam affixed to a boom and the platform is mounted on the carriage permitting rotation of the platform about a substantially vertical axis. In a second embodiment a four bar linkage is used for longitudinally moving a rotatable platform. One or more powered means may be provided for elevating, leveling and
10 longitudinally and rotationally positioning the work platform.

APPARATUS FOR ELEVATING AND POSITIONING A WORK PLATFORM

Background

5 Field:

This disclosure pertains to aerial deck and work platforms which are mounted on single or multi-section telescopic or articulated booms to position the platform at a selected elevation and position relative to a chassis or other support structure. More specifically, the disclosure pertains to apparatus which is more
10 efficiently able to position large sized work platforms with telescopic booms although articulated booms can also be used instead.

Description of the Related Art:

Boom mounted work platforms are typically of rectangular configuration
15 and, frequently, it is desirable to position the long side of the rectangular platform in close proximity to a vertical wall or to the vertical edge of a horizontal deck. Ideally, this should be easily accomplished without having to reposition an entire mobile vehicle on which the boom and work platform is supported.

One prior art example of a telescopic boom having a large work
20 platform non-rotatably supported thereon is the Manitou 150 TP which has a relatively short platform supported slide out deck which overlaps the main deck of the platform when the slide out deck is retracted.

A second example of known prior art is the Nagano NUZ090D device in which a rectangular work platform of about 7 feet by 10.5 feet is mounted at the
25 upper end of a telescopic boom for rotation about a vertical axis relative to the boom. Although the platform can be rotated, it cannot be laterally translated relative to the boom. The long sides of the work platform in this device are ordinarily aligned parallel to the longitudinal axis of the mobile support on which the boom is mounted.

Rotation of a large work platform relative to the boom creates very large
30 torsional forces on the supporting boom which require substantial additional structural strength. The prior art platforms have therefore been limited in size by

either using a rotatable platform while ensuring that the vertical axis of rotation of the platform is not located too far from a centered position over a mobile support structure or by merely precluding rotation of the platform relative to the boom and using a small slidable deck instead.

5 A more efficient arrangement is desired which is capable of longitudinal and rotational positioning for large workloads and in which the work platform and supporting boom may be closely positioned and stowed over the support structure, usually a mobile wheeled vehicle, during movement to different work locations.

10 Summary

In one embodiment there is provided an apparatus for elevating and positioning a work platform. The apparatus includes a mobile support structure and an extensible boom connected to the support structure for pivotal movement about a substantially horizontal axis extending transversely to the support structure, the boom
15 having a platform support end. The apparatus further includes an elongated platform support beam having a longitudinal axis which remains in a substantially horizontal orientation connected to the platform support end of the boom and a piston and cylinder unit connected to the platform support beam and connected to the boom, the piston and cylinder unit maintaining the platform support beam in the substantially
20 horizontally extending orientation during an elevation and lowering of the boom. The apparatus further includes a carriage mounted for sliding movement on the support beam to horizontally spaced positions above the boom, a motor for moving the carriage to the horizontally spaced positions, and a platform having an upper surface. The platform is mounted on the carriage for rotation of the platform about a
25 substantially vertical axis which extends through the carriage and the boom and is located at a geometric center of the upper surface of the platform.

The piston and cylinder unit may include a hydraulic piston and cylinder unit.

The support structure may include a mobile chassis having a
30 longitudinal axis and the boom may be connected to the chassis by a pivotal connection for rotation of the boom about the substantially horizontal axis.

The apparatus may further include powered means for moving the boom about the horizontal axis.

The platform may be substantially rectangular.

5 Brief Description of the Drawings

Figure 1 is a schematic side elevation view of a first embodiment of an apparatus for elevating and positioning a work platform and a large work platform;

Figure 2 is a view similar to Fig. 1 but showing the platform elevated to a working location;

10 Figure 3 is a perspective view of the underside of the platform in an elevated position showing a platform support carriage positioned on a platform support beam;

Figure 4 is a perspective view showing the platform in elevated position in-line with the chassis;

15 Figure 5 is a side elevation view showing the platform in elevated position with the platform rotated to present the long side of the platform in the front direction;

Figure 6 is a side elevation view of a second embodiment employing a four bar linkage for translating the platform beyond the end of the boom; and

20 Figure 7 is a perspective view of the underside of the platform of Fig. 6.

Description

As seen in Fig. 1, the apparatus includes a support structure 10. The support structure 10 may be a mobile vehicle which, as shown, may be a wheeled
25 vehicle or a tracked vehicle. Such a vehicle may be motor driven or otherwise moveable to a desired position at a work location. A boom 20, telescopic in this embodiment and having one or more extendable boom sections 22, 24, is mounted on the support structure 10 by a pivotal connection 30 (Fig. 4) which permits angular movement of the boom relative to the support structure about a substantially
30 horizontal axis. As shown in the drawings, a rectangular work platform 40 which may be elevated and laterally positioned relative to the boom 20 is shown above a

platform support beam **50**. As will be appreciated by those skilled in the art, the platform support beam **50** may take any structurally suitable configuration such as an I-beam, box beam, channel or other shape.

As shown, the boom **20** may include a boom top bracket **26** suitably
5 configured for pivotal connection of the platform support beam **50** to the boom top bracket **26** by a pivotal connection shown at **52**. A first powered means **54** is connected to the platform support beam **50** and to the boom **20** at the end bracket **26** for maintaining the platform support beam **50** in a substantially horizontal position during elevation and lowering of the boom **20**. In the embodiment shown in Fig. **1**,
10 the first powered means **54** is depicted as a piston/cylinder unit having a pivotal connection **56** to the boom bracket **26** and a second pivotal connection **58** to the slider beam **50** as shown. Although the first powered means **54** shown in the drawings comprises a piston/cylinder unit which may be hydraulic or pneumatic, the first powered means can of course take other forms such as a motor and
15 transmission connected between the boom **20** and the support beam **50** operably functioning to maintain the support beam **50** in a generally level horizontal orientation as workers and/or equipment are being elevated and lowered on the platform **40** by elevation and lowering of the boom which by either or a combination of the angular adjustment of the boom about the pivot **30** and extension or retraction of one or more
20 of the boom sections **22**, **24**.

A carriage **60** is mounted on the support beam **50** in a manner permitting longitudinal movement of the carriage **60** between limits of travel along the length of the support beam **50**. The carriage **60** may be supported on the beam **50** in any suitable fashion such as by rollers (not shown) which ride along a suitable
25 surface or surfaces of the support beam **50** which have a horizontal extent such as a top surface or lower of the support beam **50** or upper faces of horizontally extending flanges on the support beam **50**.

A work platform **40** is rotatably connected to the carriage **60** using a bearing arrangement positioned at a location possibly, but not essentially, at or near
30 of the geometric center of the platform in a manner to permit rotation of the platform

40 about a substantially vertical axis. The bearing may be connected to the platform **40** and carriage **60** by any suitable means such as threaded connectors or welding.

In Fig. **3**, a second powered means is mounted on the carriage **60** for longitudinally moving the carriage to different positions along the support beam **50**.

5 As shown, the second powered means includes a hydraulic motor or motors **72** for driving a pinion gear or gears suitable for engaging a rack gear or rack gears mounted on the support beam **50** to move the carriage **60** longitudinally along the support beam as desired. As will be appreciated by those skilled in the art, suitable control of the second powered means, accessible by personnel on the work platform
10 **40** will be provided. The details of the carriage positioning control are not shown and may be easily provided by those with reasonable skill in the art.

Also shown in Fig. **3** is a third powered means, generally indicated at **90**, for rotating the platform **40** about a substantially vertical axis when desired. The third powered means **90** may comprise a motor and transmission of any suitable
15 type, such as hydraulic. In the arrangement shown in Fig. **4**, the transmission includes a drive gear (not shown) engageable with a driven gear shown at **92**. The third powered means **90** for rotating the platform relative to the carriage should also be controllable by personnel on the work platform **40** whereby personnel on the work platform **40** can both rotate the platform about a substantially vertical axis relative to
20 the platform support beam **50** and laterally position the platform **40** at selected working locations relative to the platform support beam **50**. This enables workers to rotate and translate the platform as desired such that the long side of the platform may be positioned outwardly well beyond the footprint of the support structure **10** underneath. In many job sites, it is impossible or highly difficult to position a work
25 platform close enough to a vertical wall other than by placing the longitudinal axis of the vehicle parallel and close to the wall. This is particularly true if the boom is telescopic and is mounted on the support vehicle for rotation only around a horizontal axis transverse to the vehicle length. The structure disclosed herein can easily accommodate a very large platform of approximately **7.5** feet by **22** feet which can
30 rotate relative to the telescopic boom on which it is supported to present a long side to the work area when desired and hence allow the support vehicle to approach the

work at any angle. Significantly larger loads (typically twice the capacity of existing machines) can be supported on a large platform that can be rotated, without imparting substantial torsional loads into the telescopic boom structure.

As is conventional, the boom **20** is angularly elevated and lowered
 5 relative to the support structure **10** by a fourth powered means **100** which, as shown, is in the form of a hydraulic piston/cylinder arrangement. As will be appreciated by those skilled in the art, although the fourth powered means **100** is depicted as a hydraulic piston/cylinder unit, it should be apparent that the fourth powered means **100** can take any other suitable form for achieving the intended purpose, such as a
 10 pneumatic piston/cylinder unit, and electric or fluid driven motor/transmission units and others. Also, as will be appreciated by those skilled in the art, a fifth powered means (not shown) will be provided for extending and retracting the extensible sections **22, 24** of the telescopic boom **20**.

In Fig. **1**, a long side **44** of the rectangular platform **40** is generally
 15 aligned with the longitudinal axis of the boom **20** and support **10**, the boom and platform being substantially lowered toward and near a full lowered position in which the platform will be centered above the boom which is aligned with and above the support structure for transport or storage. Fig. **2** is similar to Fig. **1** but shows the extensible sections **22, 24** of the boom **20** slightly extended and with the platform **40**
 20 positioned on the support beam **50** near the far left end limit of its travel along the support beam **50**. Fig. **4** is similar to Fig. **1** but shows the boom **20** in an angularly elevated position with a short side **42** of the platform positioned parallel to the longitudinal axis of the support structure and with the support platform **40** near the right end limit of its travel along the support beam **50**. Fig. **5** is similar to Fig. **4** but
 25 shows a long side **44** of the platform **40** extending parallel to the longitudinal axis of the support structure **10**.

Figs. **6** and **7** depict a second embodiment of apparatus for elevating and rotationally and longitudinally positioning a work platform. In the embodiment of Figs. **6** and **7**, a four bar linkage **110** replaces the platform support beam **50** and
 30 carriage **60** arrangement for longitudinally repositioning the platform **40** relative to the boom **20**. The four bar linkage is comprised of spaced long bars **112** and **114**

pivotaly connected at their ends to spaced short bars **116** and **118**, the pivotal connections of the four bars to each other being shown at **120**. Short bar **116** of the four bar linkage is pivotaly connected at **152** to end bracket **126** of the boom. A rotatable platform bearing **130** possibly located at or near the geometric center of the platform **40** is affixed to the platform **40** and to or near the upper end of the second support bar **118** to permit rotation of the platform **40** about a vertical axis to alternatively present a short or a long side of the rectangular work platform to a work area when desired. As described with reference to the first embodiment, a powered means (not shown) may be provided for powered rotation of the platform as desired.

10 A first powered means **154** similar to the first powered means **54** of the first embodiment, shown in the form of a piston/cylinder unit, is pivotaly connected at **156** to the boom end bracket **126** and to the four bar linkage at **158** to maintain the platform **40** in a substantially horizontal orientation at all relevant times. A second powered means **140**, shown in the form of a piston/cylinder unit having opposite ends
15 pivotaly connected near and to opposite ends of the long bars **112**, **114** of the four bar linkage is provided for laterally translating the platform **40** relative to the boom. As in the first embodiment, a suitable control arrangement may be provided so that the platform **40** can be longitudinally and rotationally positioned by personnel on the platform by controlling the rotary connection **130** and the translating piston/cylinder
20 unit **140**.

While specific embodiments have been described and illustrated, such embodiments should be considered illustrative of the subject matter described herein and not as limiting the claims as construed in accordance with the relevant jurisprudence.

EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Apparatus for elevating and positioning a work platform, said apparatus comprising:

- 5 a) a mobile support structure;
- b) an extensible boom connected to said support structure for pivotal movement about a substantially horizontal axis extending transversely to said support structure, said boom having a platform support end;
- 10 c) an elongated platform support beam having a longitudinal axis which remains in a substantially horizontal orientation connected to said platform support end of said boom and a piston and cylinder unit connected to said platform support beam and connected to said boom, said piston and cylinder unit maintaining
- 15 said platform support beam in said substantially horizontally extending orientation during an elevation and lowering of said boom;
- d) a carriage mounted for sliding movement on said support beam to horizontally spaced positions above said boom;
- 20 e) a motor for moving said carriage to said horizontally spaced positions; and
- f) a platform having an upper surface, said platform mounted on said carriage for rotation of said platform about a substantially vertical axis which extends through said carriage and said boom and is located
- 25 at a geometric center of said upper surface of said platform.

2. The apparatus of claim 1, wherein said piston and cylinder unit comprises a hydraulic piston and cylinder unit.
3. The apparatus of claim 1, wherein said support structure is a mobile chassis having a longitudinal axis and said boom is connected to said chassis by a pivotal connection for rotation of said boom about said substantially horizontal axis.
4. The apparatus of claim 3, further comprising powered means for moving said boom about said horizontal axis.
5. The apparatus of claim 1, wherein said platform is substantially rectangular.

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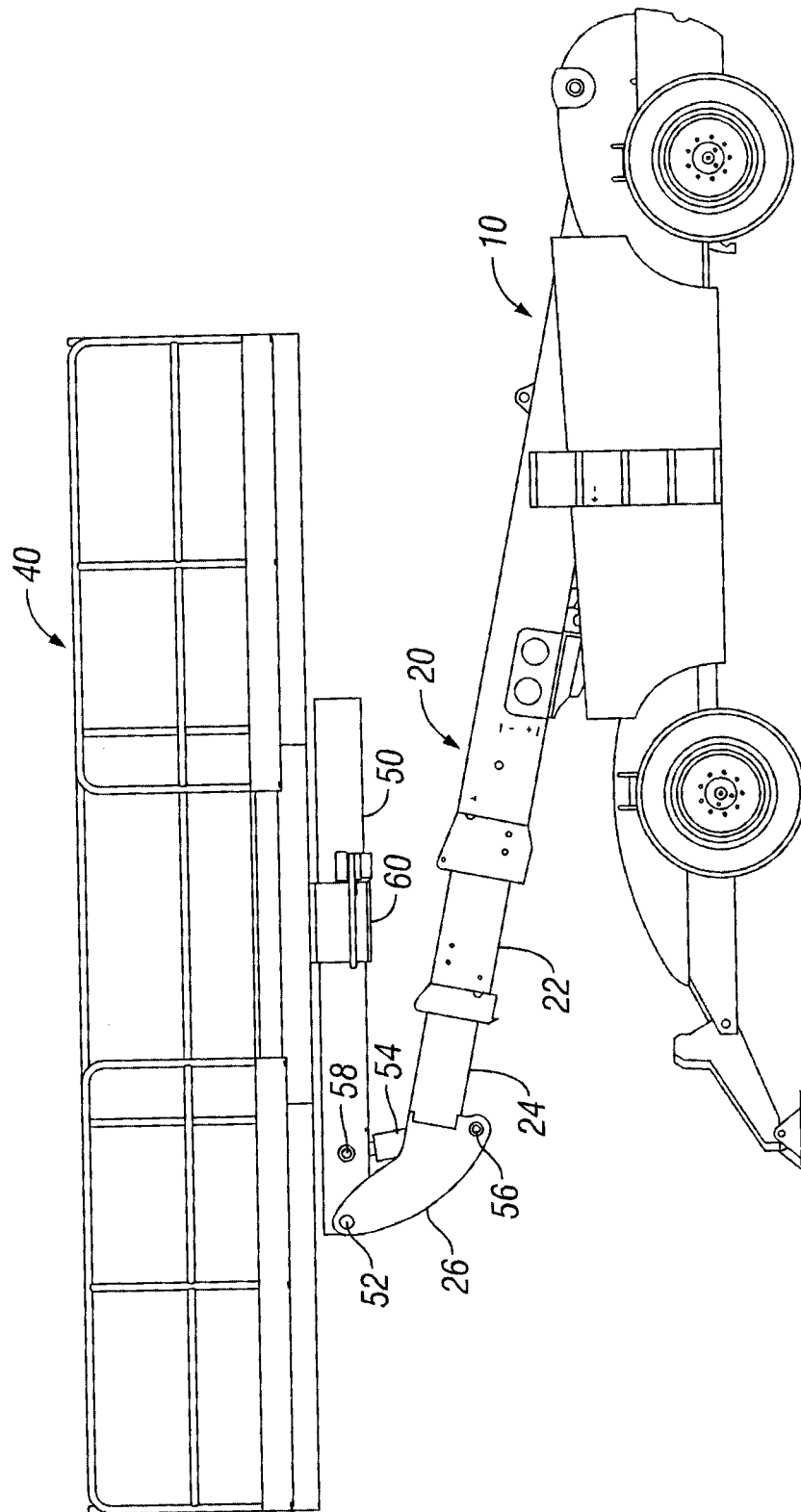
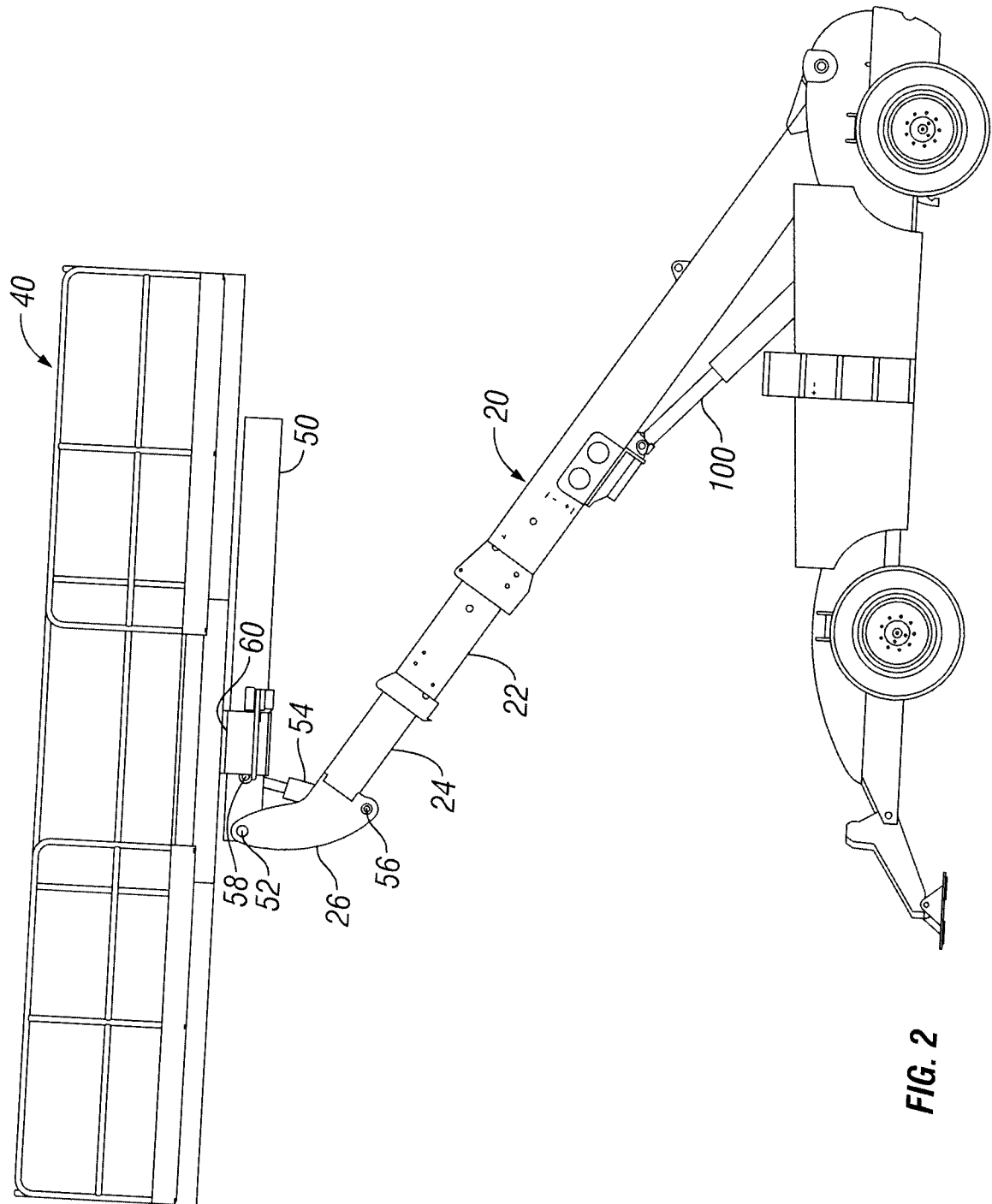


FIG. 1

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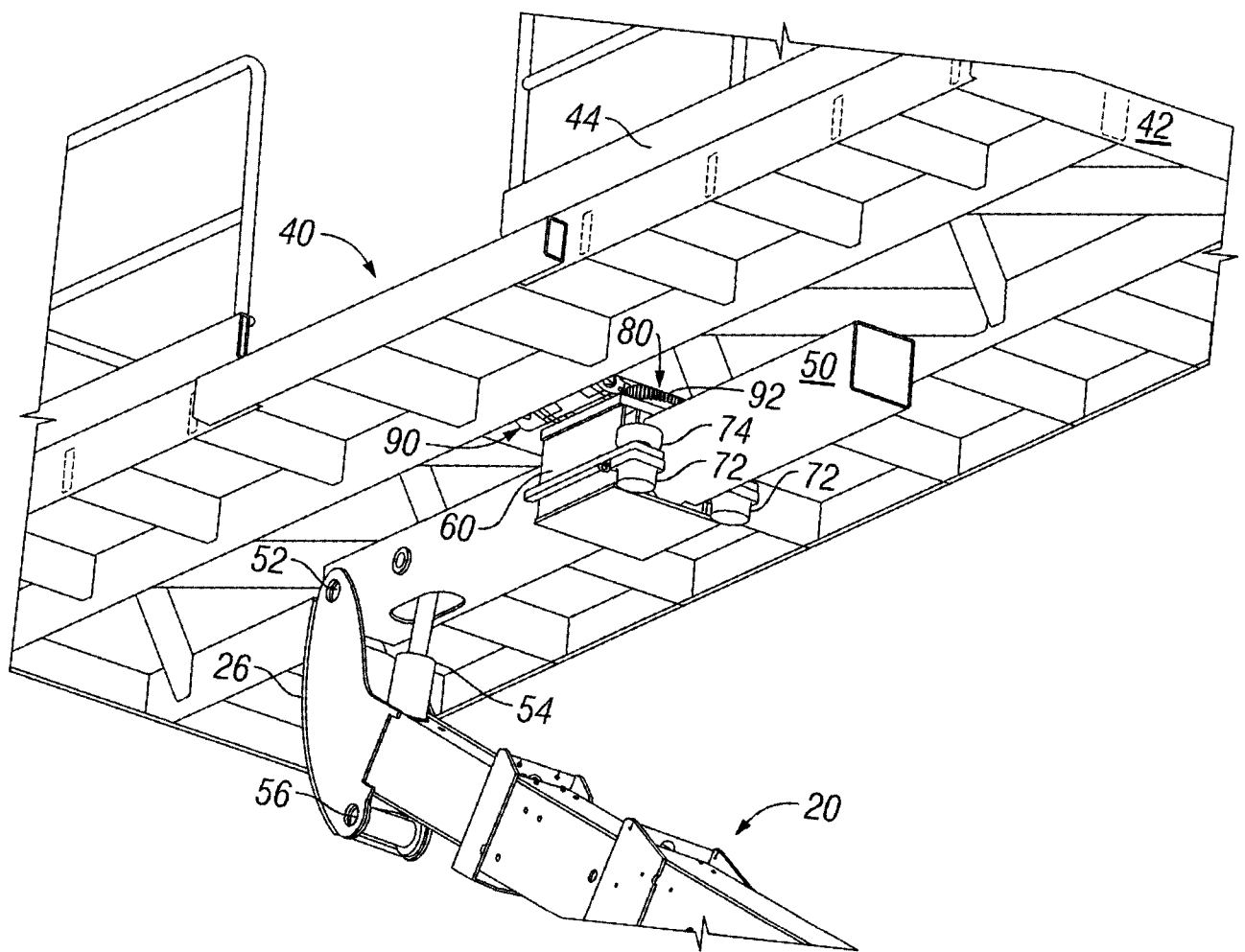


FIG. 3

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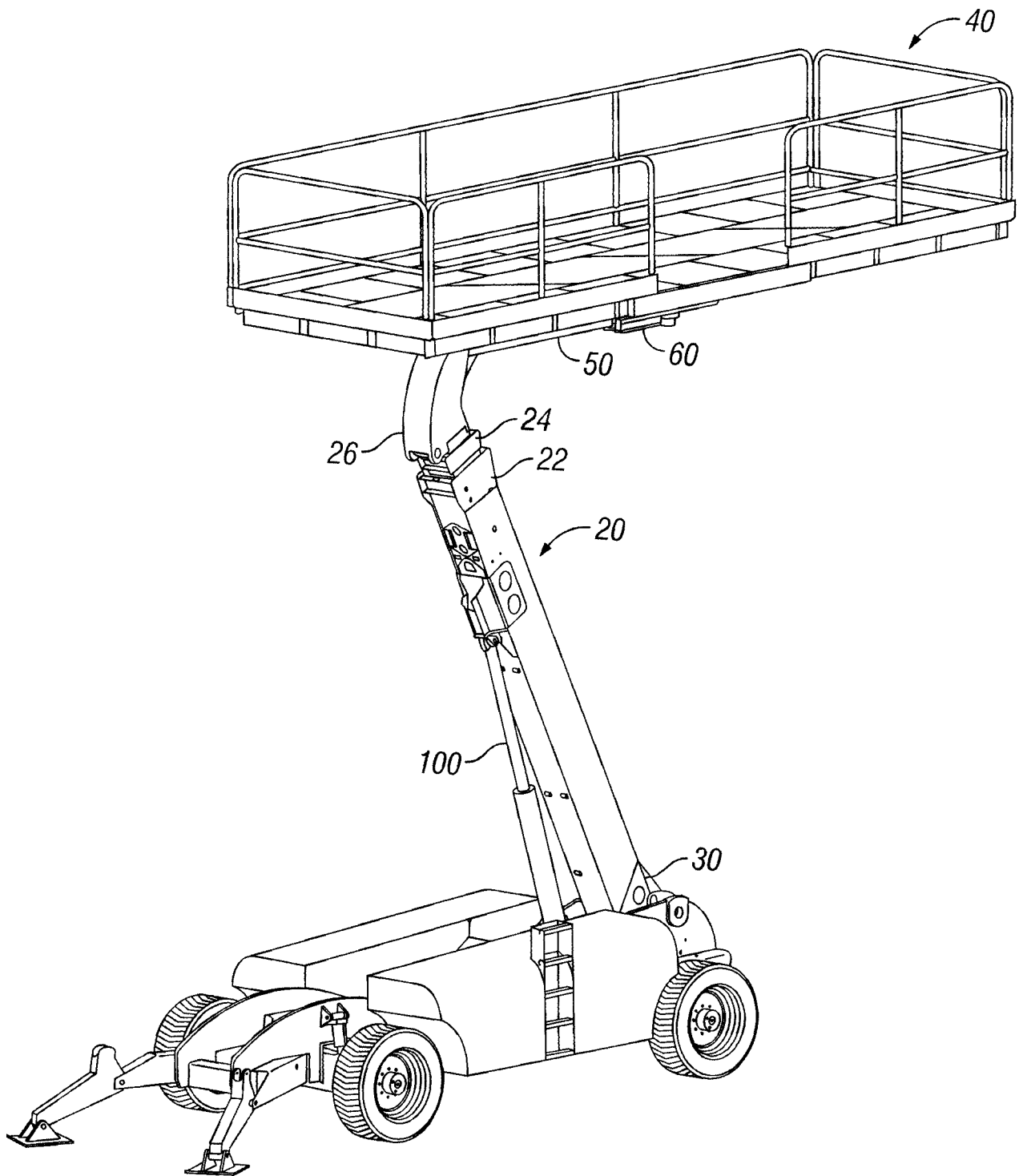
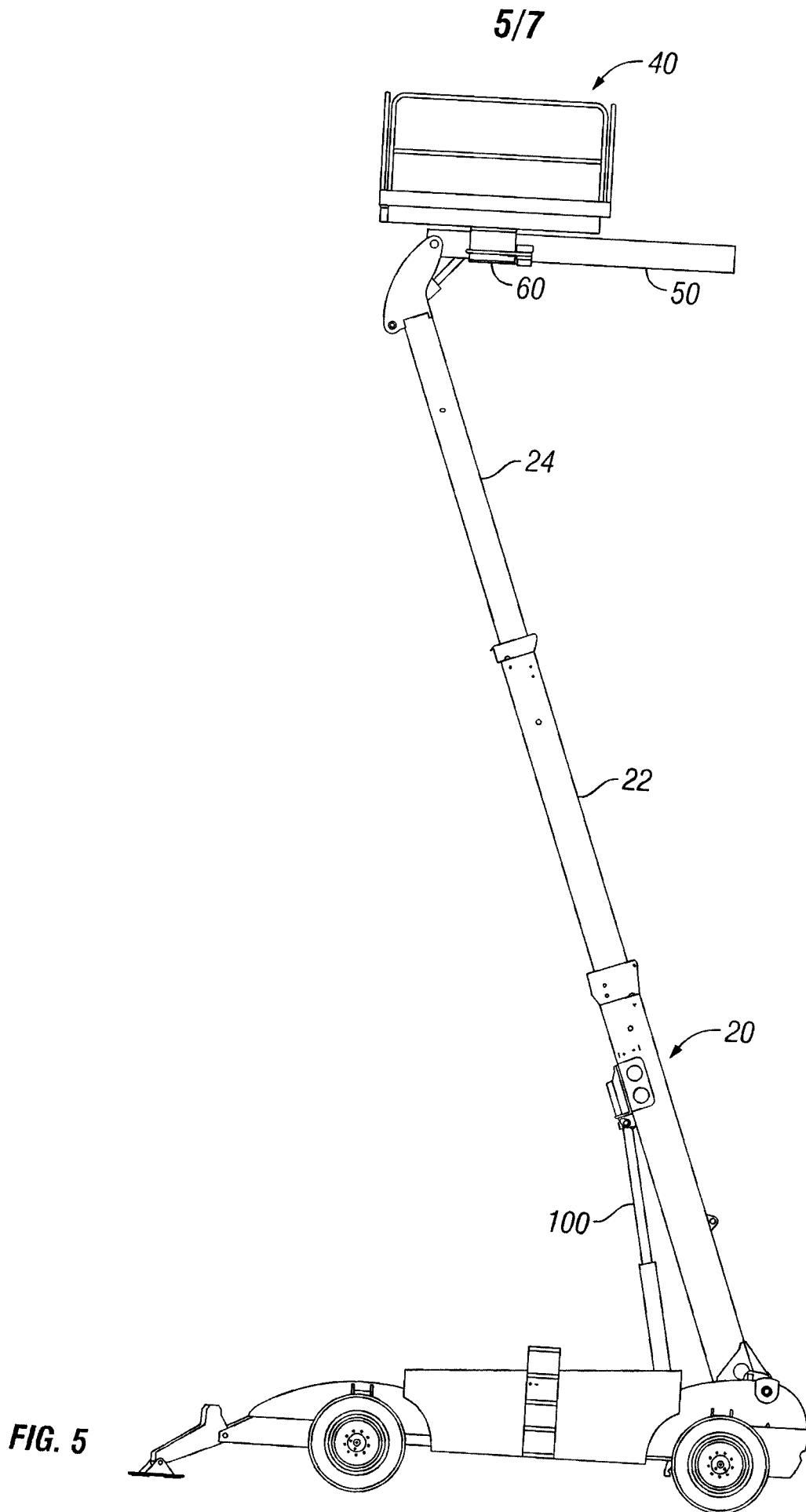


FIG. 4



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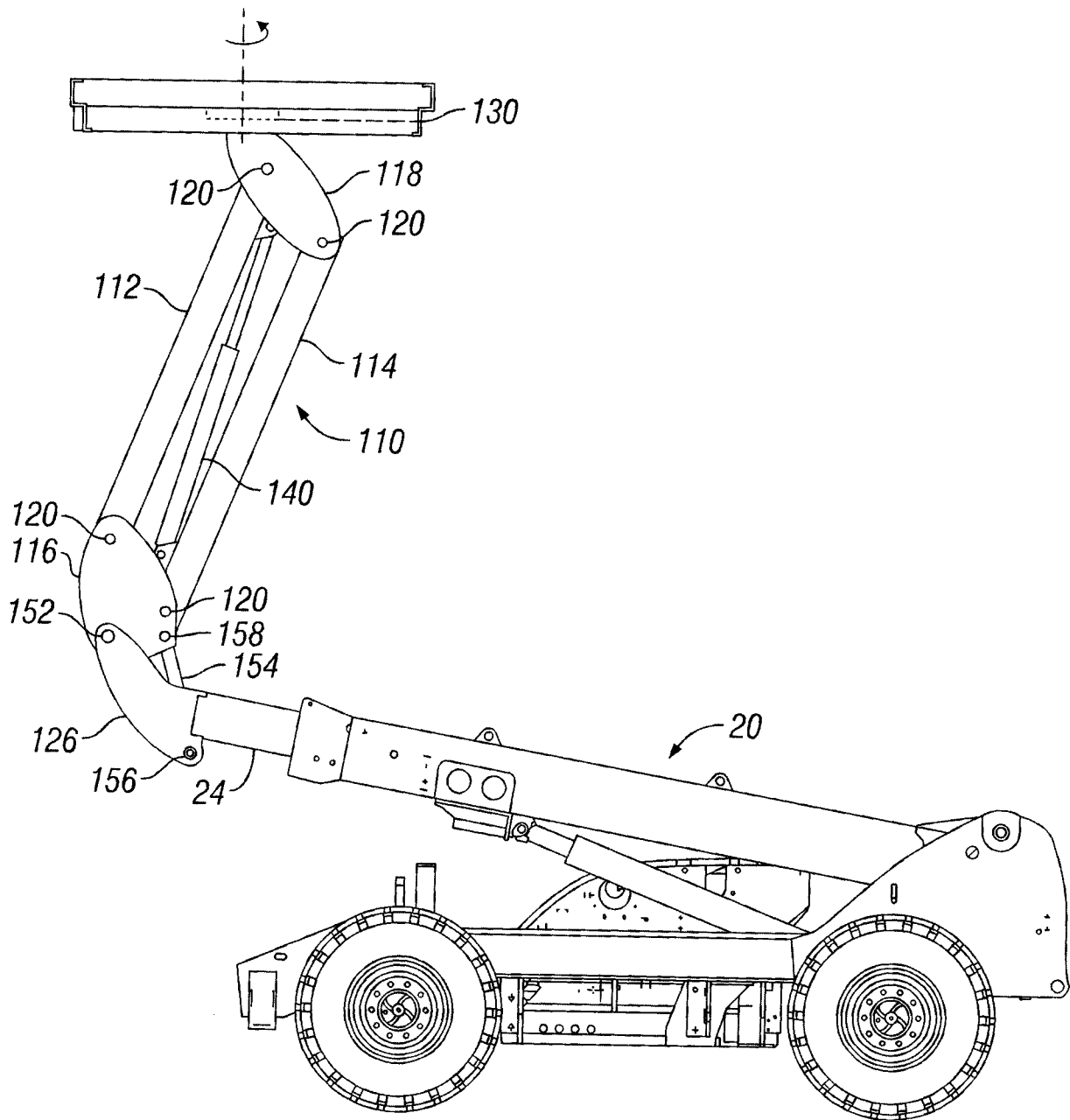


FIG. 6

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