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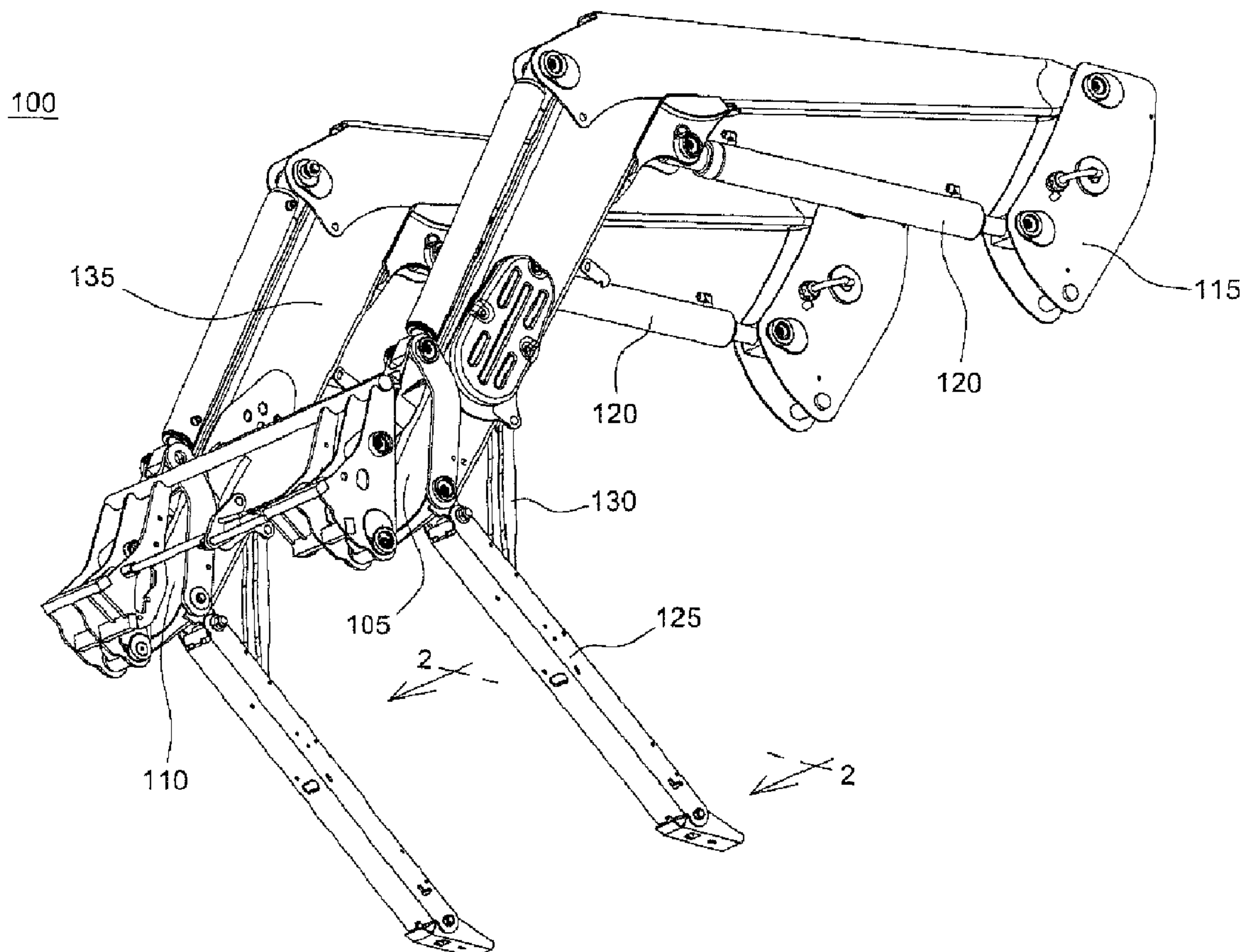
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(54) **Titre : MECANISME DE VERROUILLAGE DE POSITION AUTOMATIQUE DESTINE A DES SUPPORTS DE STATIONNEMENT
D'APPAREIL DE CHARGEMENT**

(54) **Title: AUTOMATIC POSITION LOCKING MECHANISM FOR LOADER ASSEMBLY PARKING STANDS**



(57) **Abrégé/Abstract:**

A parking stand for a detachable front loader assembly including a support leg pivoted to a boom, which is able to pivot between an extended and a retracted position. A set of parallel struts engage a locking plate, which is attached to the support leg. Being

(57) Abrégé(suite)/Abstract(continued):

engaged within locking mechanism divots, the support leg is secured within an optimally extended position. Extending the parking stand support leg into a parking configuration is achieved by way of a series of semi-automated actions that are triggered and propelled by way of hydraulic movement of a loader's boom and bucket. Such semi-automated actions include unlocking, extending, and securing the support leg. Retraction of the support leg is similarly executed.

ABSTRACT

A parking stand for a detachable front loader assembly including a support leg pivoted to a boom, which is able to pivot between an extended and a retracted position. A set of parallel struts engage a locking plate, which is attached to the support leg. Being engaged within locking mechanism divots, the support leg is secured within an optimally extended position. Extending the parking stand support leg into a parking configuration is achieved by way of a series of semi-automated actions that are triggered and propelled by way of hydraulic movement of a loader's boom and bucket. Such semi-automated actions include unlocking, extending, and securing the support leg. Retraction of the support leg is similarly executed.

AUTOMATIC POSITION LOCKING MECHANISM FOR LOADER ASSEMBLY PARKING STANDS

TECHNICAL FIELD

[0002] A parking stand for supporting a boom-type loader assembly, which is commonly mounted onto tractors such as front loaders. More particularly, the parking stand includes a locking mechanism to facilitate semi-automated parking stand positioning.

BACKGROUND

[0003] Used in the context of heavy equipment, a “loader” is a type of tractor having a front-mounted rectangular wide bucket connected to the end of two hydraulic booms. A loader, may also be referred to as a bucket loader, front loader, front-end loader, payloader, scoop, shovel, skip loader, or wheel loader. It is most often a wheeled vehicle, although loaders moving about tracks are often used where the geography is not suitable for wheels. Loaders are commonly used to scoop material from ground level and dump it into a dump truck, hole, trench, bin, or the like. Depending on the intended application, a loader’s design, components and specific functionality can vary significantly. However, many components are common to all types of loaders such as, for example, hydraulic booms that are attached to a tilting bucket.

[0004] Because front loader assemblies (e.g. booms and bucket) are often required for short operations and at infrequent intervals, such implements are normally detachably attached to a vehicle (i.e., “tractor”) so that the boom and bucket (i.e., “loader assembly”) can be removed from the tractor and parked. When detached from the tractor, the bucket portion of the loader assembly typically rests on the ground in an upright position. To keep the loader assembly in the upright position, the boom portions of the loader assembly can be configured to include a parking stand.

[0005] A parking stand is most often extended and retracted manually. When in the retracted position, the parking stand folds such that it is parallel to the boom and is secured by a lock or lever device. To “park” the loader assembly, the operator typically lowers the booms and tilts the bucket so that the flat portion of the bucket is level with and resting on the ground. The operator exits the cab and walks to the front of the tractor to disengage the

parking stands and allow them to swivel and drop down into a rest position on the ground. When retracting the parking stands, the reverse is performed.

[0006] To ensure that the loader assembly can later be reattached without significant difficulty, the parking stands should be extended and locked into a precise position where the connectors on the loader assembly will align with the connectors on the tractor. At a minimum, the above steps represent a tedious and time consuming task. However, as can be true with any task requiring manual interaction with heavy equipment in an operational state, the manual process of setting and retracting parking stands exposes the operator to a number of hazards.

SUMMARY

[0007] Disclosed herein is a unique parking stand assembly, which provides temporary support for a front loader boom and bucket. The parking stand includes a latch and lock mechanism that is activated when the boom and/or bucket is in a specific position, indicative of a parking procedure. Activation of the latch and lock mechanism unlocks a parking stand when it is in a stowed position, such that it can drop and lock into a position where the parking stand is able to support the weight of the boom.

[0008] The present invention comprises a loader assembly having a suspension and support mechanism, which include a boom with a movable implement attached at one end and a parking stand attached to the boom comprising a first strut pivotally attached to a second strut and a locking plate, wherein the locking plate comprises plurality of locking divots for receiving the first strut and second strut.

BRIEF DESCRIPTION OF EXEMPLARY DRAWINGS

[0009] A more complete understanding of the present invention may be derived by referring to the detailed description and claims when considered in connection with the Figures, wherein like reference numbers refer to similar elements throughout the Figures, and:

[0010] **FIG. 1** is a perspective view of a boom with the parking stand in a stowed and locked position in accordance with one embodiment;

[0011] **FIG. 2** is a perspective view of an engaged parking stand and strut pivotally connected to a loader assembly boom in accordance with one embodiment;

[0012] FIG. 3 is a perspective view of a loader assembly boom with a pivotally attached support leg and strut in a stowed position in accordance with one embodiment; and

[0013] FIG. 4 is a perspective view of a support leg component of the parking stand including a ratchet-type mechanism for locking the support leg in an extended position in accordance with one embodiment

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0014] In general, this disclosure presents a unique front-end loader parking stand arrangement, which is of a simple, compact design, which may be easily moved between stowed and parking positions. More specifically, the front-end loader parking stand arrangement includes a pair of support legs, which are each pivotally mounted to a respective boom of the loader assembly. A support leg include a pair of independently pivoting support struts, which function in a ratchet-like manner relative to a locking mechanism. The locking mechanism comprises a plate having a pair of rows that each include a number of sequential divots. The divots receive the free-end of the respective support strut and secure it unidirectionally, thereby preventing the support legs from collapsing.

[0015] When stowed, each parking stand is secured within a respective locking receptacle, which is affixed to each respective loader boom. The locking feature of the receptacle may comprise, for example, a cross pin or cover. Each of a pair of parallel but independently pivoting struts are brought into contact with one of a plurality of divots in the locking mechanism when the support leg is lowered to establish the parking stand park position.

[0016] Before any embodiments are explained in detail, it is to be understood that the disclosure is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The disclosure is capable of other embodiments and of being practiced or of being carried out in various ways. Further embodiments of the invention may include any combination of features from one or more dependent claims, and such features may be incorporated, collectively or separately, into any independent claim.

[0017] In describing embodiments herein, directional and positional descriptors (e.g., left, right, front, and back) are based on a perspective of one who is facing the bucket

from the position of the boom/tractor connections. As such, for example, the bucket is at the front and the tractor is at the back of the boom assembly.

[0018] FIG. 1 is a perspective view of a boom with the parking stand in a stowed and locked position in accordance with one embodiment. For simplicity, a loader assembly is illustrated as being detached from the front-end of a tractor. However, those of ordinary skill in the art will appreciate that the described processes for parking and un-parking the loader assembly **100** will most often be performed while the loader assembly **100** is pivotally attached to the tractor. For example, a front-end of a tractor may include a first coupling pin positioned and affixed to a first side of the tractor frame and a second coupling pin positioned and affixed to a second opposing side of the tractor frame, the first and second coupling pins pivotally securing first boom **105** and second boom **110** of a loader assembly **100** to the tractor frame.

[0019] In one embodiment, the loader booms **105**, **110** are pivoted about a tractor frame coupling pins by a first pair of hydraulic motors **120** that are respectively coupled between each tractor frame coupling pin and the associated boom **105**, **110**. A second pair of hydraulic motors may be implemented to control the disposition of a bucket about its pivotal connections with the forward end **115** of the each boom **105**, **110**. In one embodiment, the bucket is removable, such that it may be detached from the loader assembly **100** and interchanged with other implements.

[0020] In one embodiment, the parking stand **125** and the strut **130** are pivotally connected to the primary boom **135**. Front-loader assemblies typically fall into one of two common boom configurations. In a first configuration, a single boom **135** pivots at an end where it connects to the tractor and pivots at the opposing end to control the tilt of an attached bucket. In a second configuration, the boom **135** includes an additional pivot point that is positioned at a point between the tractor end **105**, **110** and the bucket end **115** of the boom. For simplicity, a single boom will be described with reference to the disclosed parking stand **125**. However, those of ordinary skill in the art will appreciate that the parking stand **125** may be applied to any or all of various boom configurations. Moreover, the parking stand **125** may be positioned at any point along the length of a boom **135** and/or boom segment.

[0021] **FIG. 2** is a perspective view of an engaged parking stand and strut pivotally connected to a loader assembly boom in accordance with one embodiment. As shown, a parking stand assembly **200** includes a support leg **225** and strut **220**, which are each connected to a boom **205**. In one embodiment, the support leg **225** includes on a first end, a through-hole **210**, which engages a boom **205** attached coupling pin. The through-hole and coupling pin attachment **210** allows the support leg **225** to move on a single axis (e.g., front to back).

[0022] In a typical configuration, a loader assembly **200** will include a parking stand that is positioned on each of two parallel booms. Elements of the parking stands and their associated booms may be referenced in the singular throughout this disclosure. However, the description of the parking stand and interconnected loader assembly components will at least equally apply to a second parking stand assembly that is positioned on and attached to a second boom. For simplicity, only one parking stand assembly is described.

[0023] In one embodiment, a strut **220** is pivotally attached to the boom **205** in order to follow the front-to-back movement of the support leg **225**, which the strut **220** supports. Similar to the support leg **225** attachment to the boom **205**, the strut **220** includes a through hole **215** at a boom engaging end. A coupling pin that is affixed to the boom **205** passes through the through-hole **215** of the strut **220** such that a hinge-like attachment is provided.

[0024] At a strut end **235** opposite the boom engaging end, the strut **220** includes a portion that is sized and comprises a shape that may be suitably received by or retrained by one of a series of locking mechanism divots or grooves on a locking mechanism **240**. As will be described in greater detail herein, the divots or grooves are machined or molded along the strut facing side of the support leg. In one embodiment, the locking mechanism **240** comprises a plate that is fixed to the support leg **225** by way of, for example, welds, bolts, pins, or rivets.

[0025] In one embodiment, the support leg **225** includes a ground-engaging foot **230**, which is pivotally attached to an end opposing the boom **205** engaging end of the support leg **225**. To provide greater support on a ground surfaces of variable grades, the foot **230** is attached to the support leg **225** to allow limited movement along a single axis.

[0026] FIG. 3 is a perspective view of a loader assembly boom with a pivotally attached support leg and strut in a stowed position in accordance with one embodiment. In the stowed position of the parking stand, the support leg 310 is pivoted and latched against the boom 305 so as not to interfere with the operation of the front-loader assembly. A latching mechanism 330 secures the support leg 310 while stowed and may comprise a pivoting hook that is held into a default latched position by a spring or similar. In one embodiment, the latching mechanism 330 may be operated by linkages or cable controls. Alternatively, the latching mechanism 330 may be actuated electrically, hydraulically, or pneumatically using power sources made available by the tractor. Further, a means for activating the latching mechanism 330 may include an electromagnet. For example, through the use of an electromagnet, a latch pin or lock may be controlled, with the pin being spring biased to a position such that when the electromagnet is de-energized, even by a power failure, the support leg 310 would remain latched in the stowed position.

[0027] When the latching mechanism 330 is released, the support leg 310 pivots down due to the force of gravity. In one embodiment, the support leg 310 may be driven down toward a parking position by a motor, spring, or actuator. While not wholly visible when the support leg 310 is stowed, a strut is pivotally connected to the boom 305. In one embodiment, movement of the strut is provided by any means disclosed herein, thereby causing movement of the support leg 310 to correspond to the guided movement of the strut. In order to return the support leg 310 to a position in which is pivoted upward in the stowed position, the strut may be manually or automatically pivoted upward toward the boom, where it is secured by the latching mechanism 330.

[0028] In one embodiment, powered movement to either of the support leg 310 or the strut is provided by hydraulic driven movements of boom 305 components. For example, in order to park the loader assembly, an operator uses tractor controllers to invoke movement of the boom 305 and the bucket 325. By raising or lowering the boom 305 and tilting the bucket 325 into a specific position, attached cabling may translate the hydraulic driven movements into mechanical movements of parking stand components. These movements may be applied to open or close a latching mechanism 330, lower or retract the support leg 310, or pivot a strut.

[0029] **FIG. 4** is a perspective view of a support leg component of the parking stand including a ratchet-type mechanism for locking the support leg in an extended position in accordance with one embodiment. A support leg is presented in **FIG. 4** with respect to the interconnections with the boom and struts while in a parking position. When the parking stand is released and lowered from its stowed position, downward motion is stopped when a foot **435** contacts the ground surface. At the ground-engaging end of the support leg, the foot **435** is pivotally attached to the support leg **405** by means of a coupling pin **445**, in accordance with one embodiment.

[0030] To provide vertical reinforcement to the support leg **405** and to lock the support leg **405** into a precise ground-engaging position, the parking stand assembly includes two struts **415, 420**. In accordance with this embodiment, the struts **415, 420** are pivotally attached to a loader boom by way of a through hole and coupling pin **425**, such that each strut is able to pivot independently.

[0031] Each of the struts **415, 420** include a locking element (e.g., divot or groove) **440** engaging portion **455** at the end opposite of the pivotally connected end **425**. The size and shape of the engaging portion **455** may vary based on the size and shape of the divots **440**. In one embodiment, the parking stand assembly includes a single strut, which is pivotally attached to the boom and engages a single row of sequentially positioned divots **440**.

[0032] In one embodiment, each of the two struts **414, 420** are pivotally attached by way of a coupling pin **425**, which secures the struts to a mounting bracket that is attached to the boom. In accordance with this embodiment, the two struts **414, 420** are configured to pivot in unison when moving in a single direction. Accordingly, a first strut **420** includes a stopper **450** attached thereto to prevent the second strut **415** from pivoting ahead of the first strut **420** while moving in single direction.

[0033] In a further embodiment, the two pivotally attached **425** struts are bound together in a manner that causes them to pivot in unison. A bracket **450** that functions to bind a first strut **415** and second strut **420** is configured in a manner that creates a slight offset, wherein the second strut **420** is held in a position that is slightly ahead of the first strut **415**. Two rows of divots **440** for securing the engaging end **455** of each strut **415, 420** are similarly offset to allow for a greater density of divots allowing for greater precision in strut

positioning. Having a greater number of divots **440** in close proximity contributes to the increased positioning precision without significantly impacting the tensile strength of the locking plate **410**.

[0034] When the first strut **415** engages one of the divots **440** in the first row, the second offset strut **420** engages a divot **440** in the slightly offset second row. Because the two struts **415**, **420** engage two slightly offset divots **440**, the locking plate **410** is not overly weakened by having two horizontally aligned divots **440** or holes in very close proximity, which forms a straight line of significantly removed material. Those of ordinary skill in the art will appreciate that having a series of cutouts **440** positioned along a shared axis of a metal plate **410** will result in a logical breaking point **410** when subjected to excessive weight.

[0035] In one embodiment, the support leg **405** comprises a length of C-shaped metal (i.e., c-beam), where the open side of the “C” faces the boom and struts **415**, **420**. The locking plate **410** is attached to the support leg **405** and likewise faces the boom and struts **415**, **420**, such that the divot engaging ends **455** of the struts **415**, **420** are able to engage the locking plate divots **440**. Positioning the locking plate **410** within the channel of the c-beam shaped support leg **405** further secures locking plate **410** by preventing side-to-side movement.

[0036] The locking plate **410** comprises a high-strength material and includes, in one embodiment, two parallel lines of sequential insets, divots, or grooves **440**. A locking divot **440** may comprise a hole that is bored through the locking plate **410**, where the depth of the divot **440** equals the thickness of the locking plate **410**. In the illustrated embodiment, the divot **410** is pill shaped, wherein the long side of the divot **440** is perpendicular to the support leg **405** length. However, the divots **440** may comprise any shape and may take the form of a through-hole or an inset, which does not pass through the locking plate **410**. In one embodiment, narrow strips of a hardened material (e.g., steel) may be formed into a grid-like structure, which is attached to the top of the locking plate **410**. In accordance with this embodiment, the strut end portions **455** are secured between a series of grid lines.

[0037] In one embodiment, the locking plate **410** is permanently or semi-permanently secured to the support leg **405** by way of bolts, rivets, or welds. The locking plate **410** is of a sufficient width to fit within the support leg **405** channel and is of a sufficient length to

engage the struts **415**, **420** when the support leg **410** is pivoting into or out of a locked position.

[0038] In another embodiment, the locking plate **410** slides along a track within the support leg **405** channel. In addition to an ability to move along a track, either the locking plate **410**, the support leg **405**, or a combination thereof, include a mechanical means for securing the locking plate **410** into a position along the track. The struts **415**, **420** remain engaged with the locking plate **410** as the support leg **405** pivots between a fully extended position and a stowed position, such that the locking plate **410** moves along the length of the support leg **405** in response to movement of the support leg **405**. In the previously disclosed embodiment, having the secured locking plate rather than having the struts **415**, **420** ratchet over a secured locking plate **410**.

[0039] Those of ordinary skill in the art will appreciate that there are a variety of methods and mechanisms that would effectively secure the locking plate **410** into a desired position and release the locking plate **410** to allow full or limited movement. In various embodiments, the disclosed parking stand utilizes automatic means, manual means, or a combination of means to secure and release the locking plate **410**. Those of ordinary skill in the art will appreciate that whether the securing means comprises a cable and lever arrangement or a sensor and solenoid actuator, the elected method for securing does not alter, nor does it limit the scope of the invention.

[0040] Moreover, relative to the mechanical components for carrying out the features of the disclosed parking stand, various known methods, mechanisms, and systems exist, for example, to determine and measure movement, facilitate movement and secure components to prevent movement. The disclosed parking stand may incorporate any known method for carrying out the various mechanical features disclosed herein, without departing from the scope of the invention.

[0041] In the foregoing specification, the system has been described with reference to specific embodiments. However, it may be appreciated that various modifications and changes may be made without departing from the scope of the invention. The specification and figures are to be regarded in an illustrative manner, rather than a restrictive one, and all such modifications are intended to be included within the scope of

invention. Accordingly, the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given above. For example, the steps recited in any of the method or process claims may be executed in any order and are not limited to the order presented.

[0042] Benefits, other advantages, and solutions to problems have been described above with regard to specific embodiments. However, the benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as critical, required, or essential features or elements of any or all the claims. As used herein, the terms “comprises”, “comprising”, or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. Further, no element described herein is required for the practice of the invention unless expressly described as “essential” or “critical.”

CLAIMS:

1. A loader parking assembly comprising:
a boom with a movable implement attached at one end; and
a parking stand attached to the boom comprising a first strut pivotally attached to a second strut and a locking plate, wherein the locking plate comprises plurality of locking divots for receiving the first strut and second strut.
2. The loader parking assembly of claim 1, wherein the first strut and second strut each comprise a strut second end, wherein the strut second end engages with the one of the plurality of locking divots to secure both the first strut and second strut.
3. The loader parking assembly of claim 2, wherein the weight of the boom is supported when both the first strut second end and the second strut second end engage with the one of the plurality of locking divots.
4. The loader parking assembly of claim 2, wherein the first strut second end and the second strut second end independently engage one of the plurality of locking divots.
5. The loader parking assembly of claim 1, wherein the plurality of locking divots are positioned sequentially.
6. The parking loader assembly of claim 4, wherein the plurality of locking divots are positioned sequentially in two parallel rows of separate locking divots.
7. The loader parking assembly of claim 1, wherein the first strut and the second strut independently engage one of the pluralities of locking divots.
8. The loader assembly of claim 4, wherein the first strut second end and the second strut second end are not radially parallel when received by a first one of the plurality of locking divots and a second one of the plurality of locking divots.

9. A method for self-leveling a loader boom comprising:
lowering a boom with a movable implement attached at one end;
activating a parking stand attached to the boom comprising a first strut pivotally attached to a second strut and a locking plate, wherein the locking plate comprises a plurality of locking divots for receiving the first strut and second strut; and
allowing the first strut and the second strut to independently engage with at least two of the plurality of locking divots.
10. The method of claim 9, wherein allowing the first strut and the second strut to independently engage with at least two of the plurality of locking divots further comprises a first strut second end and a second strut second end independently engaging with at least two of the plurality of locking divots.
11. The method of claim 10, wherein the first strut second end and a second strut second end independently engage with at least two of the plurality of locking divots positioned sequentially in two parallel rows.
12. The method of claim 9, wherein activating the parking stand comprises activating a positioning mechanism configured to move the parking stand from the extended position to the retracted position.
13. The method of claim 12, wherein activating the parking stand comprises moving the movable implement which mechanically actuates the positioning mechanism.
14. The method of claim 13, wherein the positioning mechanism is actuated by tilting the movable implement along a vertical axis.
15. The method of claim 14, wherein tilting the movable implement along a vertical axis causes the parking stand to be released from the retracted position.

17. An automatic loader parking assembly comprising:
a boom with a movable implement attached at one end;
a parking stand attached to the boom comprising a first strut pivotally attached to a second strut and a locking plate, wherein the locking plate comprises plurality of locking divots for receiving the first strut and second strut;
a positioning mechanism configured to move the parking stand from the extended position to the retracted position upon tilting of the movable implement along a vertical axis.
18. The automatic loader parking assembly of claim 17, wherein the weight of the boom is supported when the strut second end of both the first strut and second strut engage with the one of the plurality of locking divots.
19. The automatic loader parking assembly of claim 17, wherein the positioning mechanism is further configured to place the parking stand in the extended position as the movable implement is in full positive tilt along its vertical axis.
20. The automatic loader parking assembly of claim 17, wherein the positioning mechanism is further configured to place the parking stand in the retracted position as the movable implement is in full negative tilt along its vertical axis.

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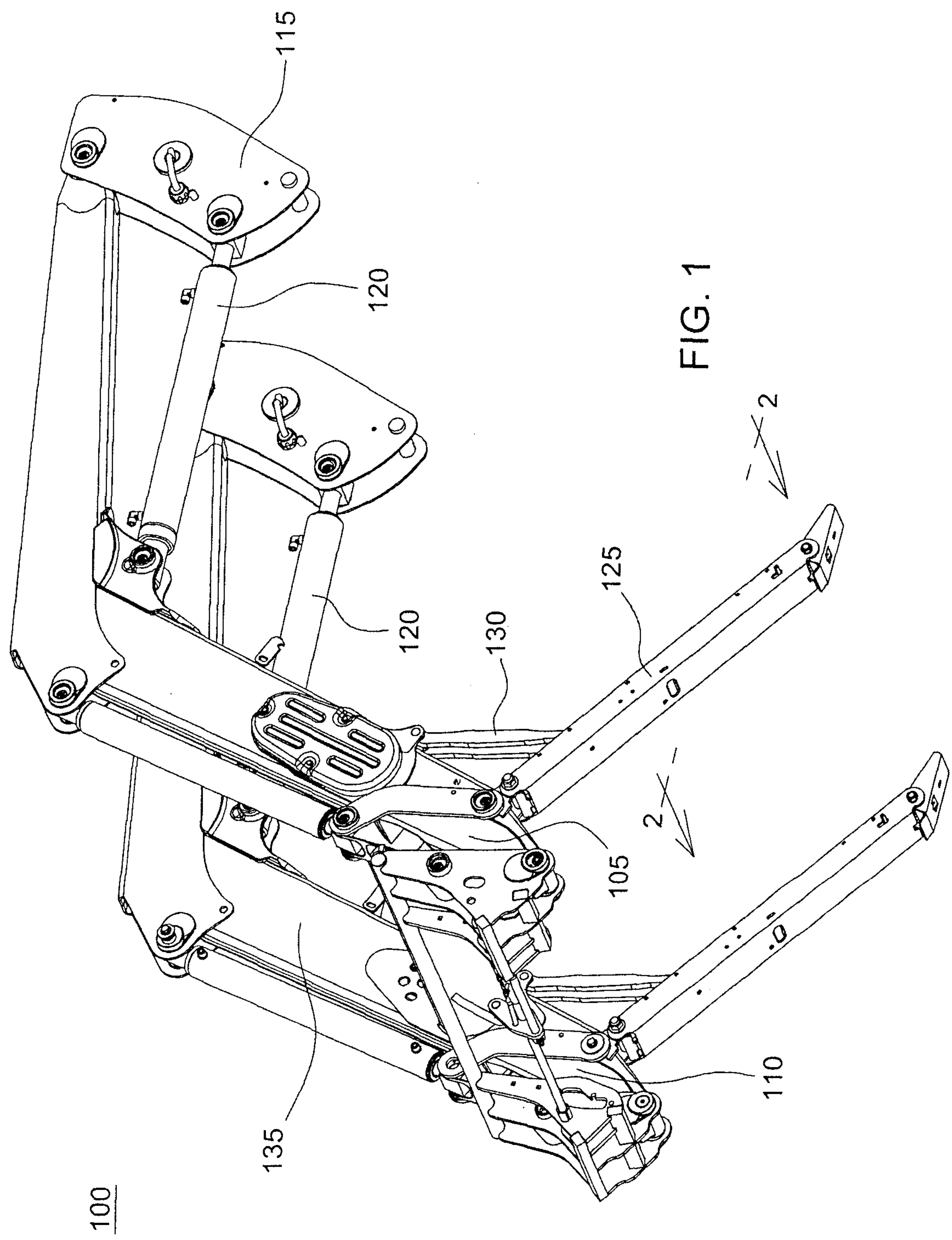
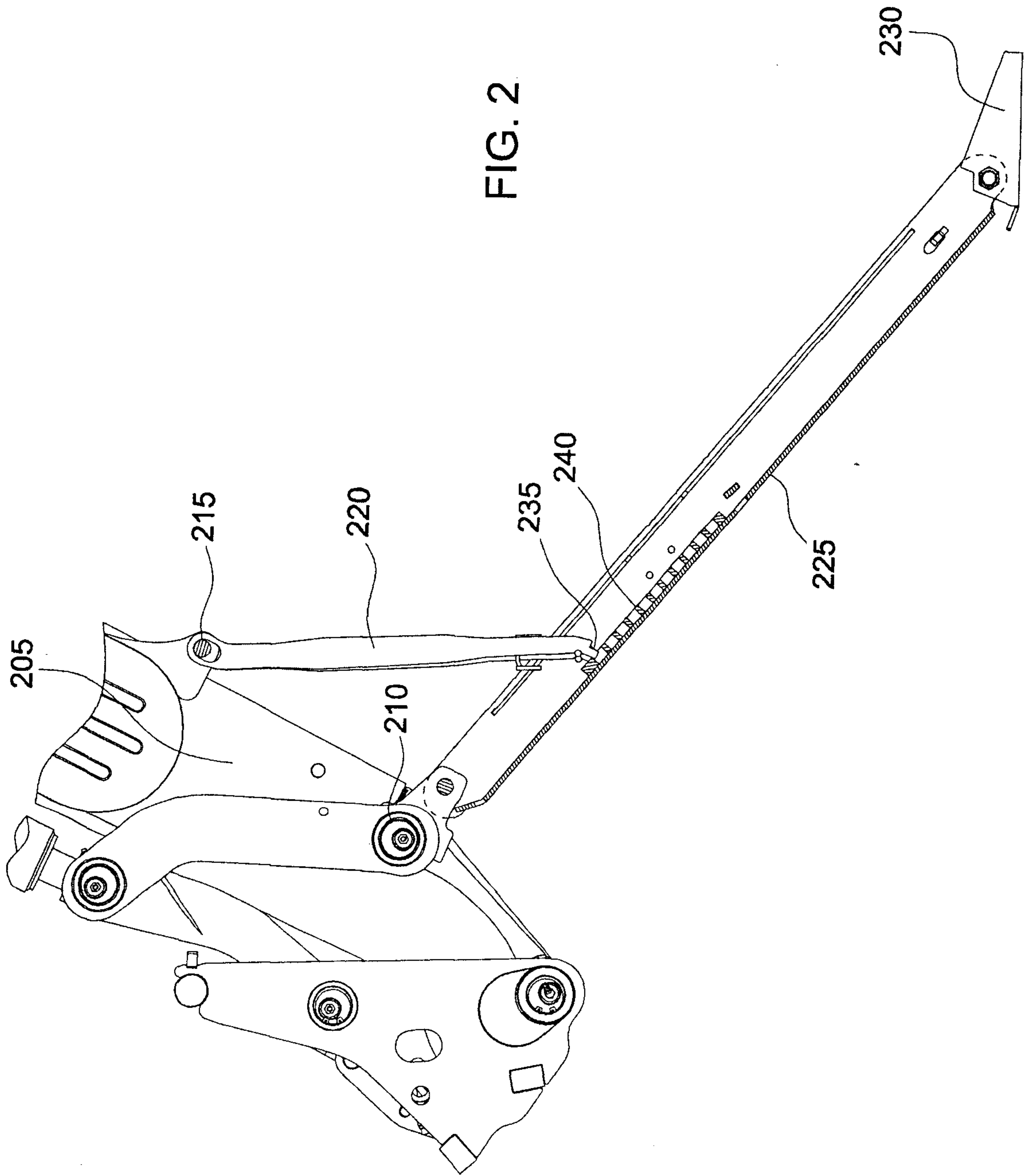
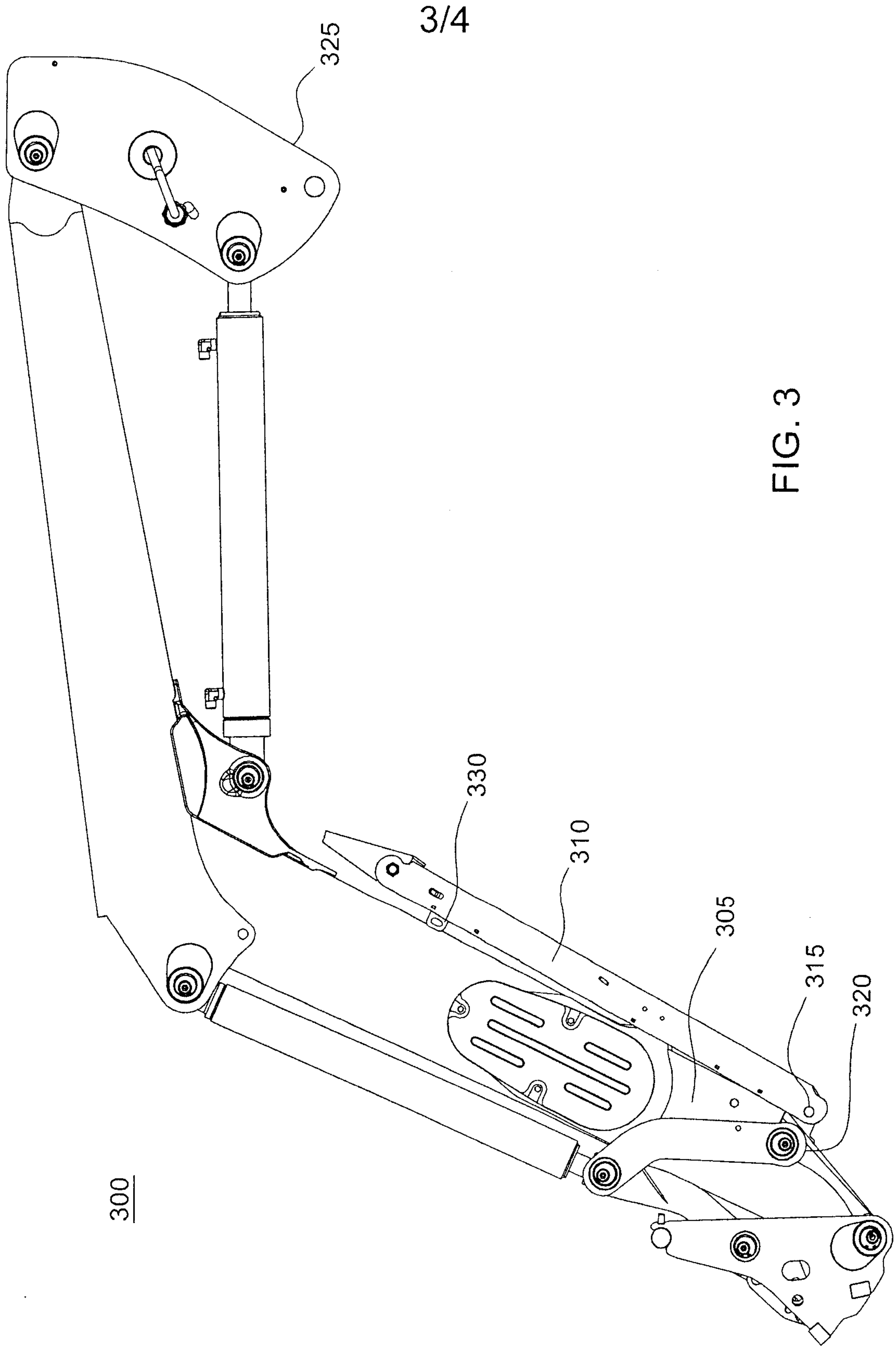


FIG. 2





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FIG. 3

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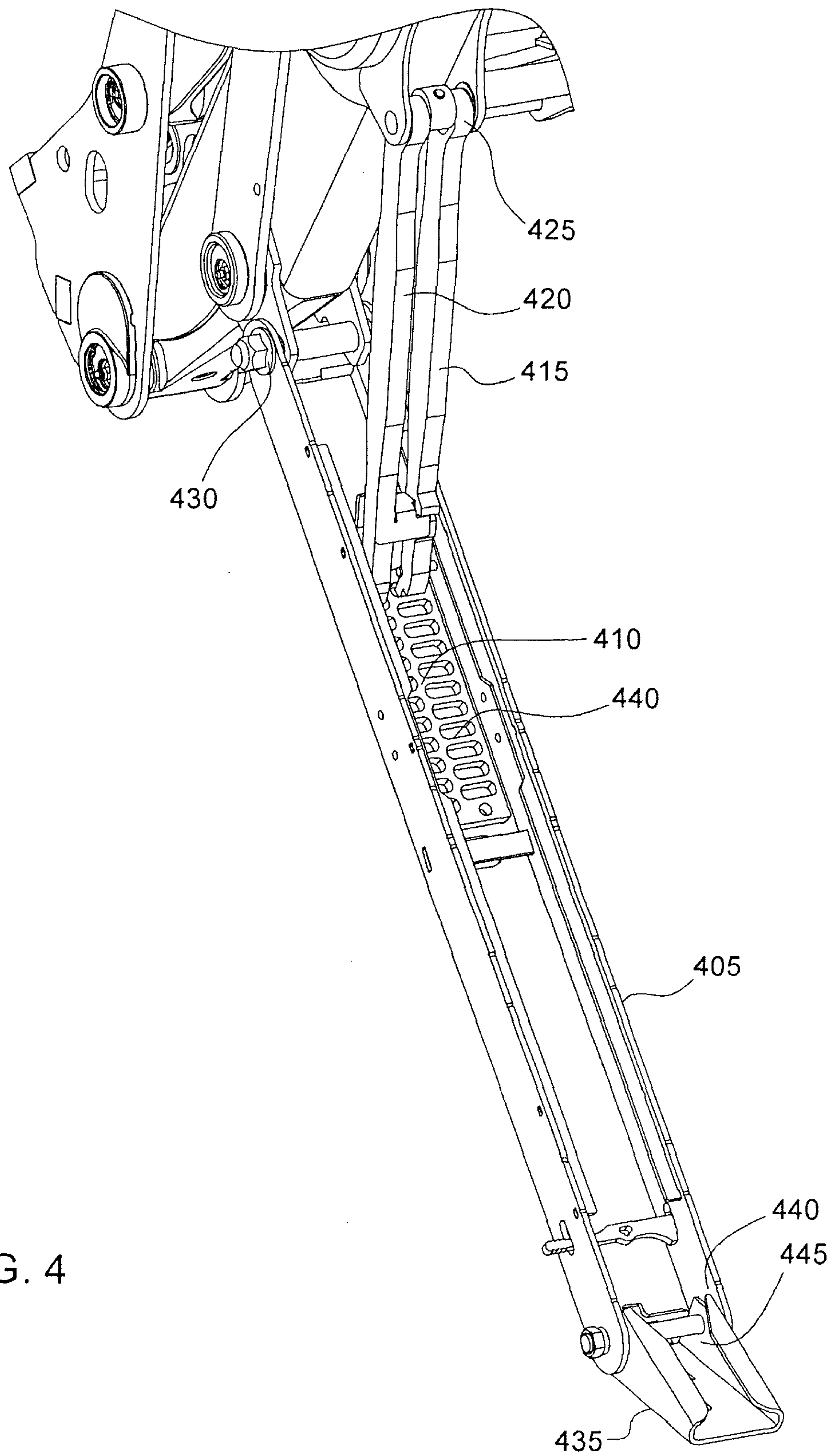


FIG. 4

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