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(54) **LIFTING ASSEMBLY FOR DUST CURTAIN OF WORK MACHINE**

(71) Applicant: **Caterpillar Global Mining Equipment LLC**, Denison, TX (US)

(72) Inventors: **Tamilselvan Krishnamoorthy**, Chennai (IN); **Scott Alan Christianson**, Edelstein, IL (US)

(73) Assignee: **Caterpillar Global Mining Equipment LLC**, Denison, TX (US)

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(58) **Field of Classification Search**
CPC E21B 21/015; E21B 21/011; B28D 7/02; E01C 2301/50
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,127,225 A * 2/1915 Galligan E21B 21/015 175/209
1,128,674 A * 2/1915 Galligan E21B 21/015 277/634
1,131,052 A * 3/1915 Galligan E21B 21/015 175/209
2,596,670 A * 5/1952 Clinton B23Q 11/0046 175/209
3,616,477 A * 11/1971 Larson E01H 1/056 15/82
3,800,890 A * 4/1974 Gyongyosi E21B 21/015 175/209
5,894,096 A * 4/1999 Kotraba G01N 1/04 15/257.6
2007/0094819 A1 * 5/2007 Lougheed E01H 1/045 15/84
2011/0037307 A1 * 2/2011 Bollinger B28D 1/045 299/41.1
2015/0176345 A1 * 6/2015 Koskinen E21B 19/24 175/57

(Continued)

FOREIGN PATENT DOCUMENTS

CN 204060773 12/2014
CN 204060774 12/2014
CN 209308656 8/2019

(Continued)

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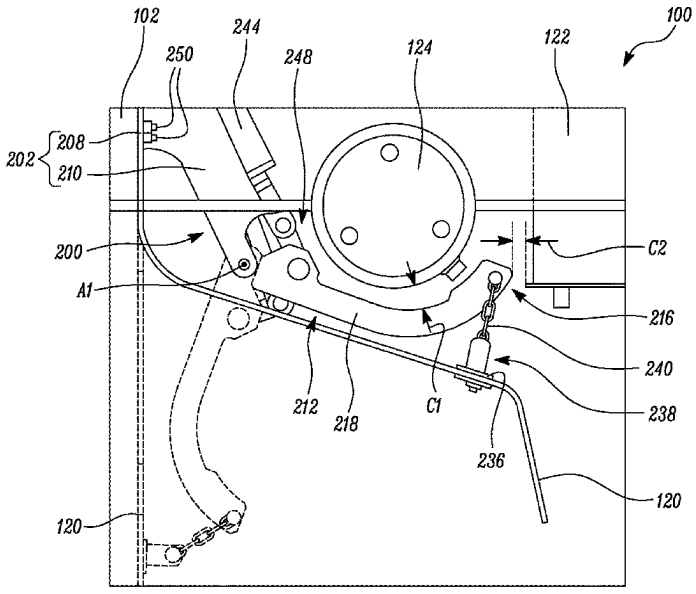
(57) **ABSTRACT**

A lifting assembly for a dust curtain of a work machine includes a pair of mounting brackets. Each mounting bracket is coupled to a frame of the work machine. The lifting assembly also includes an arm assembly pivotally coupled to each mounting bracket and is movable relative to the mounting brackets between a first state in which the dust curtain is disposed in a lowered position and a second state in which the dust curtain is disposed in a lifted position. The arm assembly includes a first arm member and a second arm member. The first arm member includes a first linear portion and a first curved portion. The second arm member includes a second linear portion and a second curved portion. The lifting assembly further includes a lifting plate coupled to the dust curtain and a linkage assembly coupling the arm assembly with the lifting plate.

20 Claims, 5 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

2017/0226808	A1*	8/2017	Vandapel	E21B 12/06
2020/0102711	A1*	4/2020	Vetrucci	A47L 11/24

FOREIGN PATENT DOCUMENTS

CN	209637805	11/2019
KR	102217729	2/2021
KR	102354430	1/2022
KR	20230102210	7/2023

* cited by examiner

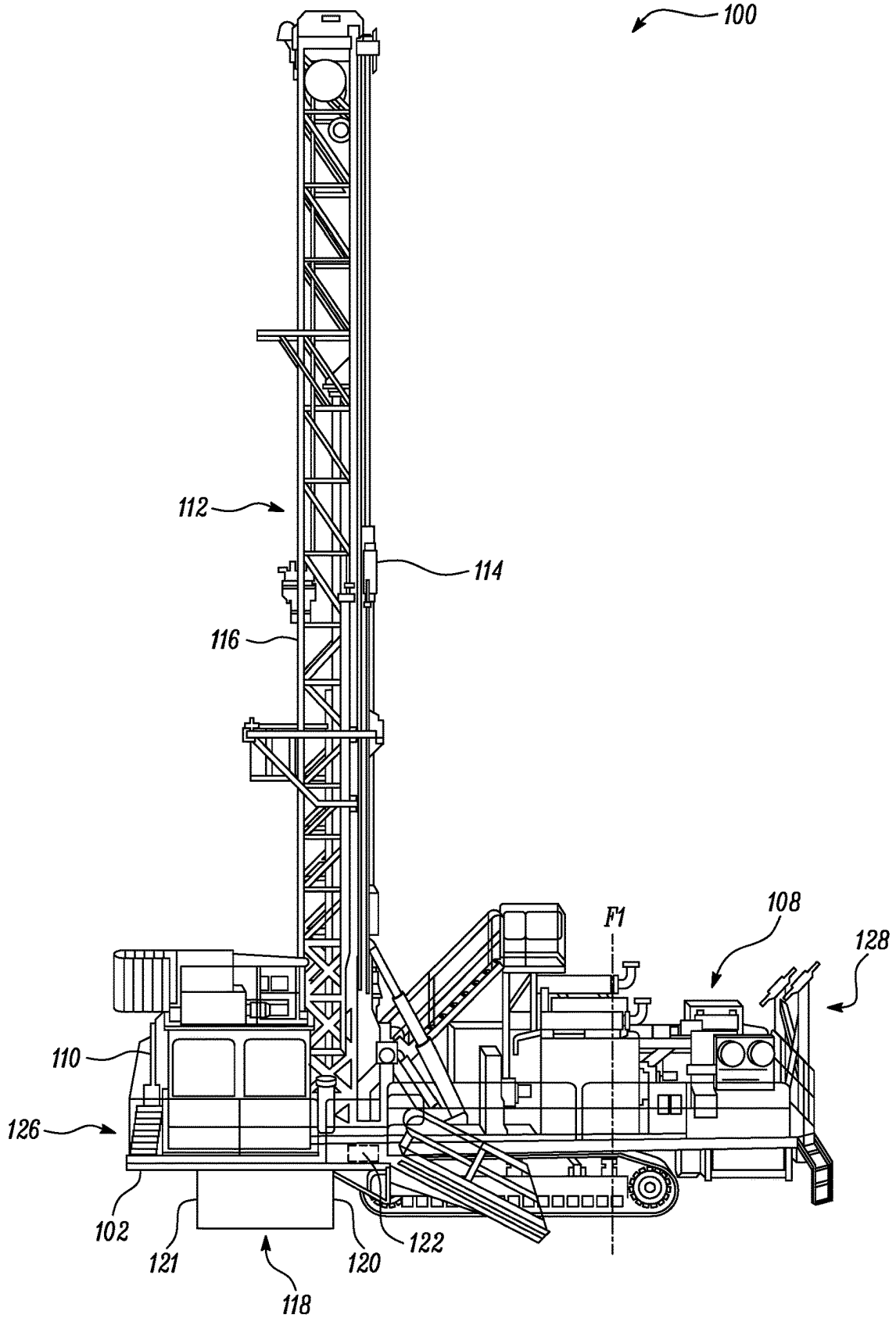


FIG. 1

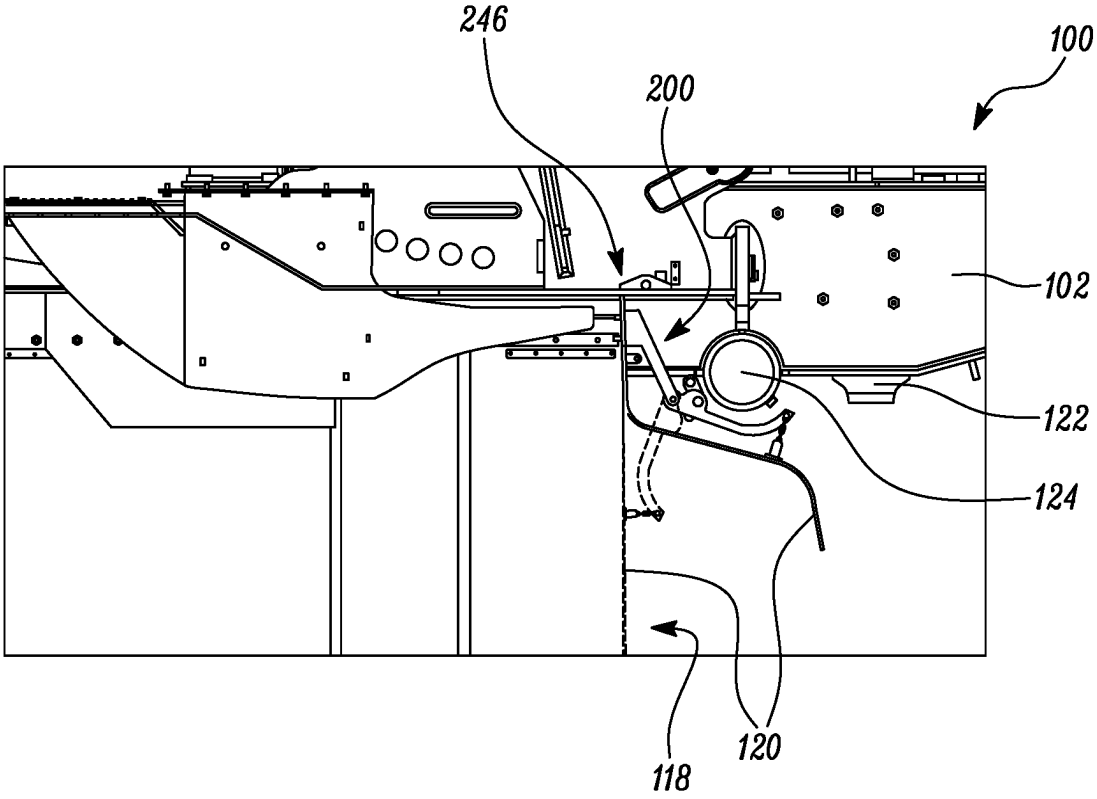


FIG. 2

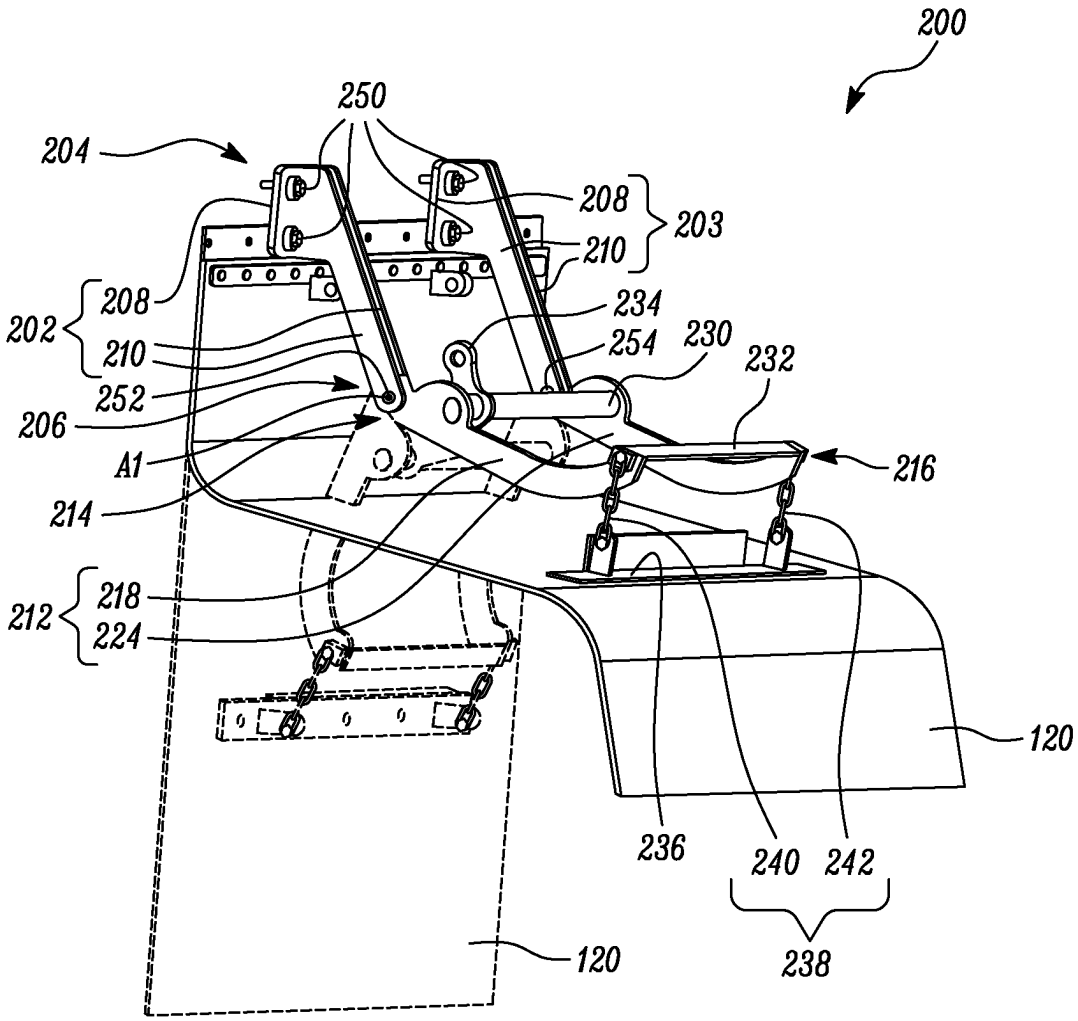

200
250
204
208
203
210
208
202
210
234
254
230
232
252
206
A1
216
214
218
212
224
120
236
240
242
238
120

FIG. 3

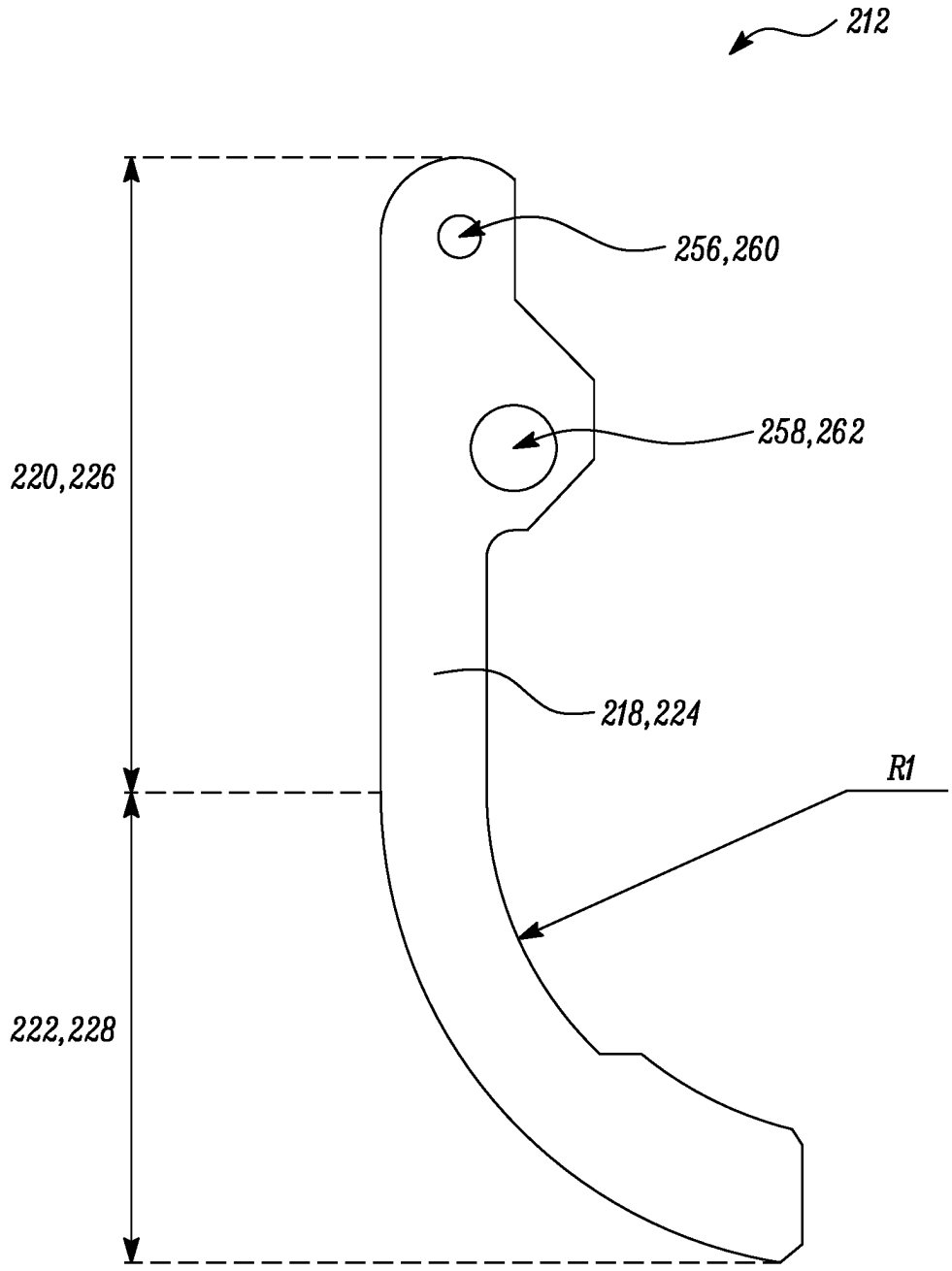


FIG. 4

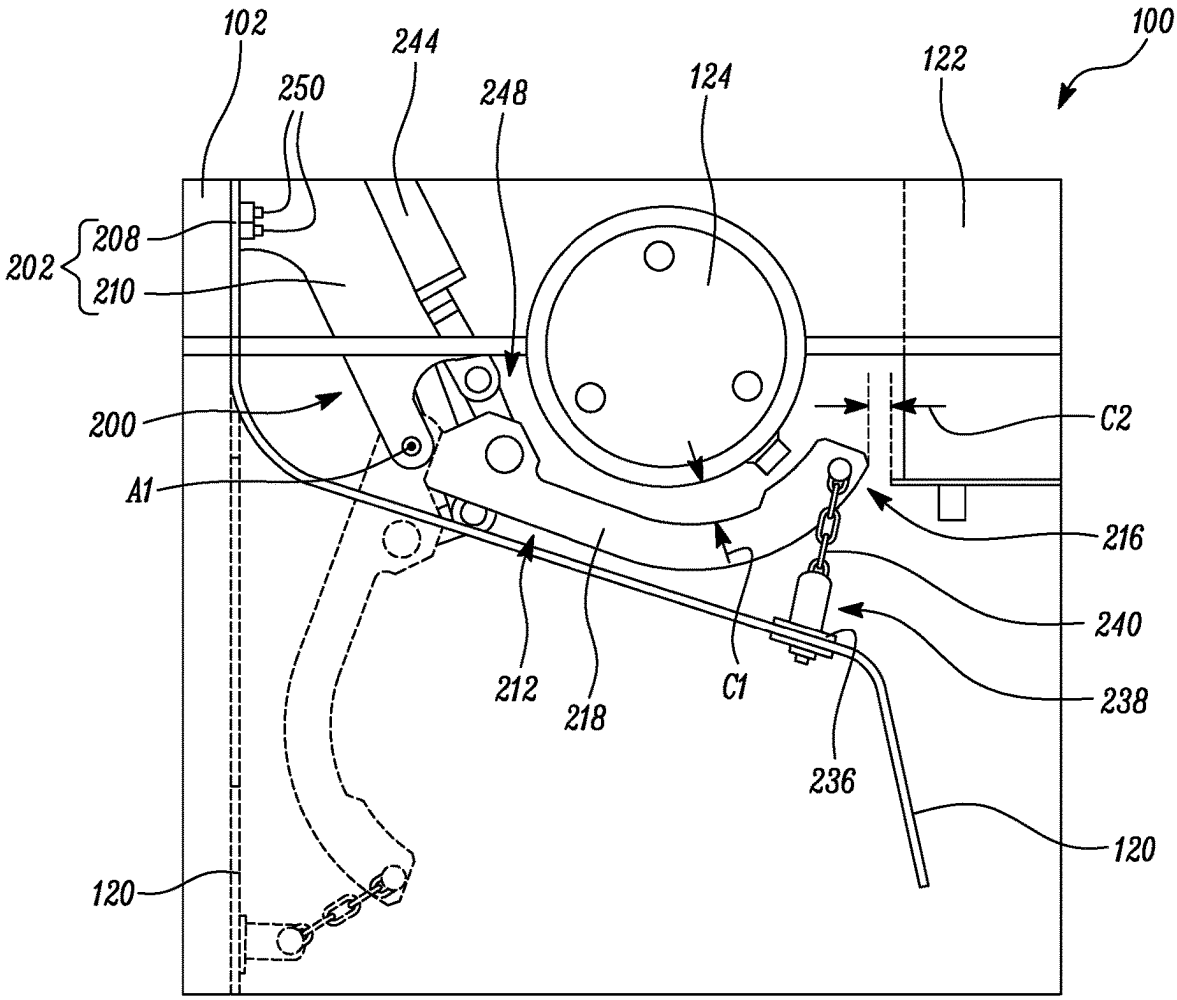

102
244
250
248
124
122
100
208
202
210
200
A1
C2
216
240
238
212
218
C1
236
120
120

FIG. 5

LIFTING ASSEMBLY FOR DUST CURTAIN OF WORK MACHINE

TECHNICAL FIELD

The present disclosure relates to a work machine, and more particularly to, a lifting assembly for a dust curtain of the work machine.

BACKGROUND

A work machine, such as a rotary drilling machine, includes a component for example, a hammer, a drill pipe, and the like to perform one or more drilling operations. In an example, the drilling operation may include drilling of a hole. The work machine includes a curtain assembly that encloses a work area around the hole to prevent scattering of material that is being removed from the hole. Typically, the curtain assembly includes a number of dust curtains that enclose a pile of material, such as, a sand pile around the hole or to enclose the hole itself.

Currently, the work machine includes a lifting assembly for lifting a rear dust curtain of the curtain assembly during a forward movement of the work machine. During a reverse movement of the work machine, it may be required to lift a front dust curtain of the curtain assembly to prevent contact of the front dust curtain with the material pile. An absence of the lifting assembly for the front dust curtain may reduce productivity at a worksite due to falling of material back in the hole, which is not desirable. However, the lifting assembly for the rear dust curtain may not be usable to lift the front dust curtain. This happens because the front dust curtain has no ground clearance and the lifting assembly may get damaged as it is mounted on a mast and is movable. Damage to the lifting assembly may increase operational cost of the work machine.

Further, a position of the front dust curtain relative to a fuel tank of the work machine and an axle of the work machine is such that conventional curtain lifting assemblies may interfere with the fuel tank and the axle while moving the front dust curtain between lowered and lifted positions. Therefore, an improved lifting assembly for the front dust curtain is desired.

CN209308656U describes a drilling dust blocking device of a rotary drill. The baffle is used for preventing dust in the drill hole from diffusing. The rotary drill is provided with a platform. The drilling dust blocking device comprises a dust blocking plate, a first dust blocking curtain and a driving mechanism. Wherein one end of the dust blocking plate is hinged to the platform, the other end of the dust blocking plate is connected with the first dust blocking curtain, the dust blocking plate and the first dust blocking curtain can prevent dust in the drilled hole from diffusing outwards, and the driving mechanism can drive the dust blocking plate to rotate relative to the platform so that the first dust blocking curtain can be away from or make contact with the ground. By the adoption of the drilling dust blocking device of the rotary drill, the dust blocking curtain can be prevented from being abraded by the ground, it is guaranteed that an operator accurately locates the drilling position, and mechanical parts are convenient to maintain.

SUMMARY OF THE DISCLOSURE

In an aspect of the present disclosure, a lifting assembly for a dust curtain of a work machine is provided. The lifting assembly includes a pair of mounting brackets. Each mounting bracket defines a first end and a second end distal from the first end. Each mounting bracket is adapted to be coupled to a frame of the work machine at the first end. The lifting assembly also includes an arm assembly pivotally coupled to each mounting bracket at the second end of a corresponding mounting bracket. The arm assembly is movable relative to the mounting brackets between a first state in which the dust curtain is disposed in a lowered position and a second state in which the dust curtain is disposed in a lifted position. The arm assembly defines a third end and a fourth end distal from the third end. The arm assembly includes a first arm member coupled to one of the pair of mounting brackets. The first arm member includes a first linear portion and a first curved portion extending from the first linear portion. The arm assembly also includes a second arm member coupled to another of the pair of mounting brackets. The second arm member includes a second linear portion and a second curved portion extending from the second linear portion. The lifting assembly further includes a lifting plate coupled to the dust curtain. The lifting assembly includes a linkage assembly coupling the arm assembly with the lifting plate. The linkage assembly is coupled to the arm assembly at the fourth end of the arm assembly.

In another aspect of the present disclosure, a work machine is provided. The work machine includes a frame. The work machine also includes a curtain assembly coupled to the frame and adapted to enclose a work area. The curtain assembly includes a dust curtain disposed proximal to a first end of the work machine. The work machine further includes a lifting assembly for the dust curtain. The lifting assembly includes a pair of mounting brackets. Each mounting bracket defines a first end and a second end distal from the first end. Each mounting bracket is coupled to the frame of the work machine at the first end. The lifting assembly also includes an arm assembly pivotally coupled to each mounting bracket at the second end of a corresponding mounting bracket. The arm assembly is movable relative to the mounting brackets between a first state in which the dust curtain is disposed in a lowered position and a second state in which the dust curtain is disposed in a lifted position. The arm assembly defines a third end and a fourth end distal from the third end. The arm assembly includes a first arm member coupled to one of the pair of mounting brackets. The first arm member includes a first linear portion and a first curved portion extending from the first linear portion. The arm assembly also includes a second arm member coupled to another of the pair of mounting brackets. The second arm member includes a second linear portion and a second curved portion extending from the second linear portion. The lifting assembly further includes a lifting plate coupled to the dust curtain. The lifting assembly includes a linkage assembly coupling the arm assembly with the lifting plate. The linkage assembly is coupled to the arm assembly at the fourth end of the arm assembly.

Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic side view of an exemplary work machine;

FIG. **2** is a schematic side view illustrating a lifting assembly for a dust curtain of the work machine of FIG. **1**;

FIG. **3** is a schematic perspective view of the lifting assembly of FIG. **2**;

FIG. **4** is a schematic side view of a portion of an arm assembly of the lifting assembly of FIG. **2**; and

FIG. **5** is a schematic side view illustrating a positioning of the lifting assembly of FIG. **2** relative to an axle and a fuel tank of the work machine.

DETAILED DESCRIPTION

Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Referring to FIG. **1**, a schematic side view of an exemplary work machine **100** is illustrated. The work machine **100** may be used to perform one or more drilling operations, such as, drilling holes, mining blast holes or geothermal wells, and the like. The work machine **100** may include a rotary work machine or a down-the-hole work machine. In the illustrated example of FIG. **1**, the work machine **100** is embodied as the rotary work machine. The work machine **100** defines a first axis "F**1**". The first axis "F**1**" extends generally in a vertical direction.

As shown in FIG. **1**, the work machine **100** includes a frame **102**. The frame **102** may be supported on a ground surface by a transport mechanism, such as, crawler tracks **104**. The crawler tracks **104** may allow the work machine **100** to maneuver on the ground surface to a desired location for a drilling operation. Alternatively, the work machine **100** may include wheels instead of the crawler tracks **104**. The frame **102** includes one or more jacks (not shown herein) for supporting and leveling the work machine **100** on the ground surface during the drilling operation. In an example, the one or more jacks may lift the work machine **100** above the ground surface along the first axis "F**1**" during the drilling operation. The work machine **100** also includes a machinery **108**. The frame **102** may support the machinery **108**, which may include various components (not shown), such as, a power source (for example, an engine, a battery system, and/or a fuel system), motors, batteries, pumps, air compressors, and/or any other equipment necessary to supply power to operate the work machine **100**. The frame **102** further supports an operator cabin **110**, from which an operator may maneuver and control the work machine **100**.

The work machine **100** includes a mast assembly **112**. The mast assembly **112** may be supported by the frame **102** of the work machine **100**. The mast assembly **112** extends along the first axis "F**1**". The work machine **100** includes a drill head **114** movable relative to the mast assembly **112**. The drill head **114** is movable along the first axis "F**1**". The drill head **114** may be supported on a mast frame **116**. The machinery **108** may provide power to operate the drill head **114** relative to the mast assembly **112**. In some examples, the work machine **100** may include one or more motors associated with the drill head **114**. The work machine **100** also includes a drill pipe or a hammer coupled to the drill head **114** to perform the drilling operation. The work machine **100** further includes a fuel tank **122**. In some examples, the fuel tank **122** may store liquid fuel such as diesel, petrol, and the like. In other examples, the fuel tank **122** may store gaseous fluid, such as, compressed natural gas, liquified petroleum gas, and the like.

Referring to FIG. **2**, the work machine **100** includes an axle **124**. The axle **124** includes a front axle of the work machine **100** to support the crawler tracks **104** proximal to a first end **126** (see FIG. **1**) of the work machine **100**. Further, the work machine **100** also includes a rear axle (not shown herein) to support the crawler tracks **104** proximal to a second end **128** (see FIG. **1**) of the work machine **100**.

The work machine **100** also includes a curtain assembly **118** coupled to the frame **102** and adapted to enclose a work area. The curtain assembly **118** may form a closed box enclosing the work area such that the curtain assembly **118** prevents material, such as sand that is being removed/drilled out from a hole, to be blown out in the surrounding. Thus, the curtain assembly **118** may prevent diffusion of material that may otherwise cause visual line obstruction of operators and environmental pollution. The curtain assembly **118** includes a dust curtain **120** disposed proximal to the second end **128** of the work machine **100**. Particularly, the dust curtain **120** is a front dust curtain **120** disposed proximal to the second end **128** of the work machine **100**. The dust curtain **120** will be hereinafter interchangeably referred to as "front dust curtain **120**". The front dust curtain **120** is disposed proximal to the axle **124** of the work machine **100**. The curtain assembly **118** also includes a rear dust curtain **121** (see FIG. **1**) disposed proximal to the first end **126** of the work machine **100**. In some examples, the dust curtains **120**, **121** may be made of rubber material, without any limitations.

The work machine **100** includes a lifting assembly **200** for the dust curtain **120**. The lifting assembly **200** moves the front dust curtain **120** between a lowered position and a lifted position. In the illustrated embodiment of FIG. **2**, the work machine **100** includes the lifting assembly **200** for the front dust curtain **120**. The lifting assembly **200** is movable by an angle of 90 degrees in an anti-clockwise direction to move the front dust curtain **120** from the lowered position to the lifted position. Moreover, the lifting assembly **200** is movable by an angle of 90 degrees in a clockwise direction to move the front dust curtain **120** from the lifted position to the lowered position.

Referring to FIG. **3**, a schematic perspective view of the lifting assembly **200** for the front dust curtain **120** of the work machine **100** of FIG. **1** is illustrated. When in the lowered position, the lifting assembly **200** may be disposed at a distance from between 180 millimeters (mm) to 300 mm from the ground surface. When in the lifted position, the lifting assembly **200** may be disposed at a distance from between 450 mm to 600 mm from the ground surface.

The lifting assembly **200** includes a pair of mounting brackets **202**, **203**. Each mounting bracket **202**, **203** defines a first end **204** and a second end **206** distal from the first end **204**. Each mounting bracket **202**, **203** is coupled to the frame **102** (see FIG. **2**) of the work machine **100** at the first end **204**.

Each of the pair of mounting brackets **202**, **203** includes a first mounting plate **208** coupled with the frame **102** of the work machine **100**. Specifically, each first mounting plate **208** is coupled with the frame **102** via a pair of mechanical fasteners **250**. In some examples, the mechanical fastener **250** may include a bolt, a screw, a rivet, and the like. Further, each of the pair of mounting brackets **202**, **203** includes a pair of second mounting plates **210** extending from the first mounting plate **208**. The pair of second mounting plates **210** are coupled with an arm assembly **212**.

The lifting assembly **200** also includes the arm assembly **212** pivotally coupled to each mounting bracket **202**, **203** at the second end **206** of a corresponding mounting bracket **202**, **203**. Specifically, the arm assembly **212** is pivotally coupled to the second mounting plates **210** of the mounting brackets **203**. The arm assembly **212** is movable relative to the mounting brackets **202**, **203** between a first state in which the dust curtain **120** is disposed in the lowered position (shown with dotted lines) and a second state (shown with solid lines) in which the dust curtain **120** is disposed in

the lifted position. The arm assembly **212** defines a third end **214** and a fourth end **216** distal from the third end **214**.

The arm assembly **212** includes a first arm member **218** coupled to one of the pair of mounting brackets **202**. The arm assembly **212** also includes a second arm member **224** coupled to another of the pair of mounting brackets **203**. Specifically, each of the first arm member **218** and the second arm member **224** is pivotally coupled with a corresponding second mounting plate **210** of the mounting bracket **202**, **203** at a pivot point A1. The first arm member **218** is coupled to the second mounting plate **210** of the mounting bracket **202**, via a mechanical fastener **252**. Further, the second arm member **224** is coupled to the second mounting plate **210** of the mounting bracket **203**, via a mechanical fastener **254**.

Referring now to FIG. **4**, a schematic side view of the arm assembly **212** is illustrated. The first arm member **218** and the second arm member **224** are similar to each other in terms of design and dimensions. The first arm member **218** includes a first linear portion **220** and a first curved portion **222** extending from the first linear portion **220**. The first arm member **218** includes a first opening **256** to receive the mechanical fastener **252** (see FIG. **3**) and a second opening **258** to receive a portion of a third arm member **230** (see FIG. **3**). The second arm member **224** includes a second linear portion **226** and a second curved portion **228** extending from the second linear portion **226**. The second arm member **224** includes a third opening **260** to receive the mechanical fastener **254** (see FIG. **3**) and a second opening **262** to receive a portion of the third arm member **230**. Each of the first curved portion **222** of the first arm member **218** and the second curved portion **228** of the second arm member **224** defines a radius of curvature "R1" that lies between 100 mm and 160 mm. In one specific example, the radius of curvature "R1" may be approximately equal to 130 mm.

Referring again to FIG. **3**, the arm assembly **212** further includes the third arm member **230** extending between the first arm member **218** and the second arm member **224**. The third arm member **230** is disposed proximal to the third end **214** of the arm assembly **212**. The third arm member **230** connects the first arm member **218** and the second arm member **224** proximal to the third end **214** of the arm assembly **212**. In an example, the third arm member **230** may be coupled to the first arm member **218** and the second arm member **224** via mechanical fasteners or any joining techniques, such as, welding, soldering, brazing, and the like. The arm assembly **212** also includes a bracket **234** coupled to the third arm member **230**. In an example, the bracket **234** may be coupled to the third arm member **230** via any joining techniques, such as, welding, soldering, brazing, and the like.

The arm assembly **212** includes a fourth arm member **232** extending between the first arm member **218** and the second arm member **224**. The fourth arm member **232** is disposed proximal to the fourth end **216** of the arm assembly **212**. The fourth arm member **232** connects the first arm member **218** and the second arm member **224** proximal to the fourth end **216** of the arm assembly **212**. In an example, the fourth arm member **232** may be coupled to the first arm member **218** and the second arm member **224** via mechanical fasteners or any joining techniques, such as, welding, soldering, brazing, and the like.

With reference to FIGS. **3** and **5**, the lifting assembly **200** further includes a lifting plate **236** coupled to the dust curtain **120**. In some examples, the lifting plate **236** may be coupled to the dust curtain **120** via mechanical fasteners, adhesives, or any joining techniques, such as, welding, soldering, brazing, and the like, without any limitations.

The lifting assembly **200** includes a linkage assembly **238** coupling the arm assembly **212** with the lifting plate **236**. The linkage assembly **238** is coupled to the arm assembly **212** at the fourth end **216** of the arm assembly **212**. The linkage assembly **238** includes a first linkage element **240** extending between the first arm member **218** and the lifting plate **236** and a second linkage element **242** extending between the second arm member **224** and the lifting plate **236**. Each of the first linkage element **240** and the second linkage element **242** includes a chain link. Specifically, the first linkage element **240** is coupled with the first arm member **218** and the second linkage element **242** is coupled with the second arm member **224**. In an example, the first linkage element **240** may be coupled with the first arm member **218** via mechanical fasteners or using joining techniques, such as, welding, brazing, soldering, and the like. In an example, the second linkage element **242** may be coupled with the second arm member **224** via mechanical fasteners or using joining techniques, such as, welding, brazing, soldering, and the like.

Referring to FIG. **5**, the lifting assembly **200** also includes an actuator **244** coupled to the frame **102** of the work machine **100** at one end **246** (see FIG. **2**) and the bracket **234** of the arm assembly **212** at another end **248**. The actuator **244** allows the arm assembly **212** to move between the first state and the second state. In some examples, the actuator **244** may include a hydraulic actuator, a pneumatic actuator, an electric actuator, and the like. In some cases, the actuator **244** may be communicably coupled with an electronic control unit (not shown) of the work machine **100**, such that the operator may be able to control the actuator **244** from the operator cabin **110** (see FIG. **1**) to move the arm assembly **212** between the first state and the second state.

When the arm assembly **212** is in the second state (shown with solid lines), each of the first arm member **218** and the second arm member **224** (see FIG. **3**) of the arm assembly **212** are radially spaced apart from the axle **124**. More particularly, when the arm assembly **212** is in the second state, the first and second arm members **218**, **224** may be radially spaced apart from the axle **124** by a radial clearance "C1" that may lie between 30 mm and 65 mm, for example.

Further, when the arm assembly **212** is in the second state, the fourth end **216** of the arm assembly **212** is axially spaced apart from the fuel tank **122** of the work machine **100**. More particularly, when the arm assembly **212** is in the second state, the first and second arm members **218**, **224** may be axially spaced apart from the fuel tank **122** by an axial clearance "C2" that may lie between 30 mm to 70 mm, for example.

It is to be understood that individual features shown or described for one embodiment may be combined with individual features shown or described for another embodiment. The above described implementation does not in any way limit the scope of the present disclosure. Therefore, it is to be understood although some features are shown or described to illustrate the use of the present disclosure in the context of functional segments, such features may be omitted from the scope of the present disclosure without departing from the spirit of the present disclosure as defined in the appended claims.

INDUSTRIAL APPLICABILITY

The present disclosure relates to the lifting assembly **200** for the front dust curtain **120** of the work machine **100**. The

lifting assembly **200** is usable to lift the front dust curtain **120** during a reverse movement of the work machine **100** in order to prevent a contact of the front dust curtain **120** with a pile of material removed from a drilled hole. The positioning of the front dust curtain **120** in the lifted position may prevent falling of material, such as, sand back into the drilled hole. The lifting assembly **200** is disposed at sufficient clearance from the ground surface in each of the lowered position and the lifted position, which may prevent damage to the lifting assembly **200**, thereby reducing costs associated with installing a replacement lifting assembly.

The lifting assembly **200** includes the arm assembly **212** having the first arm member **218** and the second arm member **224**. The first arm member **218** includes the first curved portion **222** and the second arm member **224** includes the second curved portion **228**, such that in the second state of the arm assembly **212**, the first curved portion **222** and the second curved portion **228** are radially spaced apart from the axle **124**. In other words, the first curved portion **222** and the second curved portion **228** prevents interference of the lifting assembly **200** with the axle **124**. Each of the first curved portion **222** and the second curved portion **228** of the arm assembly **212** is designed to utilize a space around the axle **124** to lift the dust curtain **120** up to a maximum height without interfering with the axle **124**.

Further, the fourth end **216** of the arm assembly **212** is axially spaced apart from the fuel tank **122** of the work machine **100** and does not engage with the fuel tank **122**. The lifting assembly **200** of the present disclosure may improve a productivity of the work machine **100** as the usage of the lifting assembly **200** may prevent contact of the front dust curtain **120** with the material removed from drilled holes. The lifting assembly **200** may be cost-effective as it has a simple design. Moreover, the lifting assembly **200** may be retrofitted on existing work machines.

While aspects of the present disclosure have been particularly shown and described with reference to the embodiments above, it will be understood by those skilled in the art that various additional embodiments may be contemplated by the modification of the disclosed work machine, systems and methods without departing from the spirit and scope of the disclosure. Such embodiments should be understood to fall within the scope of the present disclosure as determined based upon the claims and any equivalents thereof.

What is claimed is:

1. A lifting assembly for a dust curtain of a drilling or mining machine, the lifting assembly including:

a pair of mounting brackets, each mounting bracket defining a first end and a second end distal from the first end, each mounting bracket being coupled to a frame of the drilling or mining machine at the first end;

an arm assembly pivotally coupled to each mounting bracket at the second end of a corresponding mounting bracket, the arm assembly being movable relative to the mounting brackets between a first state in which the dust curtain is disposed in a lowered position and a second state in which the dust curtain is disposed in a lifted position, the arm assembly defining a third end and a fourth end distal from the third end, the arm assembly including:

a first arm member coupled to one of the pair of mounting brackets, the first arm member including a first linear portion and a first curved portion extending from the first linear portion; and

a second arm member coupled to another of the pair of mounting brackets, the second arm member including a second linear portion and a second curved portion extending from the second linear portion;

a lifting plate coupled to the dust curtain; and

a linkage assembly coupling the arm assembly with the lifting plate, wherein the linkage assembly is coupled to the arm assembly at the fourth end of the arm assembly.

2. The lifting assembly of claim **1**, wherein the arm assembly further includes:

a third arm member extending between the first arm member and the second arm member, and disposed proximal to the third end of the arm assembly; and

a fourth arm member extending between the first arm member and the second arm member, and disposed proximal to the fourth end of the arm assembly.

3. The lifting assembly of claim **2**, wherein the arm assembly further includes a bracket coupled to the third arm member.

4. The lifting assembly of claim **3** further comprising an actuator coupled to the frame of the work machine at one end and the bracket of the arm assembly at another end.

5. The lifting assembly of claim **1**, wherein each of the pair of mounting brackets includes:

a first mounting plate adapted to be coupled with the frame of the work machine; and

a pair of second mounting plates extending from the first mounting plate, wherein the pair of second mounting plates are coupled with the arm assembly.

6. The lifting assembly of claim **1**, wherein the dust curtain is disposed proximal to an axle of the work machine, and wherein, when the arm assembly is in the second state, each of the first arm member and the second arm member of the arm assembly are radially spaced apart from the axle.

7. The lifting assembly of claim **1**, wherein, when the arm assembly is in the second state, the fourth end of the arm assembly is axially spaced apart from a fuel tank of the work machine.

8. The lifting assembly of claim **1**, wherein each of the first curved portion of the first arm member and the second curved portion of the second arm member defines a radius of curvature that lies between 100 millimeters and 160 millimeters.

9. The lifting assembly of claim **8**, wherein the linkage assembly includes a first linkage element extending between the first arm member and the lifting plate and a second linkage element extending between the second arm member and the lifting plate.

10. The lifting assembly of claim **9**, wherein each of the first linkage element and the second linkage element includes a chain link.

11. The lifting assembly of claim **1**, wherein the dust curtain is a front dust curtain disposed proximal to a first end of the work machine.

12. A work machine comprising:

a frame;

a curtain assembly coupled to the frame and adapted to enclose a work area, the curtain assembly including a dust curtain disposed proximal to a first end of the work machine, wherein the work machine is a drilling or mining machine; and

a lifting assembly for the dust curtain, the lifting assembly including:

a pair of mounting brackets, each mounting bracket defining a first end and a second end distal from the first end, each mounting bracket being coupled to the frame of the work machine at the first end;

an arm assembly pivotally coupled to each mounting bracket at the second end of a corresponding mounting bracket, the arm assembly being movable relative to the mounting brackets between a first state in which the dust curtain is disposed in a lowered position and a second state in which the dust curtain is disposed in a lifted position, the arm assembly defining a third end and a fourth end distal from the third end, the arm assembly including:

a first arm member coupled to one of the pair of mounting brackets, the first arm member including a first linear portion and a first curved portion extending from the first linear portion; and

a second arm member coupled to another of the pair of mounting brackets, the second arm member including a second linear portion and a second curved portion extending from the second linear portion;

a lifting plate coupled to the dust curtain; and

a linkage assembly coupling the arm assembly with the lifting plate, wherein the linkage assembly is coupled to the arm assembly at the fourth end of the arm assembly.

13. The work machine of claim **12**, wherein the arm assembly further includes:

a third arm member extending between the first arm member and the second arm member, and disposed proximal to the third end of the arm assembly; and

a fourth arm member extending between the first arm member and the second arm member, and disposed proximal to the fourth end of the arm assembly.

14. The work machine of claim **13**, wherein the arm assembly further includes a bracket coupled to the third arm member.

15. The work machine of claim **14**, wherein the lifting assembly further includes an actuator coupled to the frame of the work machine at one end and the bracket of the arm assembly at another end.

16. The work machine of claim **12**, wherein each of the pair of mounting brackets includes:

a first mounting plate adapted to be coupled with the frame of the work machine; and

a pair of second mounting plates extending from the first mounting plate, wherein the pair of second mounting plates are coupled with the arm assembly.

17. The work machine of claim **12** further comprising an axle, wherein the dust curtain is disposed proximal to the axle, and wherein, when the arm assembly is in the second state, each of the first arm member and the second arm member of the arm assembly are radially spaced apart from the axle.

18. The work machine of claim **12** further comprising a fuel tank, wherein, when the arm assembly is in the second state, the fourth end of the arm assembly is axially spaced apart from the fuel tank.

19. The work machine of claim **12**, wherein each of the first curved portion of the first arm member and the second curved portion of the second arm member defines a radius of curvature that lies between 100 millimeters and 160 millimeters.

20. The work machine of claim **12**, wherein the linkage assembly includes a first linkage element extending between the first arm member and the lifting plate and a second linkage element extending between the second arm member and the lifting plate, and wherein each of the first linkage element and the second linkage element includes a chain link.

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