



(43) International Publication Date  
8 September 2017 (08.09.2017)

- (51) International Patent Classification:  
A01D 75/18 (2006.01) A01D 34/04 (2006.01)
- (21) International Application Number:  
PCT/AU2017/050175
- (22) International Filing Date:  
28 February 2017 (28.02.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
2016900762 1 March 2016 (01.03.2016) AU
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report (Art. 21(3))

(54) Title: SCRUB CLAW FOR A MOWER

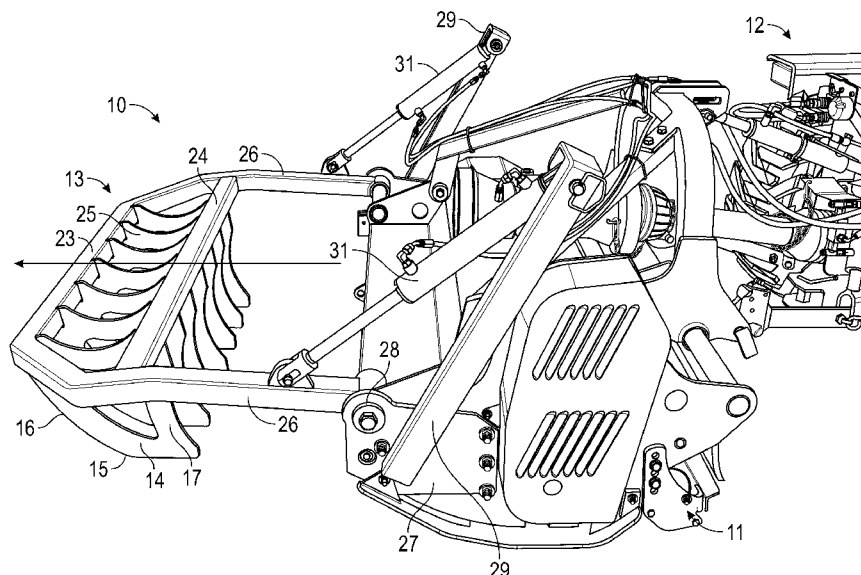


FIG. 1

(57) Abstract: An attachment for a commercial grade frontal mower/slasher comprises a forwardly extending member which can be raised and lowered and which extends in front of the mowing direction when in the lowered position. The forwardly extending member contains a plurality of transversely spaced steel fins which have a particular shape such that if the fins strike an obstacle such as a hidden rock in long grass, the fins will cause the forwardly extending member to be lifted which will alert the driver of the obstacle. The forwardly extending member can also be manipulated to allow the obstacle to be dragged away. The fins in the forwardly extending member can also be pushed into clumpy material such as lantana or blackberry and the mower reversed to allow the material to be mowed.



## SCRUB CLAW FOR A MOWER

### TECHNICAL FIELD

5

The present invention is directed to a multi-use attachment for a light commercial mower/mulcher which sits forwardly of the mower and which can provide early warning of a concealed obstacle such as a rock or stump which may otherwise damage the mower. The attachment can also improve the mowing /mulching ability of the mower, can function as a rake to rake back material as the mower is reversed and can act as a ground contour follower to reduce the likelihood of the mower blades digging into the ground on uneven ground.

### 15 BACKGROUND

Any references to methods, apparatus or documents of the prior art are not to be taken as constituting any evidence or admission that they formed, or form part of the common general knowledge.

20

Commercial grade mowers/mulchers (hereinafter referred to as "mowers") comprises a separate apparatus which is attached to the PTO (power take off) of a tractor or similar driven prime mover. A particular type of mower is one which is attached to a PTO in front of the prime mover. This type of mower is often known as a "frontal" mower as opposed to a rear mounted "pulled" mower. The advantage of this orientation is that the prime mover is behind the mower and the driver is facing in the same direction as the mower direction.

A disadvantage with this arrangement is that the mower can be damaged by obstacles such as rocks, stumps, discarded metal items etc. hidden in the long grass which is being mowed.

30

For this reason, when mowing long grass or undergrowth with a frontal mower, the mower must be slowly moved and the driver must be ever alert to any possible hidden objects which is very time consuming.

5 Such mowers are also able to slash thicker undergrowth such as brambles, lantana, blackberry and other woods weeds. However these weeds can grow into thick clumps which can hide all sorts of mower damaging items such as rocks, stumps and the like. Mowing the thick clumps is also difficult as the front protective skirt of the mover often pushes the weeds over and the blades  
10 ride over the pushed over weeds rather than cutting the weeds off at their bases. It is also often necessary to pull the clumps away to expose any threats to the mower and to be better able to mow over the clumps.

The mower can also be damaged or have accelerated blade wear if the  
15 blades scalp into the ground. This can occur if the ground contours are hidden from view caused by bushy undergrowth. A sudden dip or rise can cause the blades to strike the ground. The driver is able to raise and lower the mower slightly to avoid this but if the contours cannot be seen, the driver will be unaware of any sudden dip or lift in the ground. Thus, the mower speed is  
20 again reduced to give the driver some time to raise and lower the mower to reduce blade wear.

Damage to the mower can cause downtime and increased expenses and there would be an advantage if it were possible to reduce potential damage to  
25 the mower during use. There would be an advantage if it were possible to identify potentially damaging obstacles in the path of the mower in such a manner that the mower could be driven at reasonable speeds. There would be a particular advantage if various types of potential damage to the mower and mower blades could be reduced by a single attachment and in a manner  
30 which allowed the mower to be driven at reasonable speeds.

It is an object of the invention to provide an apparatus attachable to a frontal mower and which would overcome at least one of the abovementioned disadvantages or provide a useful or commercial choice in the marketplace.

## SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided an  
5 apparatus attachable to a mower, the apparatus comprising a forwardly  
extending member which is adapted for movement between a raised position  
and a lowered position where the member is in front of the mower, the  
member comprising a plurality of spaced apart fins, the fins having:

- a lower edge adapted for sliding motion along the ground;
- 10 a leading forwardly extending edge adapted to ride at least partially  
over an obstacle, and,
- a rear edge adapted to engage with and move obstacles.

The apparatus, which in one embodiment may be referred to as a “bramble  
15 and rock bar” or as a “scrub claw” is ideal for a mower mounted in front of the  
tractor. Such “frontal” mower/mulcher units are known in the art. Examples  
can be found at:

<http://www.bellon.it/en/products/frontal-mowers/> (retrieved 28 February 2017)

Such mowers are versatile, but by being mounted in front of the tractor/prime  
20 mover means that the mower can be damaged when mowing long  
grass/undergrowth that may conceal rocks, stumps and other obstacles.

The fins, and especially the shape of the fins, provide great versatility to the  
apparatus. By having the fins spaced apart, the fins can pass through tall  
25 grass and the grass can pass between the fins prior to being mowed by the  
mower. The fins may even assist in straightening the grass or untangling  
matted grass prior to being mowed. The lower edge of the fins can slide along  
the ground (or be slightly above the ground) to provide a degree of ground  
tracking ability if desired. If there is a hidden rock in the grass, the leading  
30 edge of one or more fins (depending on the size of the rock or obstacle) will  
contact the rock and begin to ride over it thereby lifting the forwardly extending  
member which will alert the driver of the existence of the rock.

The driver can then raise the forwardly extending member such that the fins clear the rock, drive a little forward and lower the forwardly extending member such that the rear edge of the fins are in front of the rock. The driver can then reverse the mower to drag the rock away from the area to be mowed. If the  
5 obstacle cannot be moved, the driver has sufficient reaction time to drive around the obstacle.

All of these functions can be carried out by the apparatus without the driver needing to leave the tractor or prime mover to which the mower is attached.

10

The apparatus will typically be a separate item which is attached to the mower. Alternatively, it is envisaged that there can be circumstances where the apparatus and the mower will be formed as an integral unit.

15 The mower will typically comprise a light commercial type unit which can be used to cut long grass and some types of woody weeds such as brambles, lantana, blackberry and the like. The weight of this type of mower will typically be between 200-500 kg and the apparatus is particularly suited to this type of commercial type unit.

20

The mower will typically comprise a commercially available unit an example of which is illustrated at least in figure 1 and figure 4. This type of mower comprises a steel housing in which is located a pair of oppositely rotating mower blade units, each unit comprising a rotating disk containing attached  
25 blades. The front of the mower housing contains a flexible safety skirt 20 (see for instance figure 3). The rear of the mower contains an elongate ground engaging roller. The mower unit can be attached to the power takeoff (PTO) of a prime mover such as the tractor illustrated in the figures. It should be appreciated that the mower illustrated in the present invention is only a  
30 nonlimiting example of a commercially available unit and it is not considered that any unnecessary limitation should be placed on the invention merely by the describing and illustrating of a particular commercially available mower. For instance, flail type mowers can also be used.

The apparatus of the present invention is attachable to such a mower. Various types of attachment means are envisaged and the preferred nonlimiting type of attachment means will be described and illustrated below. The attachment means may be such that the apparatus is semi-permanently attached to the mower. Alternatively, the attachment means may have some form of "quick coupling" arrangement to allow it to be quickly and easily attached and removed from the mower. It is also envisaged that the apparatus may be permanently attached to the mower such as by welding.

10 The apparatus comprises a forwardly extending member. The forwardly extending member is adapted for movement between a raised position and a lowered position. In the lowered position, the forwardly extending member is substantially in front of the mower.

15 The forwardly extending member is preferably movable between the raised position and the lowered position in a hinged manner. It is preferred that the hinge point of the forwardly extending member is positioned relatively low to the ground surface to facilitate use of the apparatus and this will be described in greater detail below. Suitably, the forwardly extending member is hinged to the mower. A mounting plate or something similar may be provided to assist in hinge in the forwardly extending member to the mower.

25 There may however be circumstances where the forwardly extending member can be raised and lowered in a substantially vertical manner.

A lifting and lowering means is preferably provided to lift and lower the forwardly extending member. Suitably, one or more actuators is provided. The actuators may comprise hydraulic or pneumatic rams. It is also envisaged that the lifting and lowering means may comprise a winch or something similar.

30 The apparatus contains a plurality of spaced apart fins. The spacing between the fins can vary. However, if the fins are spaced too closely apart, more fins will be required and this can add weight and cost to the apparatus. Conversely, if the fins are spaced too far apart, substantially sized obstacles

can pass between the fins can be missed by the forwardly extending member. However, it should be realised that if an object does pass between adjacent fins, it will be made visible and the driver of the prime mover is able to stop the mower to prevent damage to the mower. It is envisaged that a spacing of  
5 between 20-40 cm between adjacent fins will be suitable.

The number of fins on the forwardly extending member is preferably such that the fins can protect the width of the mower opening. It is envisaged that  
10 between 5-12 fins will be sufficient for most commercial mowers.

Each fin is preferably formed from steel and, to reduce weight, each fin may contain a central opening or cutout.

The fins are preferably connected to a support member. The support member  
15 is preferably adjacent an upper part of the fins. The support member preferably comprises a first front crossbar and a second rear cross bar spaced from the first crossbar. Suitably, each fin is attached to the first crossbar and the second crossbar. It is envisaged that each fin will be welded or otherwise attached to the support member. However, it is also envisaged that each fin  
20 can be bolted or otherwise attached to the support member to enable it to be removed if necessary.

The fin has a lower edge adapted for sliding motion along the ground. Thus, it is envisaged that the lower edge, in use, is substantially parallel to the ground.  
25 It is not envisaged that the forwardly extending member will be orientated such that the fins are always directly in contact with the ground. That is, it is envisaged that the lower edges of the fins may also be slightly spaced above the ground surface. This can still provide a degree of ground tracking as any sudden change in the ground contours will cause the lower edge of the fins to  
30 contact the ground.

The fins have a leading forwardly extending edge which is configured such that when the fins strike an obstacle such as a rock or stump, it will begin to ride over the obstacle. The leading edge typically has an edge portion which

extends outwardly and upwardly to facilitate riding over the obstacle. In a particularly preferred embodiment the leading edge has a forwardly curved edge profile to facilitate in this action.

- 5 The fins have a rear edge adapted to engage with and remove obstacles. The rear edge is preferably substantially vertical (when the forwardly extending member is in the lowered position). To facilitate grabbing of obstacles and woody weeds, the rear edge may be slightly concave to provide a slight hook like configuration in the junction area between the rear edge and the lower  
10 edge. The rear edge may include teeth or serrations of other grip enhancing means.

Suitably, an accumulator or load sharing means is provided. The accumulator may function to provide a measure of shock absorption to the forwardly  
15 extending portion. The accumulator may also function as a load sharing means to reduce weight on the forwardly extending member thereby allowing the forwardly extending member to move upwardly more easily should an obstacle be located. The accumulator may comprise a hydraulic accumulator.

## 20 **BRIEF DESCRIPTION OF THE DRAWINGS**

Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed  
25 Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows:

- Figure 1. Illustrates an apparatus attached to a mower and where the forwardly extending member is in the lowered position.
- Figure 2. Illustrates a forward view of the apparatus of figure 1 with the  
30 forwardly extending member in the raised position.
- Figure 3. Illustrates a front view of the apparatus of figure 1 with the forwardly extending member in the lowered position.
- Figure 4. Illustrates a rear view and of the apparatus attached to a mower.
- Figure 5. Illustrates a close-up view of one side of the apparatus.

Figure 6. Illustrates the apparatus in use mowing long grass.

Figure 7. Illustrates the apparatus contacting a rock on the ground.

Figure 8. Illustrates the ability of the apparatus to drag a rock away.

## 5 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring initially to figure 1, there is illustrated an apparatus according to a preferred embodiment of the present invention, being a "bramble and rock bar" 10 that is pivotally attached to a known type of light commercial frontal mower 11. The apparatus 10 has a forwardly extending member 13 which can  
10 move between a lowered position illustrated in figure 1 (and figure 3) and a raised position illustrated at least in figure 2. The forwardly extending member has a plurality of spaced apart fins 14. Each fin 14 has a lower edge 15 which is designed to be able to slide along the ground 19 or be slightly spaced above and reasonable parallel the ground 19. Each fin 14 further has a front  
15 leading edge 16 which curves upwardly to enable it to slightly ride over a ground obstacle (see figure 7) such as a rock 40, stump or anything else that may be hidden in the long grass and which may damage the mower blades. Finally, each fin 14 has an abrupt rear edge 17 (best illustrated in figure 2) which is slightly concave.

20

In brief, the apparatus 10 has at least three advantages. One advantage is as an obstacle detector to detect obstacles that may be hidden in the long grass or undergrowth that is being mowed/slashed. When the apparatus is in the lowered position illustrated in figure 1 (see also figure 6), and the mower is  
25 moved in a forward direction illustrated by the horizontal arrow in figure 1, the fins 14 will ride over any rock 40 or stump (see figure 6) that may be hidden in the long grass which will lift the forwardly extending member 13 upwardly and which will be a visual indicator to the driver 21 (see figure 2). It is envisaged that some form of audio alarm may also sound if the forwardly extending  
30 member 13 suddenly moves upwardly when in encounters a rock in the long grass.

A second advantage (see figures 7 and 8) is as a "claw" or "rake" to enable the apparatus to pull obstacles such as rocks away from the mowing area and

also to pull tangled woody weeds out of the ground for better mowing. With the second advantage, the forwardly extending member is raised (see for instance figure 2) and the mower 11 is driven forwardly to abut the obstacle (e.g. rock or stump). The extending member can then be lowered back to the  
5 position illustrated in figure 1 which will trap the obstacle between the front of the mower and the rear edge 17 of the fins 14. The mower can then be reversed which will cause the fins 14 to drag the rock 40 or other obstacle away from the area to be mowed. When the obstacle has been dragged away, the forwardly extending member 13 can be raised to the position illustrated in  
10 figure 2 to free it from the obstacle, the mower can then be driven back to the mowing area, the forwardly extending member can again be lowered to the position illustrated in figure 1 and mowing can continue.

In a similar manner, if the mower comes against a particularly thick clump of  
15 lantana or other similar clump of woody weeds, the forwardly extending member 13 can be raised, the mower can be pushed up against the clump, the forwardly extending member can be lowered such that the fins are pushed into the clump and the mower can be reversed to claw or rake the woody clump away.

20  
A third advantage is as a ground tracking device. The forwardly extending member 13 can be lowered such that the bottom edge of the fins lightly touch the ground 19 or are slightly above the ground 19. The mower can then be driven forwardly and should there be any sudden rise in the ground surface,  
25 the lower edge of the fins 14 will contact the sudden rise and the forwardly extending member 13 will be lifted. In this arrangement, it is preferred that the forwardly extending member is located in the lowered orientation and held in a relatively rigid manner such that any lifting of the forwardly extending member 13 will also slightly lift the front of mower 11 to reduce the likelihood of the  
30 mower blades scalping into the ground.

All these advantages can be provided by the same apparatus 10.

Referring now in greater detail to apparatus 10, the fins 14 comprise steel plate members that can be welded together to form the particular configuration of the fins. Alternatively, the fins 14 may comprise a solid steel plate which is subsequently cut to form the central cutouts. The steel members need not be made from steel but should be robust enough to survive the function of the apparatus. Thus, the fins may be formed from other metals such as aluminium and there may be circumstances where the fins may even be formed from non-metal materials such as engineering plastics and particularly laminated plastics. The fins may also comprise a core material which may be softer and a hard edge material.

Each fin will typically have a thickness of between 5-20 mm depending on the material from which the fin is manufactured.

Each fin 14 has a lower edge 15, a leading edge 16, and a rear edge 17. In the particular embodiment, each fin is also provided with an upper edge 25 which is slightly concave. Lower edge 15 has a configuration such that it can slide along ground 19 or if positioned slightly above ground 19, will not dig into the ground if there are sudden undulations. Leading edge 16 has an upwardly and slightly convexly curved configuration to facilitate riding over obstacles hidden in the long grass or undergrowth that is to be mowed. The rear edge 17 is substantially vertical when the forwardly extending member is in the lowered position illustrated in figure 1 and is slightly concave (best illustrated in figure 2) to provide a slight a hook like configuration at the junction between the rear edge 17 and the lower edge 15. This can facilitate digging into clumps of woody weeds.

The fins 14, in the preferred embodiment, are all substantially identical in size and shape. This is for convenience only and for ease and cheapness of manufacture and there is no reason why the fins could not be of different configurations as long as the apparatus can still function in the manner required in the present invention. In the preferred embodiment, the fins 14 are all made of the same material (steel) but there may be circumstances where there is an advantage in providing fins of different materials.

The fins 14 are equally spaced apart and in the particular embodiment, the spacing is between 20-40 cm. This seems to provide a reasonable balance between cost of manufacture (by not having too many fins), ease of pushing  
5 through long grass (too many fins may impede passage of the apparatus through long grass) while still detecting substantial obstacles that may damage the mower. However, even if an obstacle passes between adjacent fins, it will become visible to the operator 21 and the operator 21 will have sufficient time to stop the mower to prevent damage.

10

The fins are attached to a support member 22 which comprises a front crossbar 23 and a rear crossbar 24 which are spaced apart and parallel to each other. The crossbars are attached at their ends to lifting arms 26. In the embodiment, the crossbars 23, 24 and the lifting arms 26 are formed from  
15 steel box section cut and welded together to form a strong rigid frame unit. The length of the lifting arms is typically between 1-2 meters to provide enough time to stop the mower should an obstacle be detected. Also, this provides enough space to enable the obstacle to be dragged away (see below with reference to figures 7 and 8). The lifting arms can be telescopic or  
20 otherwise length adjustable.

The front crossbar 23 can also provide a "push down" function to the grass or scrub to be mowed. As the mower moves forwardly, the crossbar 23 will bend the long grass forwardly to better expose the lower stem the area of the grass  
25 which allows the mower to cut the grass in a more efficient manner. A similar effect will be noticed with scrub and woody weeds. The bending over can also better expose any obstacles that may extend between adjacent fins 14 (such as a rusted steel picket).

30 Lifting arms 26 are pivotly attached to a mounting plate 27 on each side of the mower. A pivot pin 28 functions to pivotly attach the lifting arms 26 to the mounting plate 27. The mounting plates 27 are bolted or otherwise attached to the sides of the mower.

The pivot pin 28 is located fairly close to the ground and this facilitates easier lifting of the forwardly extending member 13 should an obstacle be contacted as the lifting arms 26 are substantially horizontal when the forwardly extending member 13 is in the lowered position.

5

Rigidly attached to each mounting plate 27 is an inclined support arm 29. Support arm 29 comprises steel box section welded at one end to the mounting plate 27. The other (upper) end of support arm 29 supports a pivot pin 30 which one end of an actuator (in the form of a hydraulic ram 31) is attached. The other end of ram 31 is pivotly attached to a respective lifting arm 26. Operation of ram 31 and therefore lift and lower the forwardly extending member between the position illustrated in figure 1 and the position illustrated in figure 2 and any position there between.

15 If the width of forwardly extending member is larger, it may be necessary to provide a third intermediate ram (not illustrated) to enable the larger and heavy forwardly extending member to be raised and lowered.

The forwardly extending member 13 can be quite easily raised due to the rams 31 being hydraulically connected to an hydraulic accumulator 42 (see figure 5) which forms part of the hydraulics of the prime mover 12. The pressure in the hydraulic accumulator can be adjusted to take most of the weight of the forwardly extending member 13 so that minimal force from an obstacle (e.g. rock) is required to cause the forwardly extending member 13 to lift and thereby notify the driver of the presence of the obstacle.

Referring now to figures 4-5, the mower 11 is powered by the PTO 32 of the tractor 12. A rotating shaft 33 is connected to a gearbox 34 on the mower which transmits power through an enclosed shaft 35 which transmits power to the rotating blades (not illustrated) inside the mower housing. This arrangement is conventional. With the particular mower illustrated in figures 4 and 5, the front of the mower can be slightly raised and lowered by ram 36 (see particularly figure 4).

30

Figure 6 illustrates the apparatus in use and in the lowered position in long grass 18.

Figures 7 and 8 illustrates one of the advantages of the apparatus. As the  
5 mower moves in a forward direction illustrated by the horizontal arrow "X" in  
figure 7, the fins 14 of the apparatus come into contact with a rock 40. This  
will cause the forwardly extending member 13 to move upwardly in the  
direction of the upwardly extending arrow "Y" in figure 7. This will provide a  
visual indication to the driver to stop the mower or to at least slow the mower.  
10 It is envisaged that the mower will be stopped and the forwardly extending  
member raised until it clears rock 40. The mower can then be moved slightly  
forwardly to the position illustrated in figure 8 and the forwardly extending  
member can be lowered such that rock 40 is now positioned behind the fins  
14 and in front of the mower. The mower can then be reversed in the direction  
15 of the arrow "Z" in figure 8 which will cause the rock to be dragged away by  
being in contact with the rear edge 17 of the fins that are contacting the rock.  
The spacing between the front of the mower and the rear of the fins will  
depend of the length of the lifting arms, but this spacing is typically between  
60-150cm.

20

### **USE FOR THE INVENTION**

The above description identifies at least one specific, substantial and credible  
use for the invention which is to provide a versatile multiuse apparatus that  
can be attached to a commercial frontal mower and which can function to  
25 clear the area of obstacles, alert the driver of obstacles, and which can also  
be used to drag away woody weedy material such as lantana and the like.

In compliance with the statute, the invention has been described in language  
more or less specific to structural or methodical features. The term  
30 "comprises" and its variations, such as "comprising" and "comprised of" is  
used throughout in an inclusive sense and not to the exclusion of any  
additional features. It is to be understood that the invention is not limited to  
specific features shown or described since the means herein described  
comprises preferred forms of putting the invention into effect. The invention is,

therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted by those skilled in the art.

Throughout the specification and claims (if present), unless the context  
5 requires otherwise, the term "substantially" or "about" will be understood to not be limited to the value for the range qualified by the terms.

Features, integers, characteristics, compounds, chemical moieties or groups  
described in conjunction with a particular aspect, embodiment or example of the  
10 invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith.

Any embodiment of the invention is meant to be illustrative only and is not  
meant to be limiting to the invention. Therefore, it should be appreciated that  
15 various other changes and modifications can be made to any embodiment described without departing from the spirit and scope of the invention.

**CLAIMS:**

1. An apparatus attachable to a frontal mower, the apparatus comprising a forwardly extending member which is adapted for movement between a raised position and a lowered position where the member is in front of the mower, the member comprising a plurality of spaced apart fins, the fins having a lower edge adapted for sliding motion along the ground, a leading forwardly extending edge adapted to ride at least partially over an obstacle, and a rear edge adapted to engage with and move obstacles.
2. The apparatus of claim 1 including a support member to support the fins, the support member comprising a cross bar, an upper part of the fins being attached to the cross bar.
3. The apparatus as claimed in claim 1 or claim 2, wherein the forwardly extending member is pivotally attached relative to the mower.
4. The apparatus as claimed in any one of the preceding claims, including a pair of spaced apart lift arms, the cross bar extending between the lift arms and adjacent a front end of the lift arms.
5. The apparatus as claimed in any one of the preceding claims including at least one ram to move the forwardly extending member.
6. The apparatus as claimed in claim 4 and claim 5, wherein the ram is coupled at one end to an upwardly extending support arm and at the other end to the forwardly extending member.
7. The apparatus as claimed in claim 6, including a mounting plate adapted for attachment to the mower, the forwardly extending member being pivotally attached to the mounting plate, a lower end of the extending support member being fixed to the mounting plate.

8. The apparatus as claimed in any one of the preceding claims, including an accumulator adapted to support the weight of the forwardly extending member to enable the forwardly extending member to be raised with reduced force from an obstacle contacted by the fins.

9. A mower containing the apparatus as claimed in any one of the preceding claims.

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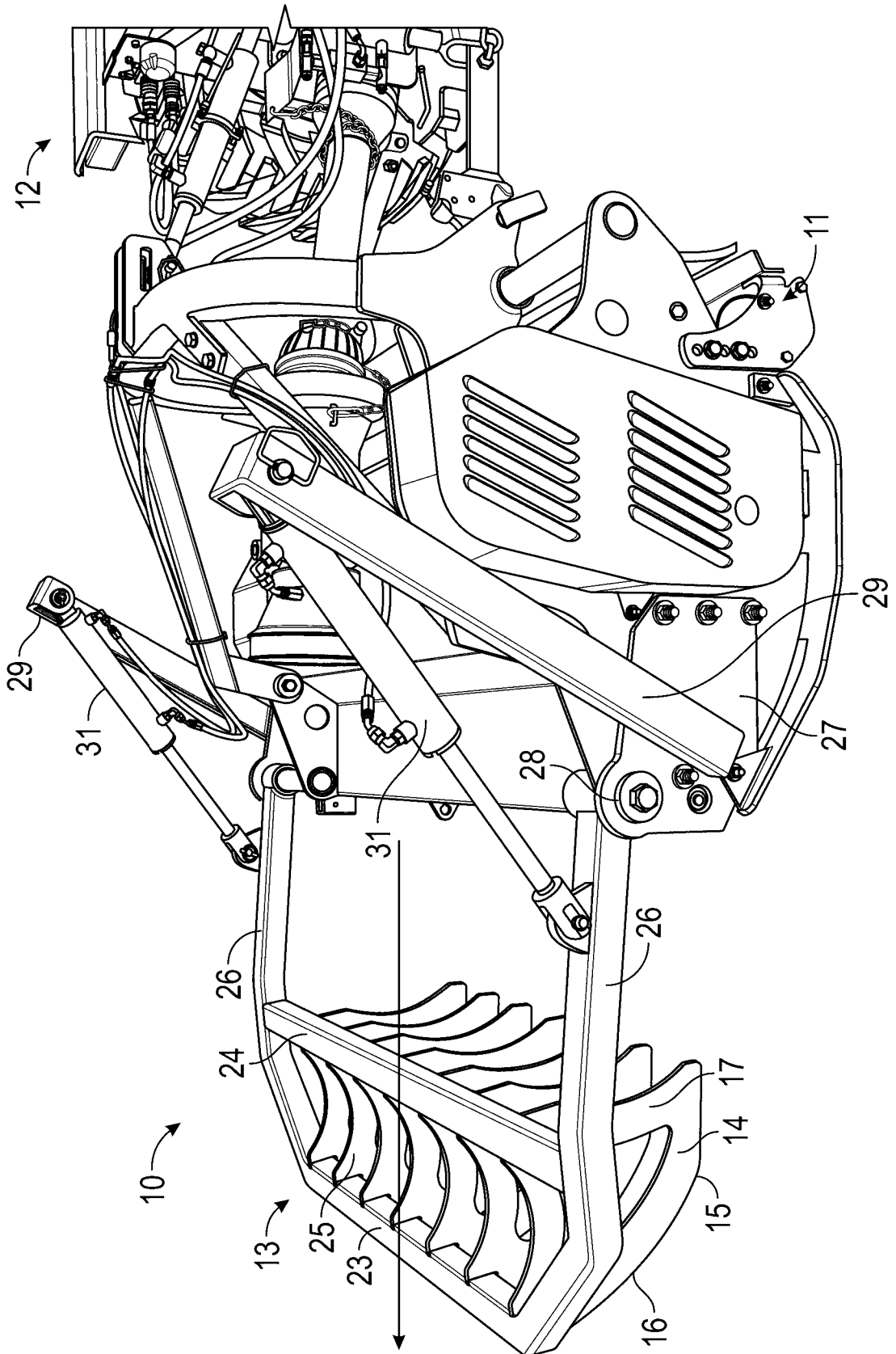


FIG. 1

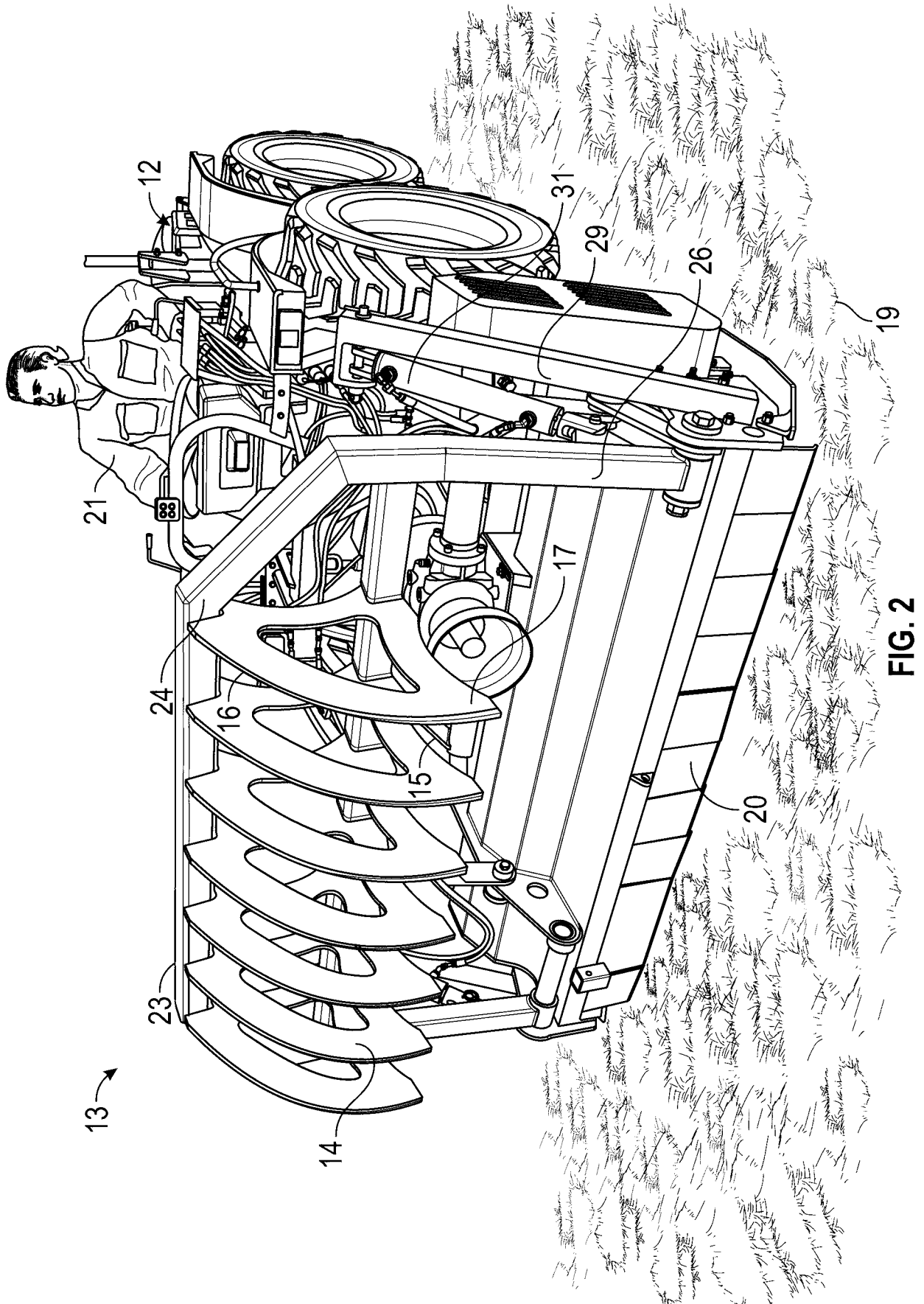


FIG. 2

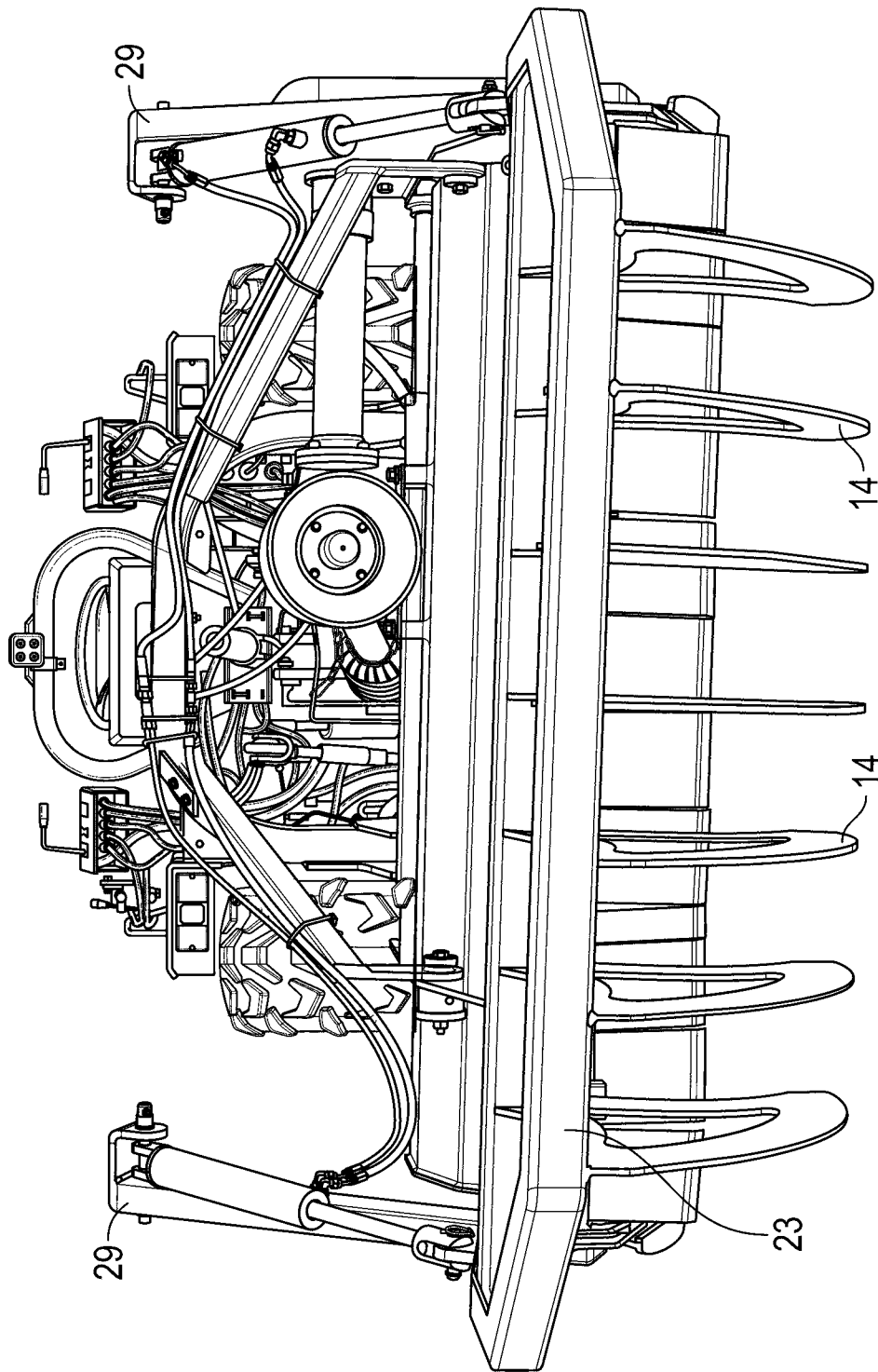


FIG. 3

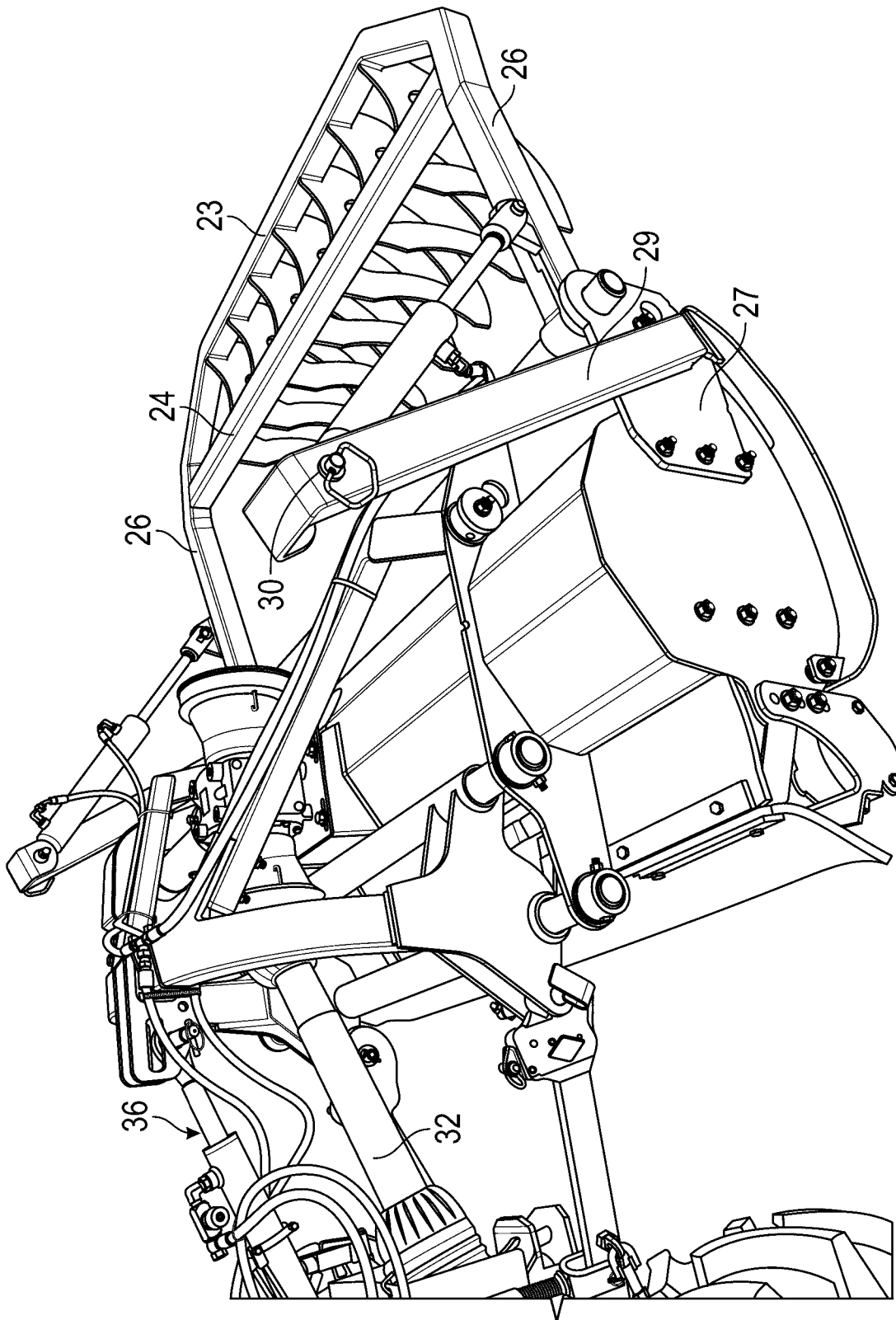


FIG. 4

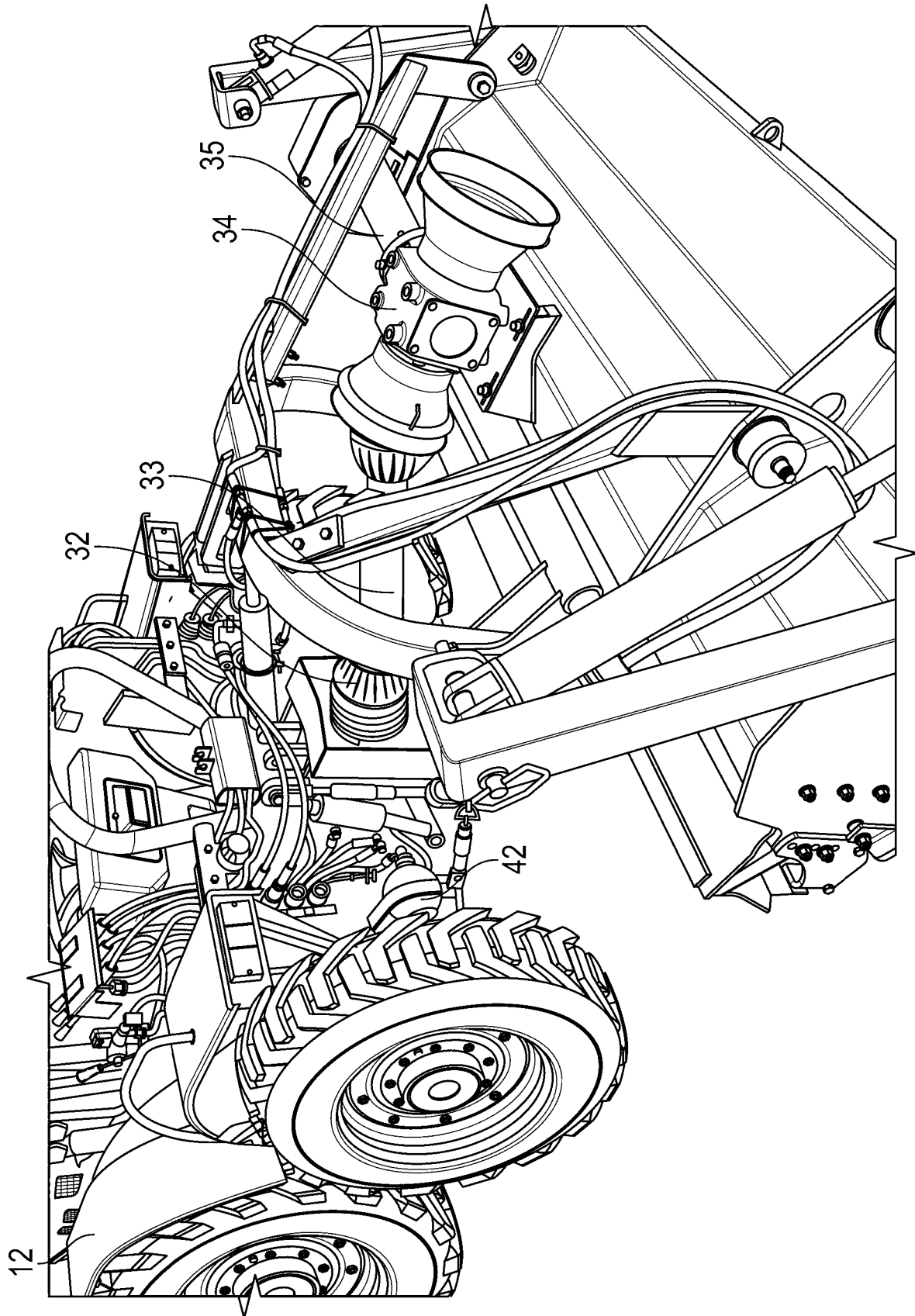


FIG. 5

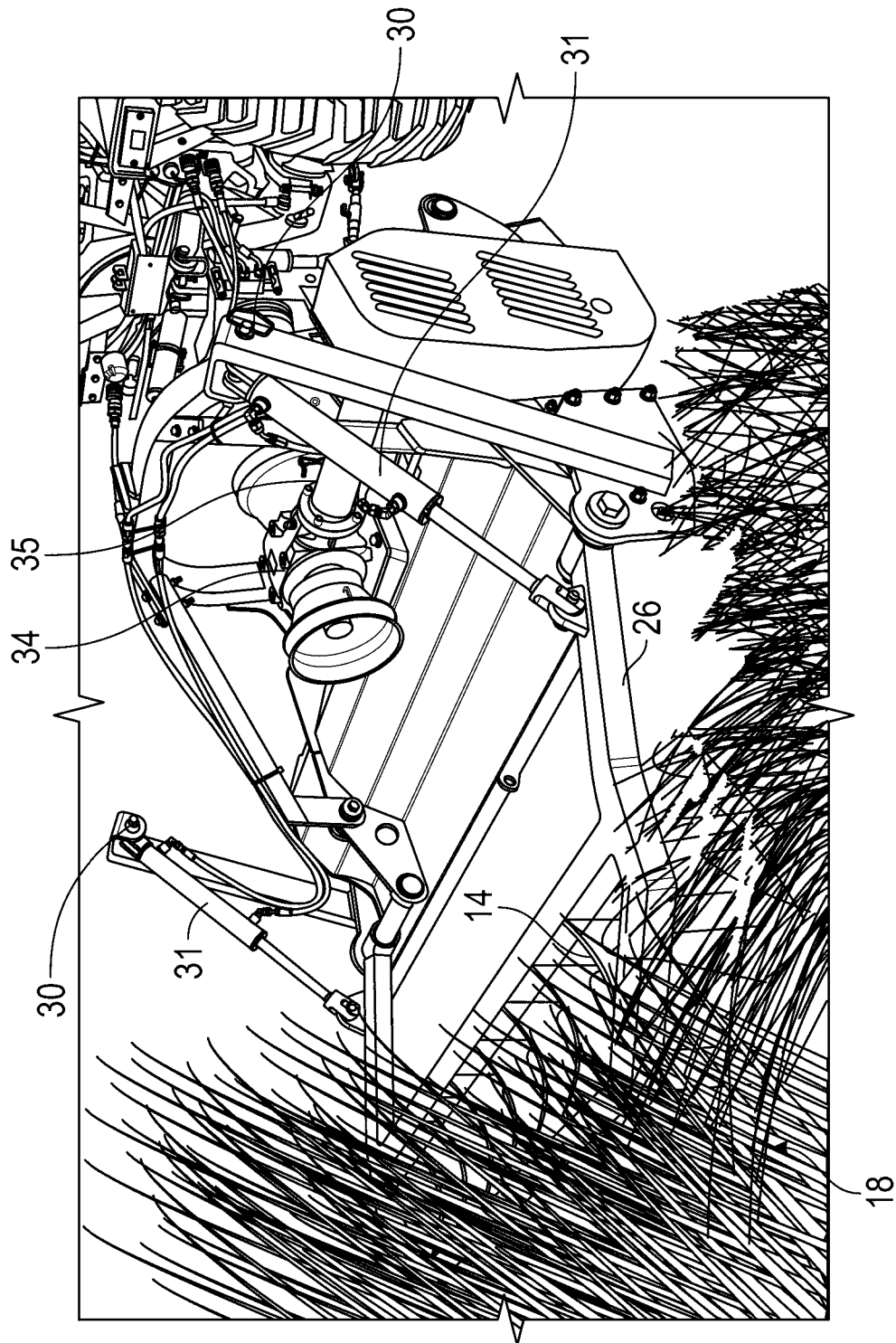


FIG. 6

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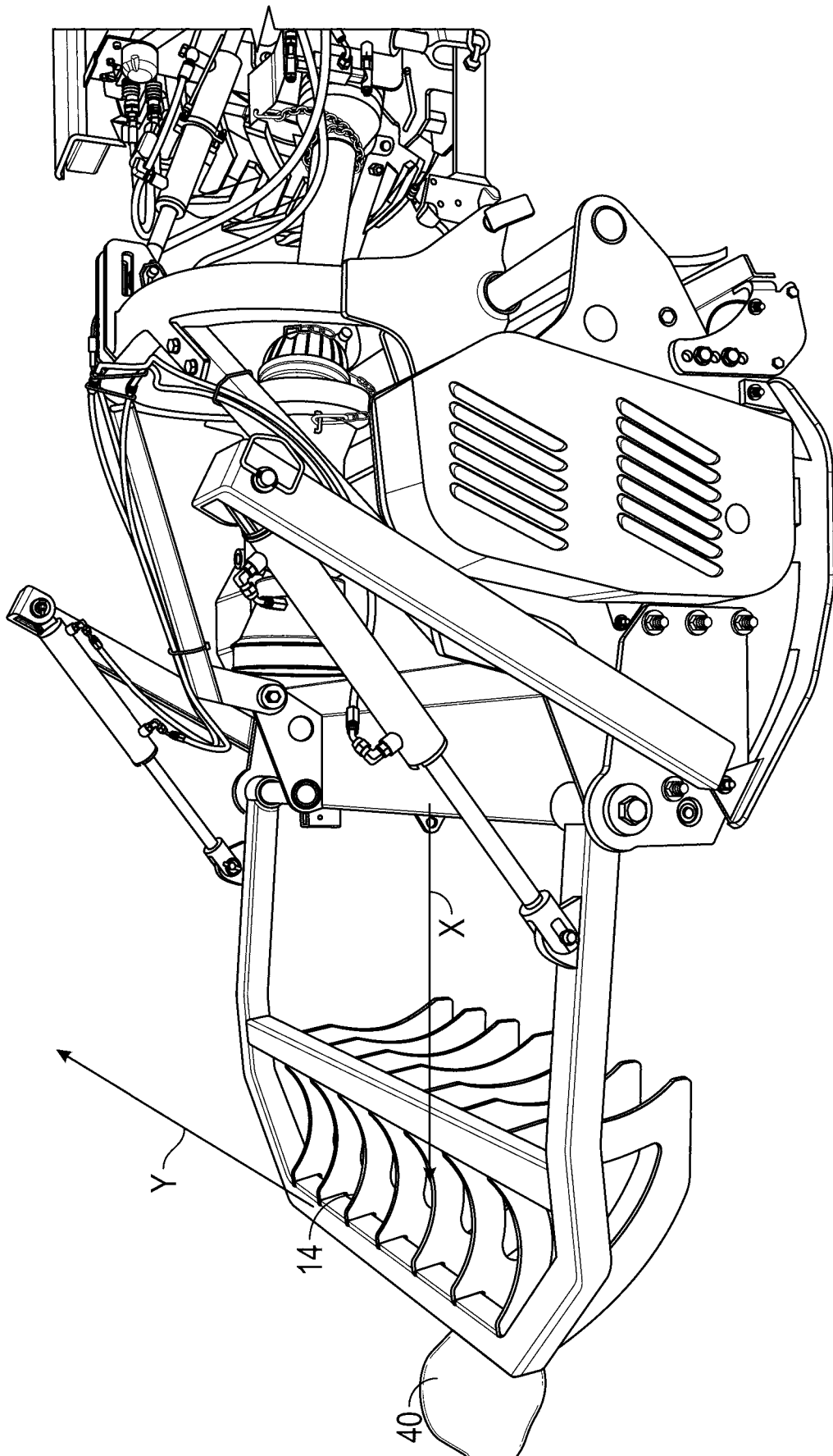


FIG. 7

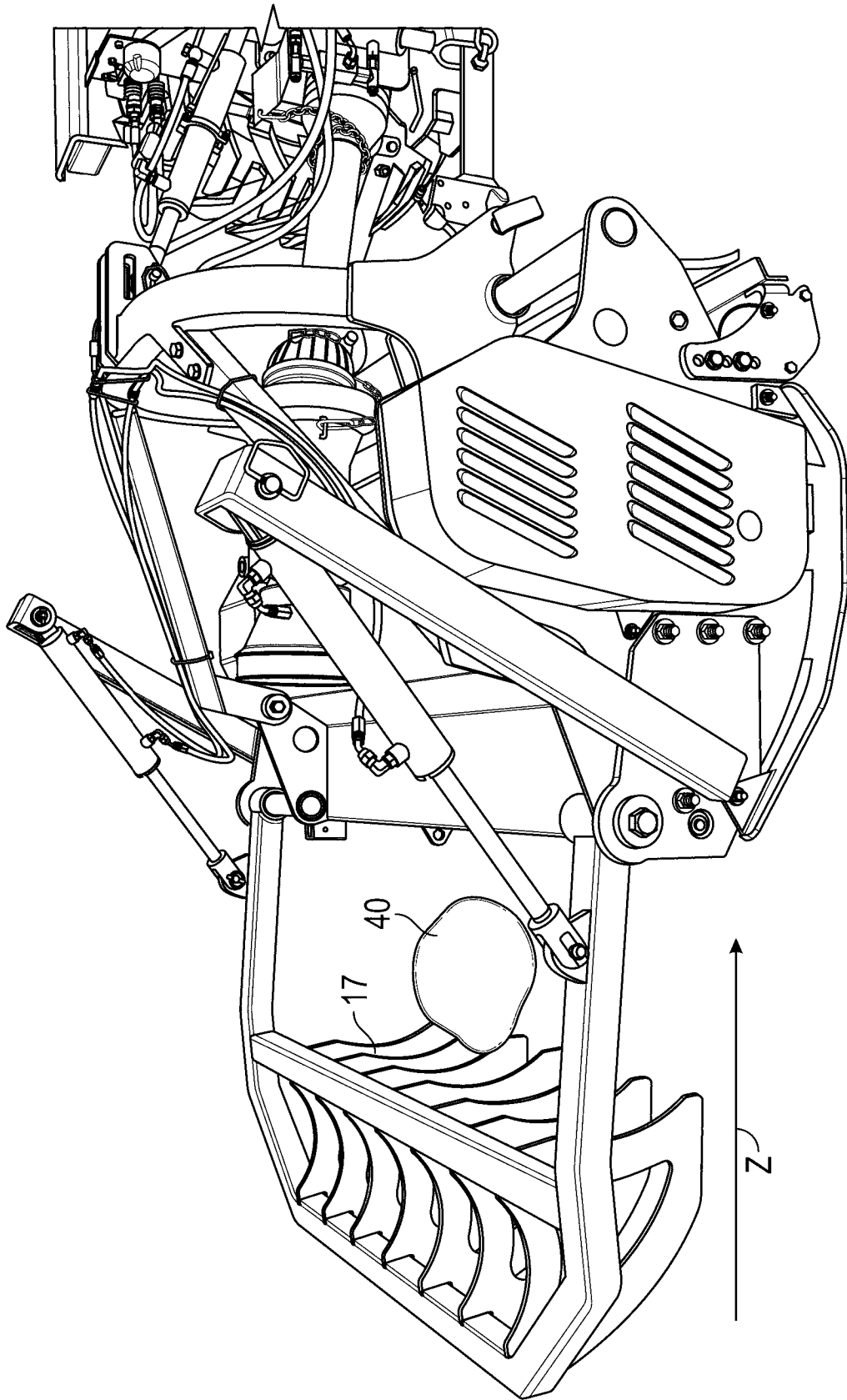


FIG. 8

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/AU2017/050175**

## A. CLASSIFICATION OF SUBJECT MATTER

**A01D 75/18 (2006.01) A01D 34/04 (2006.01)**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Applicant(s)/Inventor(s) name searched in internal databases provided by IP Australia. Applicant(s)/Inventor(s) name searched in Espacenet, AusPat and Google. Search query: "BRODERICK, Mark John", "BRODERICK, Jennifer Jean" as the applicant AND/OR "BRODERICK, Mark John", "BRODERICK, Jennifer Jean" as the inventor(s).

PATENW: EPODOC, WPIAP, TXPEA, TXPEB, TXPEC, TXPEE, TXPEF, TXPEH, TXPEI, TXPEP, TXPES, TXPEPEA, TXPUSE0A, TXPUSE1A, TXPUSEA, TXPUSEB, TXPWOEA.; IPC, CPC: A01D75/185/LOW, A01D75/18/LOW, A01D34/03/LOW, A01D34/04/LOW, A01D34/18/LOW, A01D43/02/LOW, A01D42/02/LOW, A01D2101/LOW, A01D43/12/LOW and keywords: frontal, mower, fins, cross bar, obstacle and like terms.

Google Patent Search: Keywords: frontal, mower, attach, mount, forwardly, extending, member, movement, raised, lowered, plurality, spaced, fins, sliding, obstacles, cross bar, pivot, lift arms, ram, accumulator and like terms.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 1 June 2017	Date of mailing of the international search report 01 June 2017
Name and mailing address of the ISA/AU  AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Authorised officer  Savio Albuquerque AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832913

**INTERNATIONAL SEARCH REPORT**

International application No.

C (Continuation).

DOCUMENTS CONSIDERED TO BE RELEVANT

**PCT/AU2017/050175**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 3218787 A (C. VAN DER LELY) 23 November 1965 Figures 4-14 and column 3, line 71 - column 11, line 5 Figures 5-8, 13, 14	1-4, 9 5-8
X	WO 2014/182926 A1 (CNH INDUSTRIAL AMERICA LLC) 13 November 2014 Abstract, figures 1-19 and paragraphs [0036]-[0061]	1-3, 9
Y	FR 2484761 A1 (CLAAS SAULGAU GMBH) 24 December 1981 Figures 1, 2, English Abstract and Description retrieved from Espacenet	5-8
Y	FR 2659186 A1 (CLAAS SAULGAU GMBH) 13 September 1991 Figures 1-3, English Abstract and Description retrieved from Espacenet	5-8

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU2017/050175**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

<b>Patent Document/s Cited in Search Report</b>		<b>Patent Family Member/s</b>	
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**End of Annex**

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

Form PCT/ISA/210 (Family Annex)(July 2009)