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FRONT END LOADER MOUNTING SYSTEM FOR TRACTOR

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(57) Claim

1. A method of mounting a loader on a vehicle, the loader including mast structure having upright mast posts and an actuatable boom assembly pivotably connected to the mast structure, said boom assembly including a material-engaging tool, the method comprising the steps of:

- a) attaching a mounting tube to the vehicle;
- b) providing a downwardly opening pocket member at the lower end of the mast posts;
- c) moving the pocket member and mounting tube relative to each other until the pocket member engages the tube with the pocket member contacting the tube in a preselected position;
- d) after the step c), rotating the mast structure about the mounting tube to a preselected mounting position;
- e) securing a portion of the mast structure at a

location offset from the mounting tube to the vehicle to maintain the mast structure in the mounted position;

f) providing complementary block and ramp structure adjacent the mounting tube and pocket member; and

g) preventing disengagement of the pocket member from the mounting tube, said step of preventing including, during the step d), engaging the complementary block and ramp structure as the mast structure rotates on the tube to wedge the pocket member against the tube.

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COMPLETE SPECIFICATION

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Complete Specification for the invention entitled LOADER
MOUNTING SYSTEM.

The following statement is a full description of this invention
including the best method of performing it known to me:-

- 1 -

LOADER MOUNTING SYSTEM

Background of the Invention

The present invention relates generally to loaders for mounting on tractors or the like, and more specifically to an improved method and apparatus for mounting and storing a loader.

To improve the versatility of tractors, implements such as front end loaders must be easily and quickly removable and installable on the tractor. Presently there are numerous systems and methods used to remove and install a loader with respect to a tractor. However, the systems and methods are not always easily understood nor are they reliable. Many utilize parking stands which are removed and stored in another location when the loader is mounted on the tractor. Although some stands are available which remain with the loader, these can be cumbersome when the loader is mounted and may not provide optimum parking position for the loader. Also, for optimum operation, the loader must be rigidly mounted on the tractor. Although numerous systems have been employed to provide a rigid mount, many of these are complex, bulky, or difficult to mount or adjust.

Brief Description of the Invention

In one broad form the invention provides a method of mounting a loader on a vehicle, the loader including mast structure having upright mast posts and an actuatable boom assembly pivotably connected to the mast structure, said boom assembly including a material-engaging tool, the method comprising the steps of:



- a) attaching a mounting tube to the vehicle;
- b) providing a downwardly opening pocket member at the lower end of the mast posts;
- c) moving the pocket member and mounting tube relative to each other until the pocket member engages the tube with the pocket member contacting the tube in a preselected position;
- d) after the step c), rotating the mast structure about the mounting tube to a preselected mounting position;
- e) securing a portion of the mast structure at a location offset from the mounting tube to the vehicle to maintain the mast structure in the mounted position;
- f) providing complementary block and ramp structure adjacent the mounting tube and pocket member; and
- g) preventing disengagement of the pocket member from the mounting tube, said step of preventing including, during the step d), engaging the complementary block and ramp structure as the mast structure rotates on the tube to wedge the pocket member against the tube.

In another broad form the invention also provides a front end loader adapted for mounting on a framed vehicle such as a tractor, the loader including a mast having a rear upright mast post and a mast arm extending forwardly from the post, and a mounting structure comprising:

- a support including a tubular beam;
- means for connecting the support to the vehicle;
- a downwardly opening pocket located at the lower end of the mast post and adapted for support on the tubular beam;



complementary block and wedge structure connected to the mast post and the support;

said support including means for guiding the pocket onto the beam in a preselected position with the block structure offset from the wedge structure;

means for rotating the mast arm upwardly about the beam to engage the block and wedge structure and tightly secure the mast post against the beam; and

means for releasably securing the mast arm in an upwardly rotated position.

Brief Description of the Drawings

FIG. 1 is a side view of a tractor with the loader of the present invention attached thereto.

FIG. 2 is a perspective view of the rear support structure for the loader of FIG. 1.

FIG. 3 is a side view, partially in section, of the rear support structure of FIG. 2 showing the pocket of the corresponding mast post resting on the support tube with the forward end of the loader rotated downwardly.

FIG. 4 is a view similar to FIG. 3 but showing the mast post in the mounted position.

FIG. 5 is a side perspective view of the over centre latching lever of the front support structure on the loader.

FIG. 6 is a view similar to FIG. 5 but showing the latching lever in the latched position.



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FIG. 7 is a front view of the loader when mounted on the tractor and showing the latching lever acting as both a structural member to tie the forward mast arms together and as a grille guard for the tractor.

FIG. 8 is a schematic representation of the loader prior to dismounting with the latching lever in position to function as a parking stand.

FIG. 9 is a view similar to FIG. 8 but showing the loader rotated downwardly with the stand engaging the ground.

FIG. 10 is a view similar to FIG. 9 but showing the mast removed from the rear support so that the tractor may be backed away from the loader.

FIG. 11 is a view showing the loader in a parked position with the tractor backed away from the loader.

Description of the Preferred Embodiment

Referring to FIG. 1, there is shown a tractor 10 having a main frame 12 supported for forward movement (F) over the ground by front ground engaging wheels 14 and rear ground engaging



1 wheels 16. A loader 20 is connected to the tractor frame 12 by
left- and right-hand rear supports 22 and by front supports 24.
The loader 20 is generally symmetrical about an upright
longitudinal axis and includes a mast 26 having a pair of mast
5 posts 28 releasably secured in position, as described in detail
below, on the rear supports 22. A boom 30 includes rear boom
arms 32 pivotally connected at their aft ends to the upper ends
of the respective mast posts 28. A forward boom arm 34 extends
downwardly from each of the arms 32 to a lower portion which is
10 pivotally connected to a bucket 36 or other earth engaging
implement.

Fixed to a portion of the mast post 28 below the boom pivot
... is a mast arm 40 which extends forwardly and generally
... horizontally to a forward mast arm portion 42 which in turn
15 angles downwardly and forwardly to a lower front support
(... engaging portion indicated generally at 44. Pivotaly connected
... to the lower end of the mast arm portion 42 is a parking stand
... or lever structure 50 which also serves as a latch for

maintaining the mast structure in position on the front end of
20 the tractor, and as a grille guard and a structural member to
... tie the two mast arms together.

Boom cylinders 54 are connected between the central portions
of the mast posts 28 and the front portions of the corresponding
... rear boom arms 32. Bucket actuating cylinders 56 are connected
25 between the forward end of the boom arms 32 and the bucket 36.
The cylinders 54 and 56 are operably connected through
... releasable hoses to the hydraulic system (not shown) on the
tractor 10.

The left- and right-hand rear supports 22 and the
30 corresponding lower ends of the mast posts 28 are configured to
facilitate mounting and dismounting of the loader 20 with
respect to the tractor frame 12 and to automatically provide a
secure, tight fit as the loader is moved toward the mounted
position. As best seen in FIGS. 2-4, each rear support 22
35 includes a mounting tube 62 connected to a plate 64 which in
turn is connected by bolts 66 to the frame 12. A pair of flared
plates 68 are rigidly fixed to the tube 62 at axially spaced
locations to define a forwardly and upwardly opening, cradle-
like structure 70 adapted to receive the lower end of the mast
40 post 28. A rear upright wall 72 is connected between the aft

1 ends of the flared plates 68. A wedge 74 having a lower
downwardly and rearwardly inclined surface 76 is connected by a
pair of bolts 78 to the upper portion of the rear wall 72. The
wedge 74 may be adjusted vertically by loosening the bolts 78
5 and moving the assembly with respect to the rear wall 72.

The lower end of the mast post 28 includes a downwardly and
slightly rearwardly opening pocket 82 having a boundary
generally conforming to the tube 62. The boundary is defined by
a formed metal plate 84 having an upright front panel portion
10 86, a rearwardly and upwardly directed central panel portion 88,
and a downwardly directed rear panel portion 92. As best seen
in FIG. 2, the plate 84 is welded to the sides of the mast posts
28 and projects slightly outwardly from the sides of the posts
to provide a wide stable base.

15.. Adjacent the pocket 82, a block 94 is welded to the aft face
(20) of the post 28 above the rear panel 92 and includes a top
surface which is generally parallel to the panel 92. An upright
wall 96 is connected to the upper portion of the panel 92
adjacent the contact area of the panel with the tube 62 (FIGS. 3
and 4) and is welded to the block 94 and to the sides of the
mast posts 28. The block 94 is chamfered at its rear edge 98 to
facilitate the sliding movement of the block into and out of
engagement with the inclined surface 76 of the wedge 74 as the
loader is mounted and dismounted, respectively.

25 During mounting of the loader 20, the mast posts 28 are
raised, for example, by extending the boom cylinders 54, to the
position shown in FIG. 10. The tractor 10 is then driven
between the mast posts 28 until the mast pockets 82 are located
directly above the rear supports 22. Thereafter the boom
30 cylinders 54 may be retracted to cause the mast pockets 82 to
settle onto the tubes 62 (FIGS. 3 and 4) guided by the flared
plates 68. Upon contact of the mast pockets 82 with the
mounting tubes 62, the tubes become the pivot points for the
loader and continued retraction of the boom cylinders 54 raises
35 the mast arm 40 until the front support engaging portion 44
engages the front supports 24 (FIGS. 5 and 8). As the mast
posts 28 rotate in the clockwise direction (as shown in FIGS. 3
and 4) toward the mounted position of FIG. 1, the block 94 is
forced under the wedge 74 as the top of the block 94 slides
40 against the inclined surface 76. In the final mounted position

1 (FIG. 4) the wedge 74 urges the block 94 and the corresponding
wall 96 and pocket 82 against the upper rear quadrant of the
tube 62. The structure therefore provides a very secure fit of
the mast posts 28 against the respective tubes 62 and
5 automatically locks the respective post to its tube 62. As the
rear mounting contact areas wear, the wedges 74 may be adjusted
downwardly as necessary to insure a snug fit. The mechanical
advantage provided by the long moment arm from the tip of the
bucket 36 to the block 94 may be utilized to force the block 94
10 between the wedge 74 and the tube 62 to create a tight fit. The
long moment arm is also utilized to move the block 94 away from
the wedge 74 when disconnecting the loader from the tractor.

Due to the unique geometry of the rear support system described
above, the loading from most of the loader operations, including
15 forward ramming, drop and catch and digging, will actually
tighten the connection at the rear supports 22.

Referring now to FIGS. 1, 5-7 and 12, the operation of the
parking stand 50 and the front support arrangement for securing
the forward mast arm portions 42 to the forward portion of the
tractor frame 12 will be described in detail. The forward mast
20 arm portion 42 includes an upwardly opening, hook-like portion
102. A bracket 104 is connected to the tractor frame 12 and
includes an outwardly projecting cylindrical member 106 adapted
to engage the hook-like portion 102 upon raising of the forward
25 end of the mast 26. The parking stand 50 includes upright side
legs 110, each having a first end pivotally connected to the
lower end of the mast arm portion 42 by a bolt 112. The
opposite ends of the side legs 110 are connected by a
transversely extending tubular beam 114 (FIG. 7) welded to the
30 respective side legs. Each side leg 110 includes an upwardly
opening hook 116 located adjacent the pivot bolt 112 for
engaging the cylindrical member 106 (FIG. 6) upon upward
rotation of the parking stand 50. Welded to each of the
cylindrical members 106 is a forwardly opening guide member 118
35 which helps channel the hook 116 onto the cylindrical member
106.

The parking stand 50 is rockable between a lowered parking
position (FIGS. 9-12) and a raised latching position (FIGS. 1, 6
and 7). A spring-loaded pin assembly 122 is mounted on one side
40 leg 110 between the hook 116 and the pivot area 112. Holes 124

1 (FIG. 5) and 126 (dotted lines of FIG. 6) are provided at the
lower end of the forward mast arm portion 42. The hole 124
aligns with the spring-loaded pin assembly 122 when the parking
stand 50 is in the latching position of FIG. 6, and pin 132 is
5 biased into the hole 124 to secure the stand in the latched
position. To rock the stand 50 toward the parked position, the
pin 132 is pulled out from the hole 124, and the stand 50 is
swung in the clockwise direction (FIG. 5) until the pin aligns
with and enters the hole 126 to secure the stand in the parked
10 position. The spring-loaded pin assembly 122 includes a spring
134 for biasing the pin toward the selected hole 124 or 126.

15 The inside of each mast arm portion 42 includes an upwardly
projecting guide member 142 (FIG. 12) adjacent the area of the
hook 116. The member 42 engages the bracket 104 to force the
mast 26 into position as the front end of the mast 26 is
20 raised. The guide members 142 help to properly position the
forward ends of the mast arms 42 both transversely and in the
fore-and-aft direction as the hook 116 moves into position on
the cylindrical member 106.

25 To park the loader 20, assuming it is in the position shown
in FIG. 1, the spring-loaded pin assembly 122 is released from
the hole 124 and the parking stand 50 is rotated downwardly to
disengage the hook 116 from the cylindrical member 106. The pin
132 engages the second hole 126 to secure the stand 50 in the
30 parking position. The lift cylinders 54 are then extended
(FIG. 9) to rock the front end of the mast 26 downwardly about
the supports 22 until the lower end of the stand 50 touches the
ground. As the forward end of the mast 26 is rotated
downwardly, the block 94 (FIG. 3) rotates away from the wedge 74
35 at each rear support 22 to release the mast post 28 from the
respective support. As the lift cylinders 54 continue to
extend, the masts 28 are lifted from the rear supports 22
(FIGS. 2 and 10). When adequate tire clearance is achieved, the
loader hydraulics are disconnected and the tractor 10 is backed
40 out from between the mast posts 28. The loader 20 is supported
in the parked position on the stand 50 and the bucket 36 as
shown in FIG. 10. If desired, the cylinders 54 may be retracted
to lower the mast posts 28 into ground-engaging positions as
shown in FIG. 11.

1 To attach the loader the above steps are reversed. Assuming
the loader is in the position shown in FIG. 11, the hydraulics
are hooked up to the tractor and the cylinder 54 is extended to
raise the mast post to the position shown in FIG. 10. The
5 tractor 10 then is driven forwardly until the rear supports 22
are under the respective pockets 82 of the mast posts 28. By
retracting the cylinders 54, the pockets 82 of the loader mast
posts 28 settle onto the rear cradle structure 70 guided by the
flared plates 68. Until the pockets 82 engage the tubes 22, the
10 loader 20 rests and pivots about the tubular cross beam 114 on
the ground. Once the pockets 82 engage the rear supports 22,
the mounting tubes 62 become the pivot points for the loader.

Continued retraction of the cylinders 54 raises the parking
stand 50 from the ground as the forward end of the mast 26
rotates upwardly. At the same time, the block 94 (FIG. 4) is
15 forced under the wedge 74. The mast 26 continues to rotate
until the hook 102 engages the cylindrical member 106 (FIG. 5).
The operator then grasps the stand 50 and, using the leverage
provided by the length of the side legs 110, forces the hook 116
20 into engagement with the cylindrical member 106 to secure the
front end of the mast 26 to the tractor frame 12. The pin 132
of the assembly 122 is biased into the hole 124 to maintain the
parking stand in the latched position. In the latched position,
the parking stand 50 acts as a grille guard (FIG. 7) to protect
25 the tractor grille against damage.

Having described the preferred embodiment, it will be
apparent that modifications can be made without departing from
the scope of the invention as defined in the accompanying
claims.

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The claims defining the invention are as follows:

1. A method of mounting a loader on a vehicle, the loader including mast structure having upright mast posts and an actuatable boom assembly pivotably connected to the mast structure, said boom assembly including a material-engaging tool, the method comprising the steps of:
 - a) attaching a mounting tube to the vehicle;
 - b) providing a downwardly opening pocket member at the lower end of the mast posts;
 - c) moving the pocket member and mounting tube relative to each other until the pocket member engages the tube with the pocket member contacting the tube in a preselected position;
 - d) after the step c), rotating the mast structure about the mounting tube to a preselected mounting position;
 - e) securing a portion of the mast structure at a location offset from the mounting tube to the vehicle to maintain the mast structure in the mounted position;
 - f) providing complementary block and ramp structure adjacent the mounting tube and pocket member; and
 - g) preventing disengagement of the pocket member from the mounting tube, said step of preventing including, during the step d), engaging the complementary block and ramp structure as the mast structure rotates on the tube to wedge the pocket member against the tube.
2. The method as set forth in claim 1 further including the steps of:
 - h) providing a downwardly and forwardly extending forward mast arm portion;



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i) pivotally connecting a stand to the forward mast arm portion;

j) providing a latch structure on the stand; and

k) wherein the step of securing includes pivoting of the stand to latch the forward portion of the mast structure to the vehicle.

3. The method as set forth in claim 2 including the steps of:

1) providing a transversely extending beam structure on the stand;

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m) securing the stand in a preselected location when the mast structure is in the mounted position, wherein in the preselected location the beam structure acts as a guard for the forward end of the tractor.

4. The method as set forth in any one of claims 1 to 3 wherein the step of providing complementary block and ramp structure includes providing a block with a relatively flat surface on the lower end of the upright mast post and providing a wedge with an inclined surface adapted to engage the flat surface of the block to urge the pocket member downwardly as the mast structure is rotated upwardly about the mounting tube.

5. The method as set forth in claim 4 further including the step of adjusting the wedge relative to the flat surface of the block to thereby adjust the fit between the pocket member and the mounting tube.

6. The method as set forth in any one of claims 1 to 5 including the step of actuating the boom assembly to thereby provide leverage to wedge the complementary block and ramp structure together.

7. A front end loader adapted for mounting on a framed vehicle such as a tractor, the loader including a mast having a rear upright mast post and a mast arm extending forwardly from the post, and a mounting structure comprising:

- a support including a tubular beam;
- means for connecting the support to the vehicle;
- a downwardly opening pocket located at the lower end of the mast post and adapted for support on the tubular beam;
- complementary block and wedge structure connected to the mast post and the support;



said support including means for guiding the pocket onto the beam in a preselected position with the block structure offset from the wedge structure;

means for rotating the mast arm upwardly about the beam to engage the block and wedge structure and tightly secure the mast post against the beam; and

means for releasably securing the mast arm in an upwardly rotated position.

8. The front end loader as set forth in claim 7 wherein the wedge structure is supported adjacent the beam, and including means supporting the block structure on the mast post for engagement between the wedge structure and beam.

9. The front end loader as set forth in claim 7 or claim 8 wherein the means for guiding includes a pair of plates, and means for supporting the wedge structure between the plates.

10. The front end loader as set forth in any one of claims 7 to 9 including means for adjusting the block structure relative to the wedge structure to compensate for wear in the support and in the pocket.

11. The front end loader as set forth in any one of claims 7 to 10 including a parking stand, means for pivotally connecting the parking stand for rocking between a ground support position and a mounted position, wherein in the mounted position the stand provides protection for the front end of the vehicle.

12. The front end loader as set forth in claim 11 including latch means operably associated with the parking stand for locking the mast arm in the upwardly rotated position, as the parking stand is rotated toward the mounted position.



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13. The front end loader as set forth in claim 11 or claim 12 wherein the means for releasably securing includes a front support connected to the vehicle frame and a hook-like member connected to the mast arm and adapted to engage the front support upon rotation of the mast arm upwardly about the beam, wherein the parking stand includes a latch means for preventing disengagement of the hook-like member from the front support when the stand is in the mounted position.

14. A front end loader adapted for mounting on a framed vehicle substantially as hereinbefore described and with reference to the accompanying illustrations.

15. A method of mounting a loader on a framed vehicle substantially as hereinbefore described and with reference to the accompanying illustrations.

DATED this 24th day of September, 1990.

DEERE & COMPANY
By Its Patent Attorneys
ARTHUR S. CAVE & CO.



FIG. 1

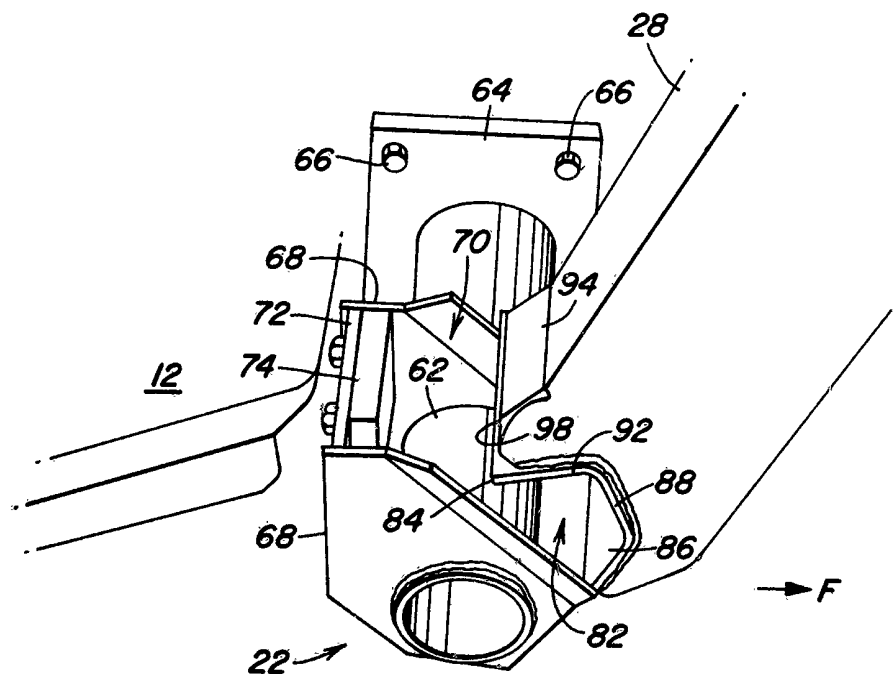
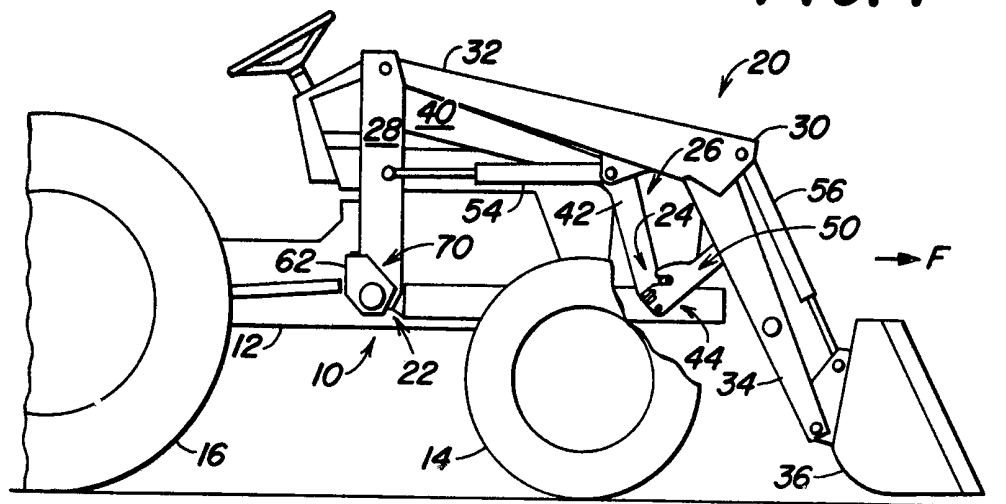
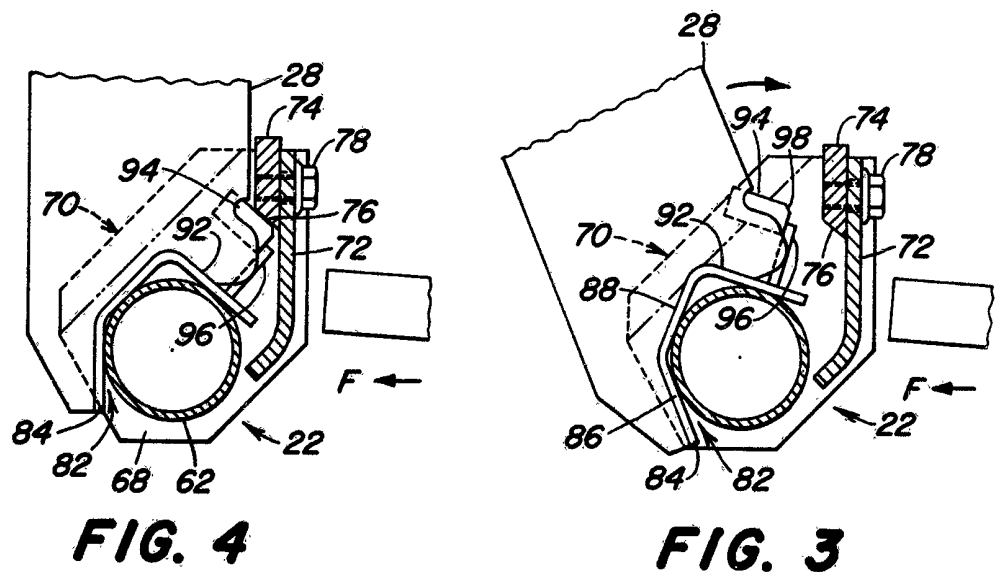
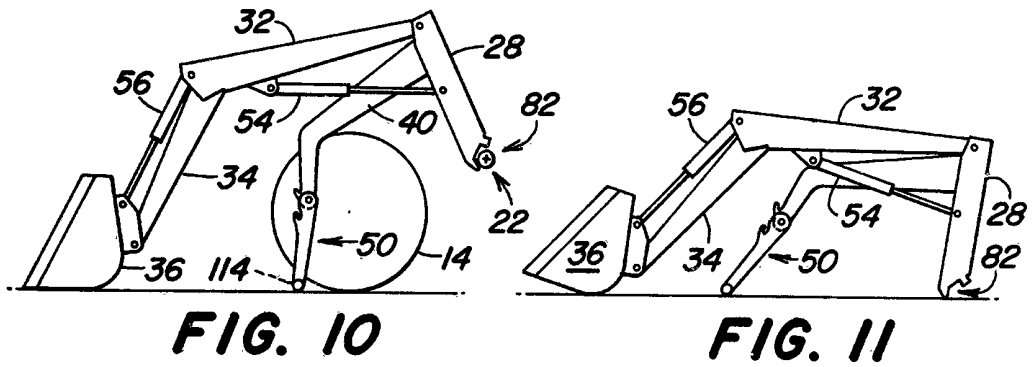
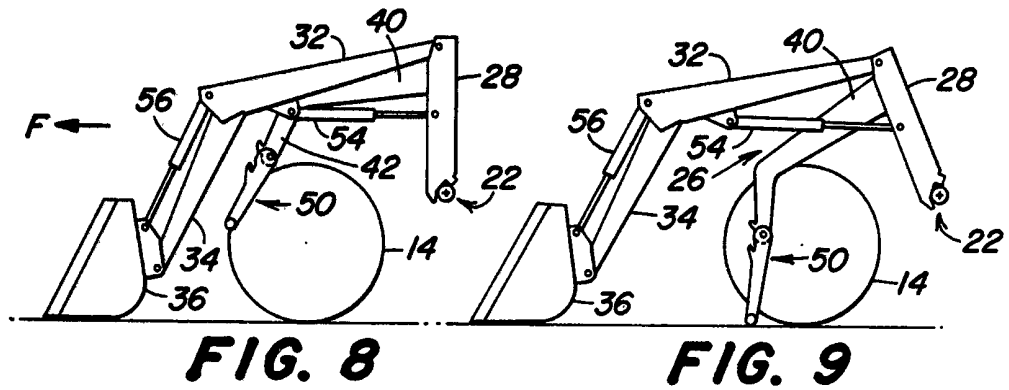


FIG. 2



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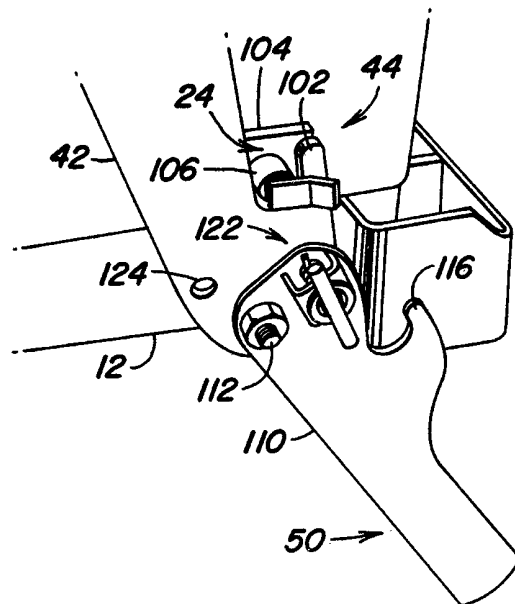


FIG. 5

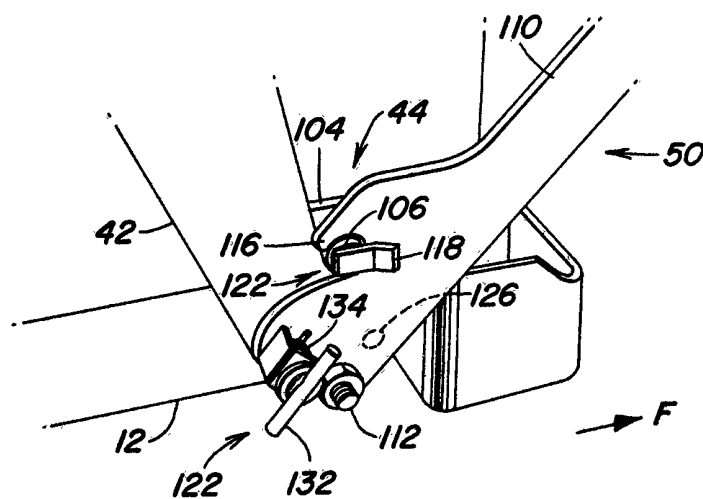


FIG. 6

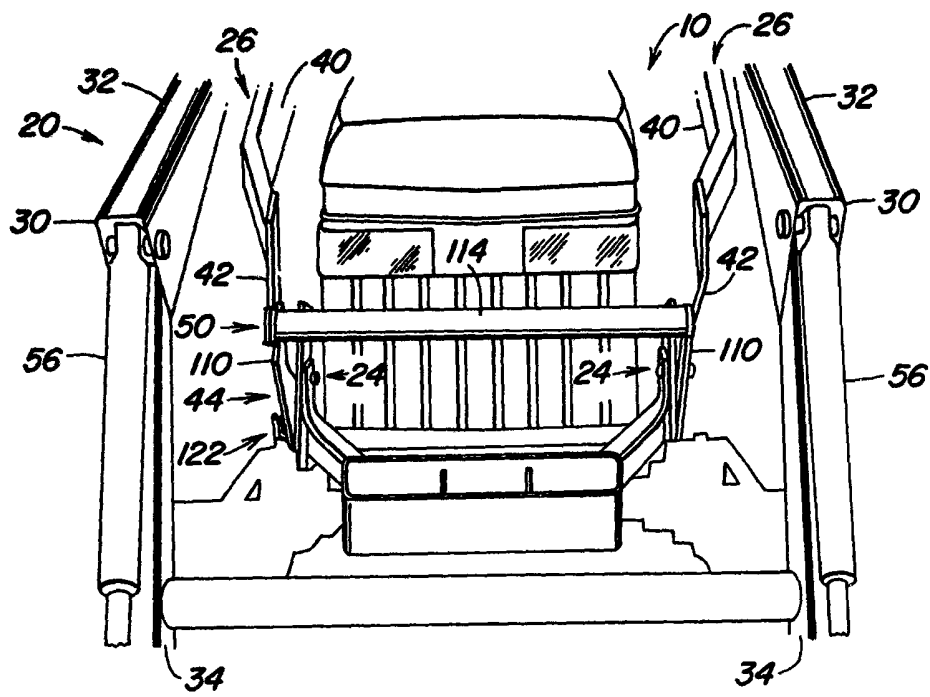


FIG. 7

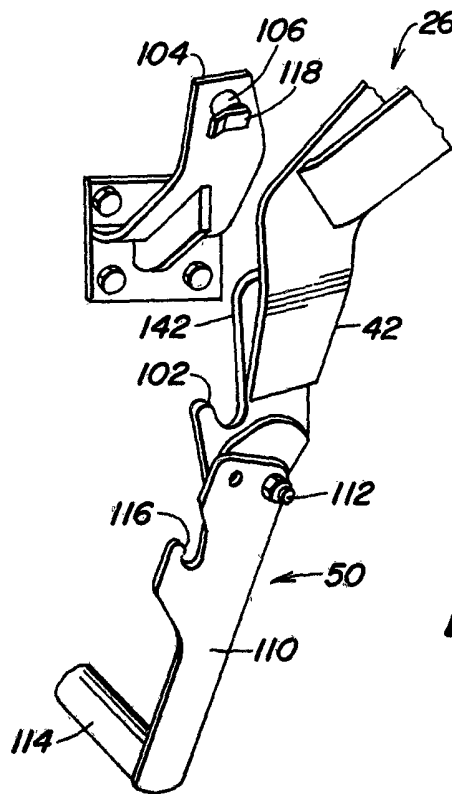


FIG. 12