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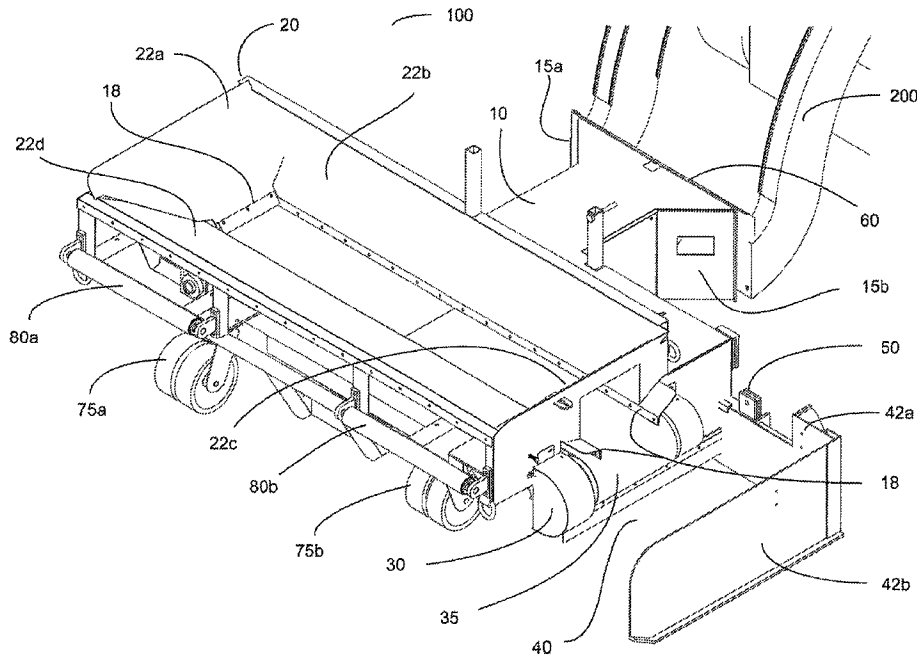
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(54) Title: FLEXIBLE SKID STEER ATTACHMENT DEVICE



(57) Abrégé/Abstract:

The present invention is a flexible skid steer road widening and shouldering attachment device with an adjustable spreader system which gives the operator precise control over the placement of debris.

Abstract

The present invention is a flexible skid steer road widening and shouldering attachment device with an adjustable spreader system which gives the operator precise control over the placement of debris.

“FLEXIBLE SKID STEER ATTACHMENT DEVICE”

Cross-Reference to Related Applications

[001] None

Field of Invention

[002] The present invention relates to the field of road apparatuses, and more particularly to a flexible skid steer attachment device for paving shoulders and widening roads.

Brief Description of the Drawings

[003] FIG. 1 illustrates a front perspective view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer with spreader system extended.

[004] FIG. 2a illustrates a back perspective view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer.

[005] FIG. 2b illustrates a back perspective view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer with spreader system extended.

[006] FIG. 3 illustrates a back perspective view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer and positioned behind a truck.

[007] FIG. 4 is a side view showing the spreader system of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer and positioned behind a truck.

[008] FIG. 5 is a side view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer and positioned behind a truck.

[009] FIG. 6 is a top view of an exemplary embodiment of a flexible skid steer road widening and shouldering attachment device attached to a skid steer and positioned behind a truck.

Background

[010] After-market attachments for road widening and shouldering are well-known in the construction industry.

[011] U.S. Pat. No. 7,540,687 (Neumann '687) teaches a skid steer attachment for performing work in confined areas (e.g., road shoulders, trenches). The attachment disclosed in Neumann '687 is comprised of a compact frame adapted to support a hopper; a conveyer system; a spreader system; a spreader system angular adjustment; a hydraulic system; wheels; front contact rollers, which contact the back wheels of a dump truck; and a universal mounting plate. This device has enjoyed an extensive market presence and improvements have been made to further increase its utility and durability.

[012] A limitation of Neumann '687 was that the conveyer belt system would become misaligned due to the pressure from debris coming in contact with the belt over

time, as well as from the motion of the vehicle. The conveyer belt was required to be realigned by running the hydraulics and lifting, then realigning, the flashing between the hopper and conveyer belt. The belt would then realign itself.

[013] A further limitation of the device disclosed in Neumann '687 is that it has to be disassembled before being placed on a trailer. The front rollers of the device have to be manually removed, causing time delays for disassembly and reassembly.

[014] The hopper further includes an additional wall which is secured to the hopper on the side opposite the spreader system.

[015] The skid steer attachment disclosed by Neumann '687 has enjoyed a wide market, and experience with the device has led to improvements resulting in a highly resilient and more portable attachment as disclosed herein.

Summary of the Invention

[016] The present invention is a flexible skid steer road widening and shouldering attachment device with an adjustable spreader system which gives the operator precise control over the placement of debris. The flexible skid steer road widening and shouldering attachment device disclosed herein is an improved version of the attachment disclosed by U.S. Pat. No. 7,540,687 (Neumann '687). The present invention is comprised of improved support components, an improved hopper design that optimizes the angle of deflection for debris, design dimensions and reduced sized rollers that eliminate the need for disassembly of the device for transport, a hopper deflection component, and a shortened flap design. Additionally, two tandem casters

are used to more equally distribute the weight of the apparatus reducing the number of casters needed.

[016a] In accordance with another aspect, there is provided a highly resilient skid steer attachment device comprising:

- a hopper having a plurality of walls for receiving debris;

- a conveyer system disposed below the hopper;

- a first spreader system disposed adjacent the conveyer system;

wherein at least one of the plurality of walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyor system.

[016b] In accordance with a further aspect, there is provided a portable skid steer attachment for a skid steer comprised of:

- a support frame;

- a hopper supported by the support frame, the hopper having a plurality of walls for receiving debris at an angle of deflection which minimizes the impact of debris on a conveyer belt;

- a conveyer system disposed below the hopper to receive debris from the hopper;

- a first spreader system comprising a first wall extending at a first angle from the support frame and a second wall extending at a second angle from the first wall, the first spreader system located adjacent the conveyer system and configured to receive debris from the conveyer system;

- a plurality of tandem casters rotatably coupled to the support frame;

- at least one contact roller rotatably coupled to a first end of the support frame;

and

a universal mounting plate coupled at a second end of the support frame and engageable with the skid steer;

wherein at least one of the plurality of walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyor system.

[016c] In accordance with another aspect, there is provided a highly resilient skid steer attachment for a skid steer comprised of:

a hopper supported by a support frame and having four walls for receiving debris at an angle of deflection which minimizes the impact of debris on a conveyor belt;

wherein at least one of said four walls is vertical relative to a horizontal plane;

a conveyor system comprised of the conveyor belt and a pulley;

a spreader system comprising a first wall extending at a first angle from the support frame and a second wall extending at a second angle from the first wall, the second wall being adjustably spaced from the support frame;

a plurality of tandem casters rotatably attached at a first end of said support frame;

at least one contact roller rotatably attached to said first end of said support frame; and

a universal mounting plate attached at a second end of the support frame;

wherein at least one of said four walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyor belt of the conveyor system.

Detailed Description of Invention

[017] For the purpose of promoting an understanding of the present invention, references are made in the text to exemplary embodiments of a flexible skid steer road widening and shouldering attachment device, only some of which are described herein. It should be understood that no limitations on the scope of the invention are intended by describing these exemplary embodiments. One of ordinary skill in the art will readily appreciate that alternate but functionally equivalent components, component placement, materials, and dimensions may be used. The inclusion of additional elements may be deemed readily apparent and obvious to one of ordinary skill in the art. Specific elements disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one of ordinary skill in the art to employ the present invention.

[018] It should be understood that the drawings are not necessarily to scale; instead, emphasis has been placed upon illustrating the principles of the invention. In addition, in the embodiments depicted herein, like reference numerals in the various drawings refer to identical or near identical structural elements.

[019] Moreover, the terms “substantially” or “approximately” as used herein may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related.

[020] FIG. 1 illustrates a front perspective view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200. Attachment device 100 is comprised of support frame 10 adapted to support hopper 20, conveyer system 30, spreader system 40, hydraulic system 50 (not visible) and universal mounting plate 60.

[021] In the embodiment shown, support frame 10 further includes support brackets 15a, 15b which add additional structural support to support frame 10. Support brackets 15a, 15b reinforce support frame 10 preventing universal mounting plate 60 from cracking where welded to support frame 10. Support bracket 15b may also serve as a step to aid the user in climbing into skid steer 200.

[022] In the embodiment shown, support brackets 15a, 15b provide a more equal weight distribution and larger surface area on which to distribute the weight of support frame 10 than a mounting plate alone.

[023] Hopper 20 is comprised of walls 22a, 22b, 22c, 22d angled inward to facilitate the movement of debris (e.g., gravel) onto conveyer system 30 which makes up the bottom of hopper 20. Conveyer system 30 moves debris away from wall 22a of hopper 20 and toward spreader system 40. In the embodiment shown, conveyer system 30 is comprised of conveyer belt 35 and a plurality of rollers that are horizontally aligned beneath the lower opening of hopper 20.

[024] In the embodiment shown, walls 22a, 22b, 22d of hopper 20 are gently angled toward conveyer belt 35 which slows the speed and force at which debris is pushed onto conveyer belt 35 decreasing the chance that the weight of the debris will force conveyer belt 35 off its rollers.

[025] In an exemplary embodiment, wall 22c is substantially vertical relative to conveyer belt 35 (at an approximate 90 degree angle) to facilitate attachment of hopper 20 to support frame 10. Walls 22b, 22a and 22d are all placed at varying angles ranging from 100 to 170 degrees (as measured from a point on a horizontal plane inside hopper 20) to deflect debris onto conveyer belt 35.

[026] FIG. 1 also illustrates vertical drop component 18 which deflects debris from walls 22a, 22b, 22d vertically onto conveyer belt 35, rather than laterally, so as not to cause pressure on the conveyer belt 35 leading to misalignment over time.

[027] In the embodiment shown, conveyer belt 35 further includes a pulley that is at least 2 inches wider than conveyer belt 35 to prevent conveyer belt 35 from moving off the edge of the pulley. This design modification substantially decreases delay resulting from malfunction.

[028] In other embodiments, conveyer system 30 may be replaced with another means for moving debris from hopper 20 out toward spreader system 40. For example, chains may be used to displace debris from hopper 20. Conveyer belt 35 may be any functionally equivalent apparatus known in the art including, but not limited to a chain conveyer, screw conveyer, and any pneumatic, flexible, and vibrating system.

[029] In the embodiment shown, attachment device 100 is approximately 125 inches wide, approximately 97 inches long, and approximately 32 inches high (top of hopper 20). The dimensions of attachment device 100 allow it to be pulled by a pick-up truck or transported by any common-width vehicle, avoiding the need for disassembly or a specialty width vehicle. In addition, attachment device 100 does not require an over-width permit for transportation or operation. In various embodiments, attachment device

100 has a width ranging from 100 inches to 170 inches, a length ranging from 75 inches to 175 inches and a height ranging from 28 inches to 58 inches.

[030] In the embodiment shown, spreader system 40 is extended. Spreader system 40 is comprised of two walls 42a, 42b which are formed at a right angle. When spreader system 40 is extended, conveyer system 30 carries debris out of hopper 20. As skid steer 200 pushes attachment device 100, spreader system 40 spreads the debris dropped into hopper 20 by truck 300 (not shown). In the embodiment shown, spreader system 40 can be extended to disperse debris over widths of 0 to 7 feet. In one embodiment, spreader system 40 can create a shoulder ranging from 0 to 4 feet 6 inches.

[031] In other embodiments, attachment device 100 includes two spreader systems, one located on each side of attachment device 100.

[032] Also visible are casters 75a, 75b which are secured to the bottom of attachment device 100 aiding in the movement and maneuverability of attachment device 100 when shouldering around obstacles (e.g., mailboxes, driveway approaches, street signs, intersections, cul-du-sacs, guard rails). In the embodiment shown, casters 75a, 75b are comprised of steel polyurethane plastic and are solidly constructed (i.e., having no air cavity). It has been demonstrated that this construction is superior in performance to air-filled casters because of the added strength and durability to support the weight.

[033] In the embodiment shown, casters 75a, 75b are attached to a plate on the bottom of the first end of attachment device 100 and protrude no more than 14 inches past the frame of attachment device 100.

[034] In the embodiment shown, attachment device 100 further includes front rollers 80a, 80b which contact the back tires of truck 300 when attachment device 100 is receiving debris from the bed of truck 300.

[035] FIG. 2a illustrates a back perspective view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 with spreader system 40 in a partially open position. Visible is hydraulic system 50 which extends and closes spreader system 40. Hydraulic system 50 is also used to drive conveyer system 30.

[036] Attachment device 100 further includes tie downs 70a, 70b, 70c, 70d (70d not visible) for securing attachment device 100 during transport. In various embodiments, attachment device 100 may include a smaller or greater number of tie-downs in varying locations or similar components which can be used to secure attachment device 100 during transport.

[037] In the embodiment shown, skid steer 200 may be used to lift and tilt hopper 20 to place debris in front of attachment device 100.

[038] FIG. 2b illustrates a back perspective view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 with spreader system 40 extended. The slope of spreader system 40 may be adjusted to create the desired shouldering angle.

[039] FIG. 3 illustrates a back perspective view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 and positioned behind truck 300. Skid steer 200 pushes attachment device 100 against truck 300 as truck 300 moves forward. Truck 300 dumps debris

directly into hopper 20 of attachment device. Conveyer system 30 moves the debris from hopper 20 out to spreader system 40. As attachment device 100 moves, spreader system 40 spreads the debris allowing precise control over the placement of the debris.

[040] In the embodiment shown, truck 300, attachment device 100 and skid steer 200 is capable of dispersing a 20-ton truckload of gravel in minutes resulting in a perfect shoulder.

[041] FIG. 4 is a side view showing spreader system 40 of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 and positioned behind truck 300.

[042] FIG. 5 is a side view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 and positioned behind truck 300.

[043] FIG. 6 is a top view of an exemplary embodiment of flexible skid steer road widening and shouldering attachment device 100 attached to skid steer 200 and positioned behind truck 300.

What is claimed is:

1. A highly resilient skid steer attachment device comprising:
a hopper having a plurality of walls for receiving debris;
a conveyer system disposed below the hopper;
a first spreader system disposed adjacent the conveyer system;
wherein at least one of the plurality of walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyer system.
2. The apparatus of claim 1 wherein at least one of the plurality of walls has a slope of 170 degrees relative to a horizontal plane.
3. The apparatus of claim 1 wherein at least one of the plurality of walls is vertical relative to a horizontal plane.
4. The apparatus of claim 1 wherein the conveyer system comprises a conveyer belt and a pulley, the pulley being at least two inches wider than the conveyer belt.
5. The apparatus of claim 1 wherein the hopper is supported by a support frame, the support frame having a first end and a second end.
6. The apparatus of claim 5 further comprising at least one contact roller rotatably attached to the first end of the support frame.

7. The apparatus of claim 5 further comprising a mounting plate attached to the second end of the support frame, the mounting plate being engageable with a skid steer.

8. The apparatus of claim 1 further comprising an angular adjustment mechanism for adjusting the slope of the first spreader system.

9. The apparatus of claim 5 further comprising a plurality of tandem casters rotatably attached to the support frame.

10. The apparatus of claim 1 further comprising a second spreader system disposed opposite the first spreader system.

11. A portable skid steer attachment for a skid steer comprised of:

a support frame;

a hopper supported by the support frame, the hopper having a plurality of walls for receiving debris at an angle of deflection which minimizes the impact of debris on a conveyer belt;

a conveyer system disposed below the hopper to receive debris from the hopper;

a first spreader system comprising a first wall extending at a first angle from the support frame and a second wall extending at a second angle from the first wall,

the first spreader system located adjacent the conveyer system and configured to receive debris from the conveyer system;

a plurality of tandem casters rotatably coupled to the support frame;

at least one contact roller rotatably coupled to a first end of the support frame; and

a universal mounting plate coupled at a second end of the support frame and engageable with the skid steer;

wherein at least one of the plurality of walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyor system.

12. The apparatus of claim 11 further comprising a second spreader system disposed opposite the first spreader system, the second spread system comprising a first wall extending at a first angle from the support frame and a second wall extending at a second angle from the first wall;

wherein the first and second spreader systems are configured to spread debris delivered from the hopper by the conveyer belt on both sides of the skid steer.

13. A highly resilient skid steer attachment for a skid steer comprised of:

a hopper supported by a support frame and having four walls for receiving debris at an angle of deflection which minimizes the impact of debris on a conveyer belt;

wherein at least one of said four walls is vertical relative to a horizontal plane;

a conveyer system comprised of the conveyer belt and a pulley;

a spreader system comprising a first wall extending at a first angle from the support frame and a second wall extending at a second angle from the first wall, the second wall being adjustably spaced from the support frame;

a plurality of tandem casters rotatably attached at a first end of said support frame;

at least one contact roller rotatably attached to said first end of said support frame; and

a universal mounting plate attached at a second end of the support frame;

wherein at least one of said four walls further includes a vertical deflection component oriented vertically for directing debris downward onto the conveyer belt of the conveyor system.

14. The apparatus of claim 13 which further includes a second spreader system.

15. The apparatus of claim 14 wherein the vertical deflection component extends toward the conveyor system.

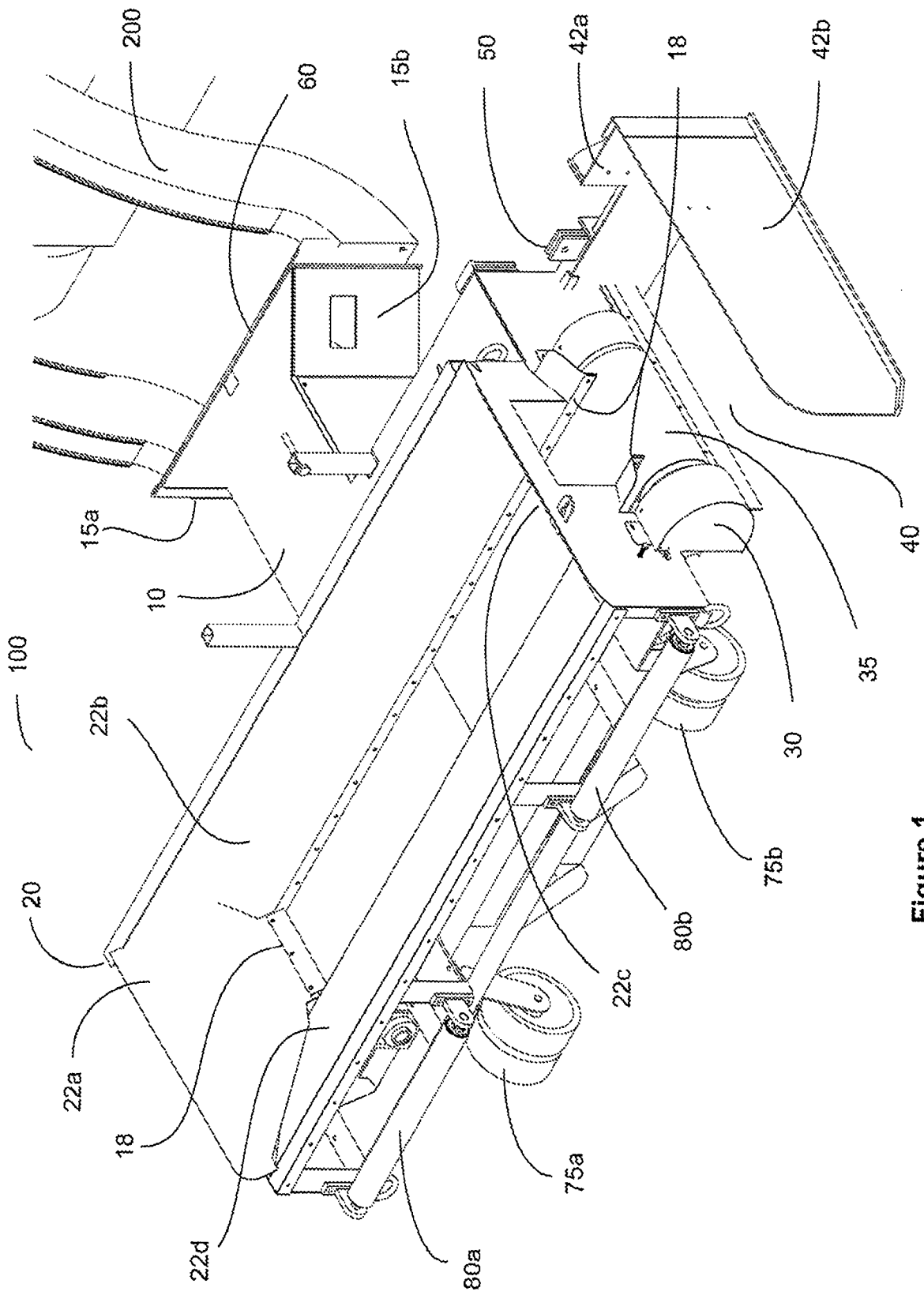


Figure 1

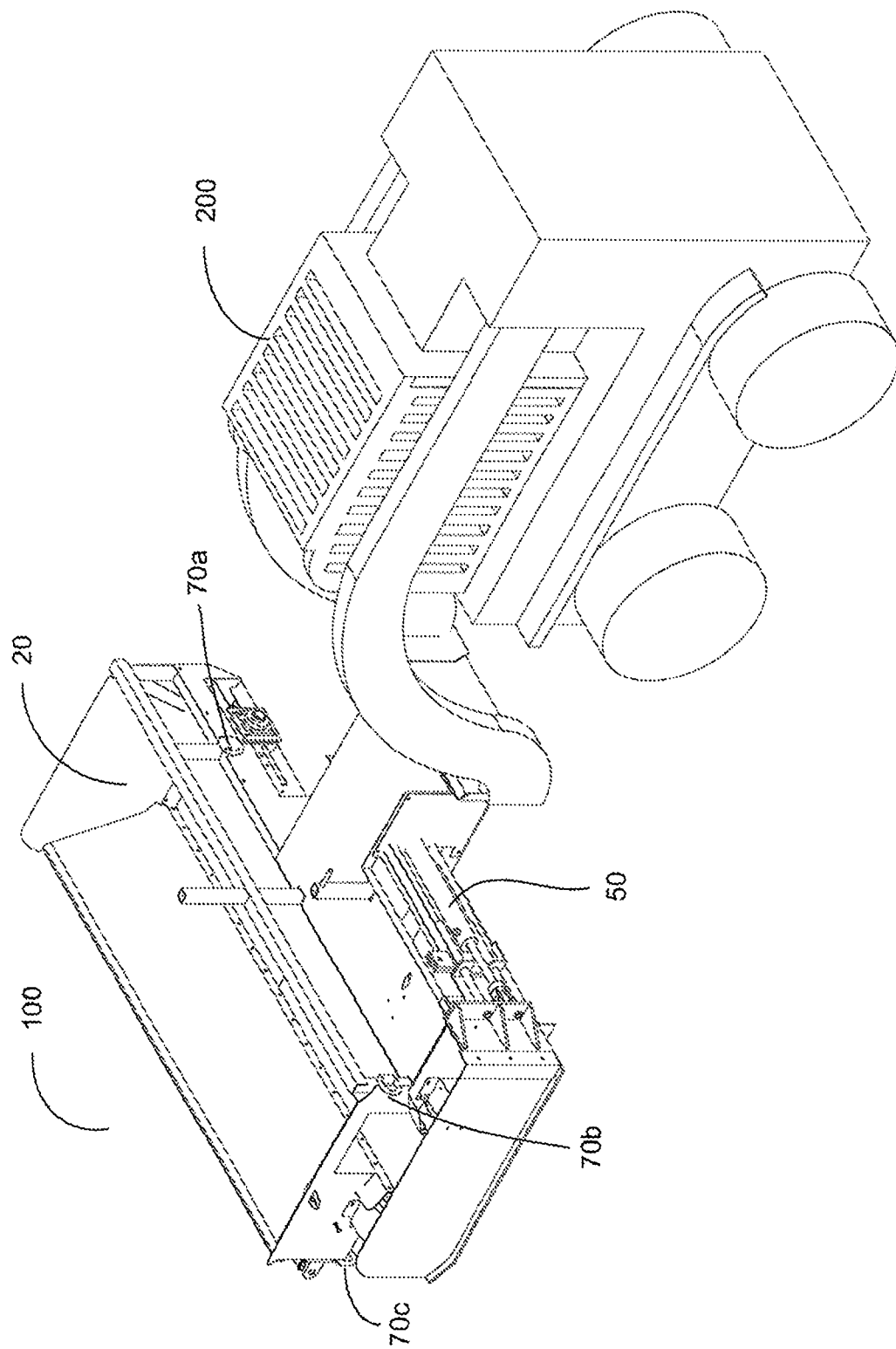


Figure 2a

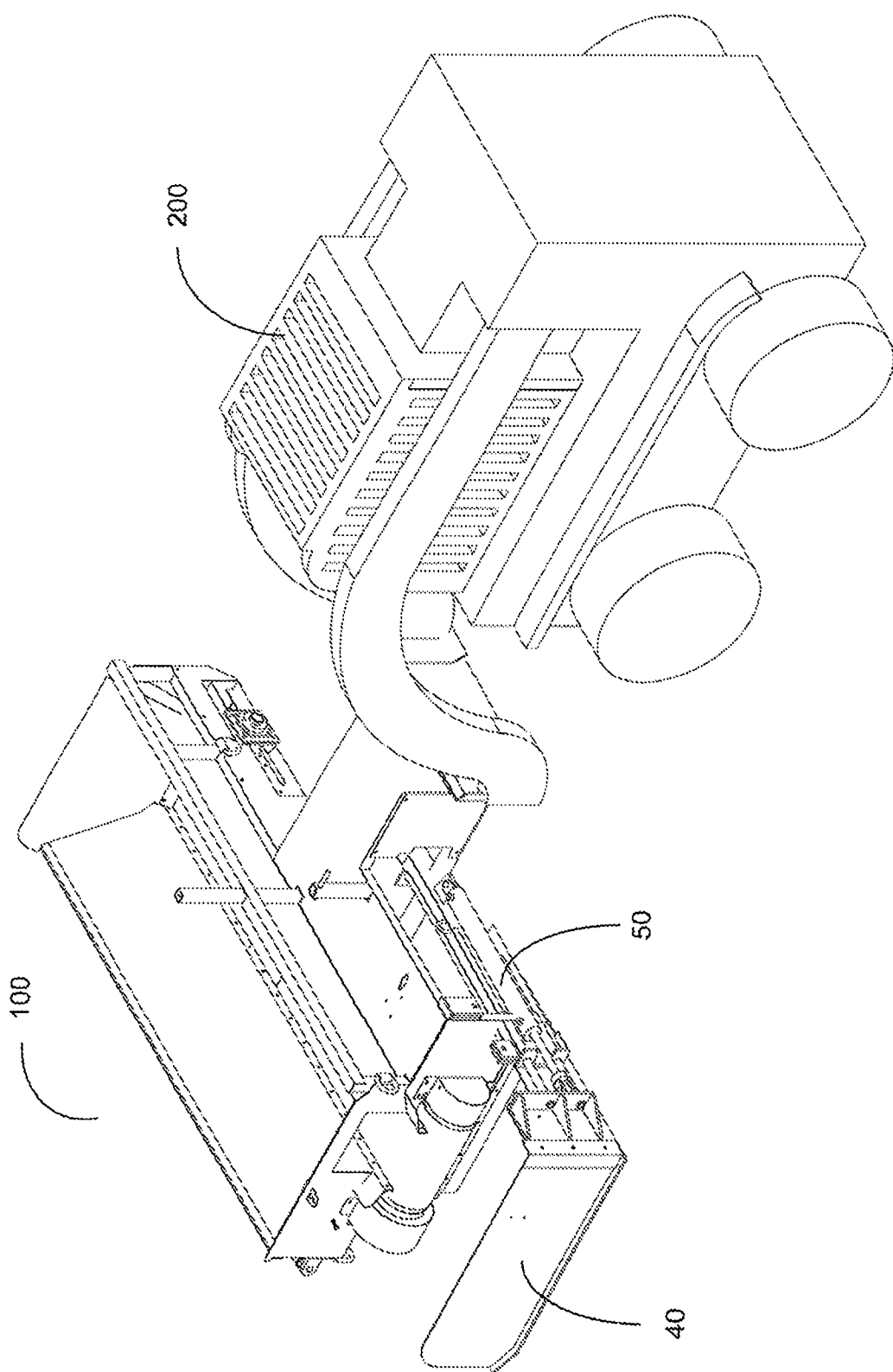


Figure 2b

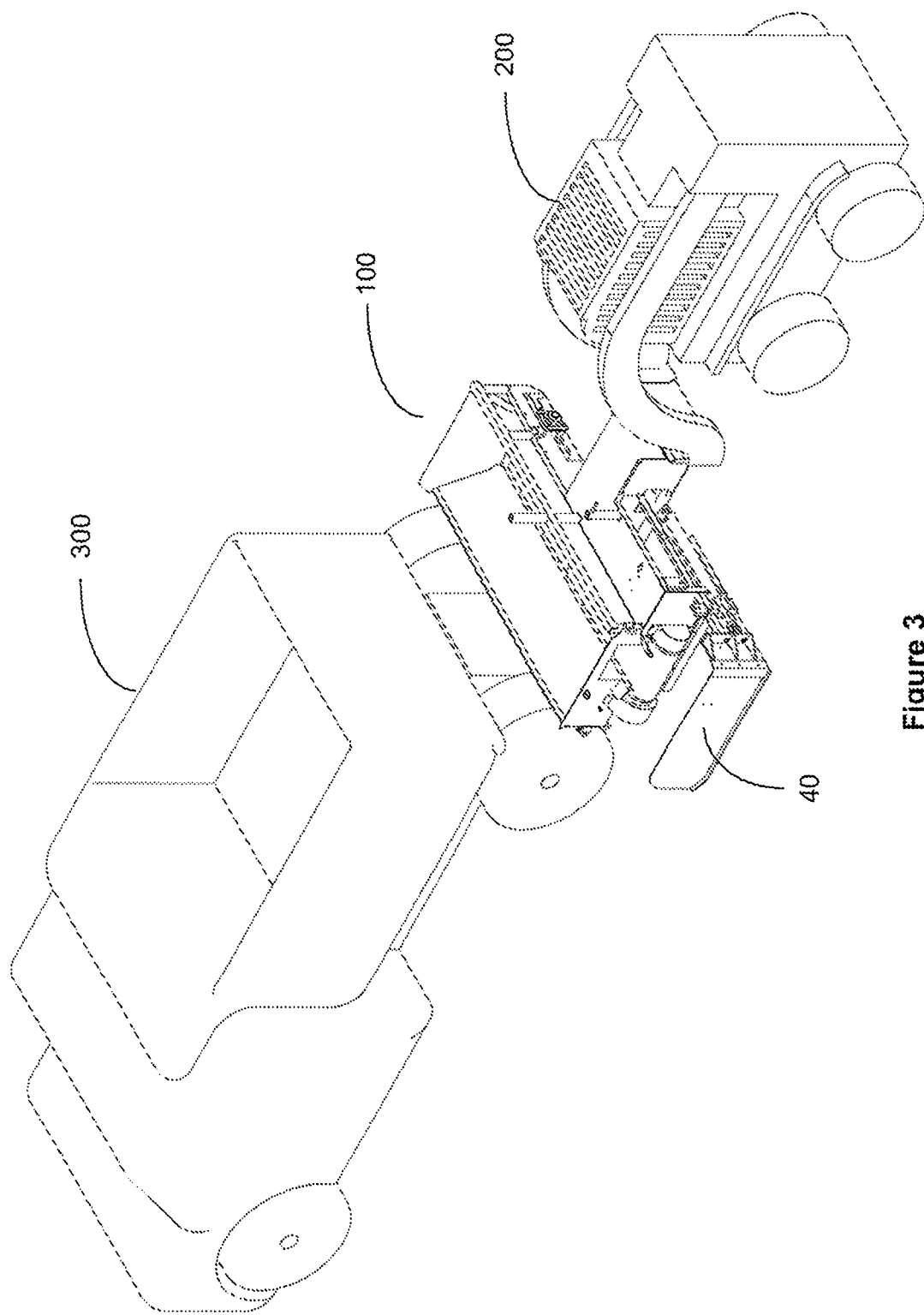


Figure 3

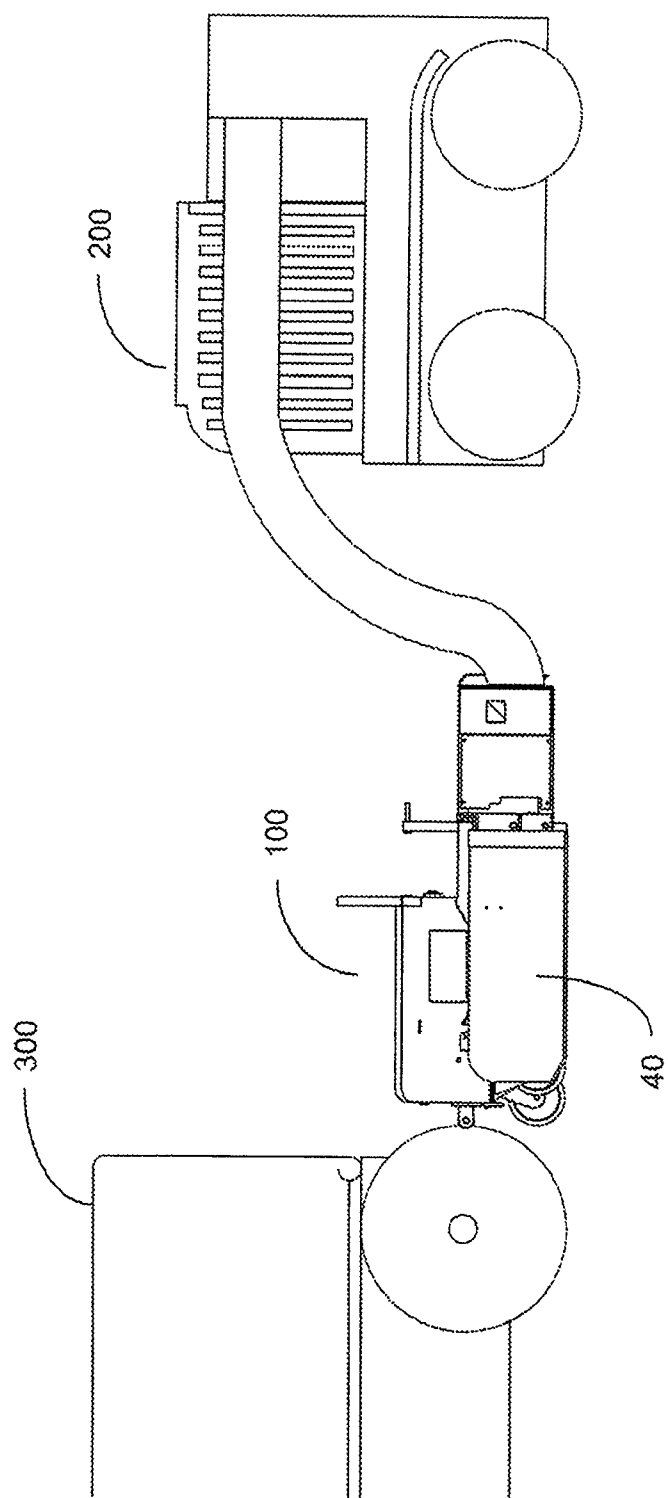


Figure 4

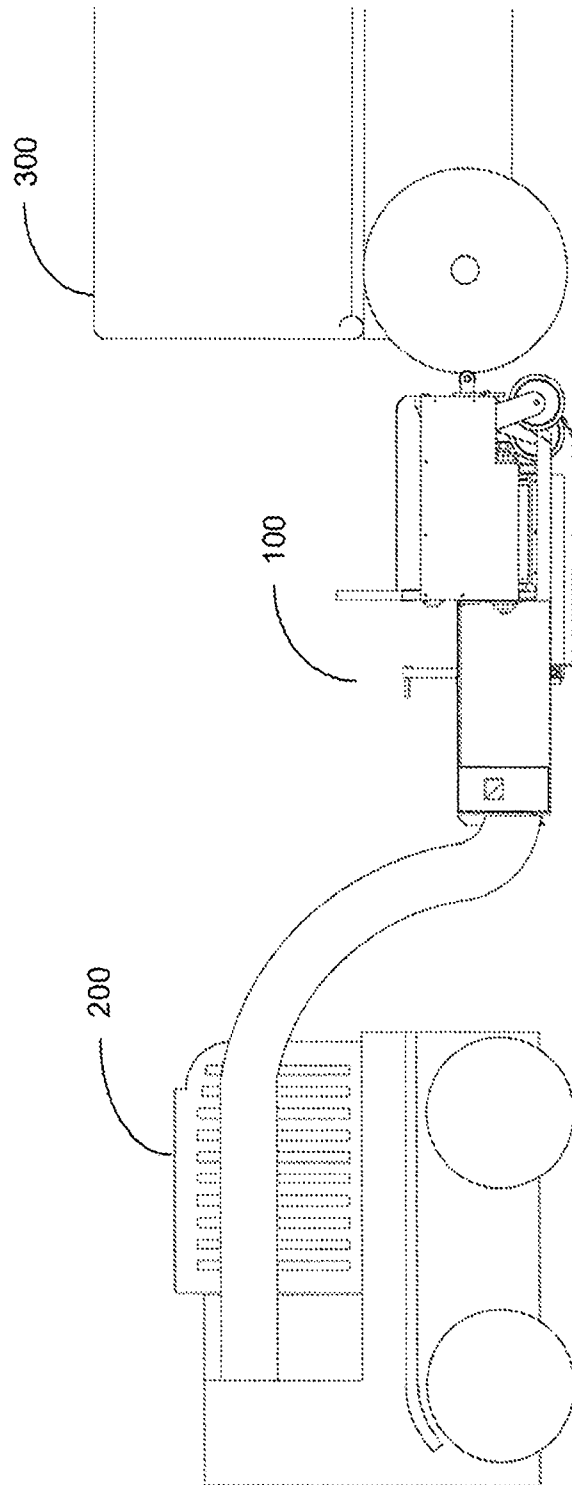


Figure 5

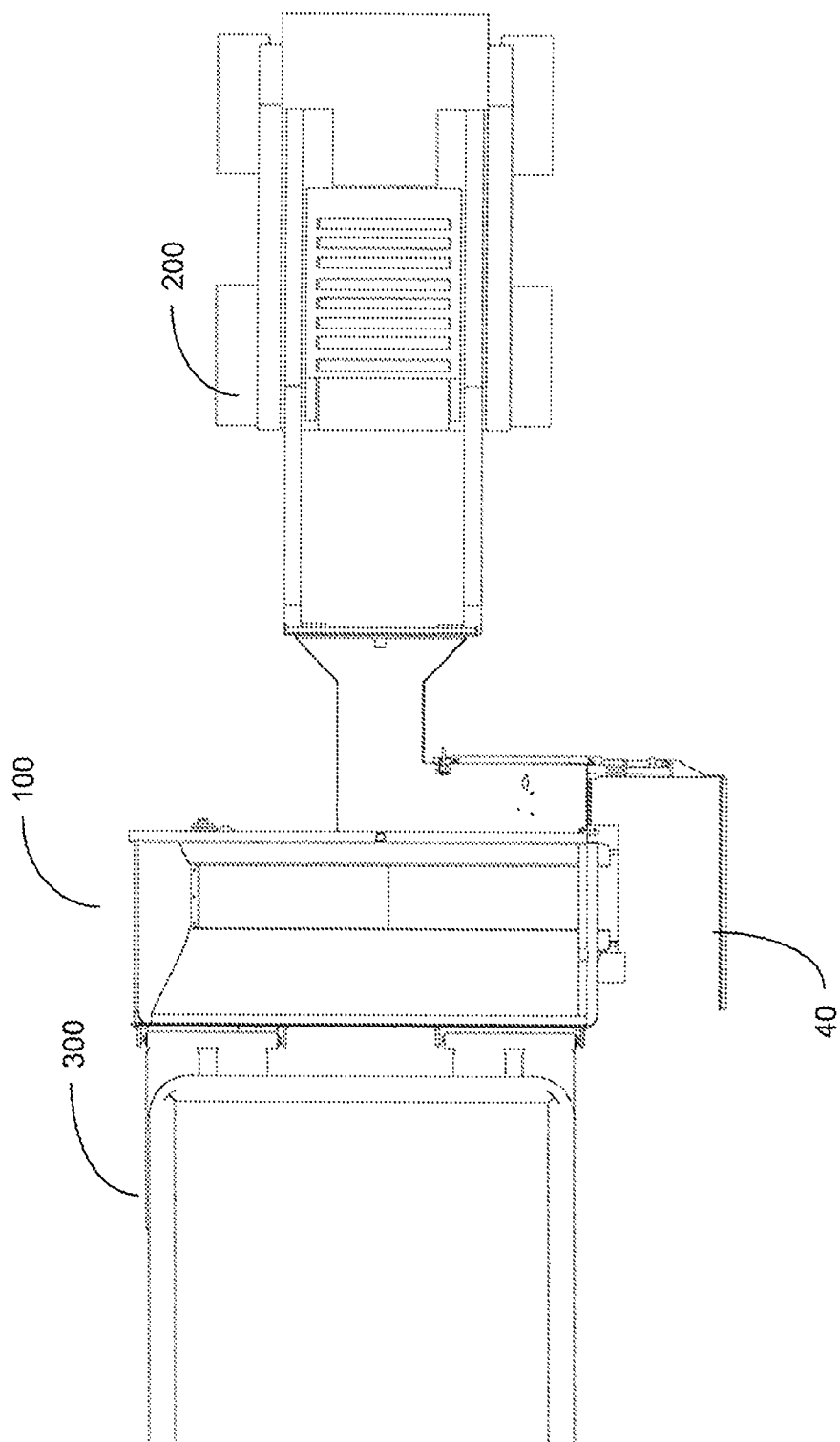


Figure 6

