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United States Patent	12385201
Kind Code	B2
Date of Patent	August 12, 2025
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Power unit with salt spreader and salt spreader for use therewith

Abstract

Skid-steer type power unit engageable with an implement using an attachment assembly including an attachment frame and a hitch. An arcuate frame member is located forwardly of the attachment frame and is engaged therewith in such a way that the frame member pivots about a vertical axis located forwardly of the frame member and generally centrally positioned relative to the attachment frame. The frame member pivots in response to actuation of a hydraulic cylinder. The power unit includes a system for transferring weight of the implement rearwardly onto the power unit. A belt-drive power-take off system on the power unit powers the implement's operation. An underbelly drop spreader is located between the front and rear wheels of the power unit and a brine delivery system distributes brine from nozzles located rearwardly of the rear wheels. A unique control panel permits operation of all systems on the power unit and implement.

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Appl. No.: **17/537817**

Filed: **November 30, 2021**

Prior Publication Data

Document Identifier	Publication Date
US 20220090338 A1	Mar. 24, 2022

Related U.S. Application Data

division parent-doc US 16150784 20181003 US 11214936 child-doc US 17537817

us-provisional-application US 62696161 20180710

Publication Classification

Int. Cl.: **A01B59/06** (20060101); **A01B61/02** (20060101); **B60K17/28** (20060101); **B60K25/02** (20060101); **E01C19/20** (20060101); **E01H3/02** (20060101); **E01H5/04** (20060101); **E01H5/09** (20060101); **E01H10/00** (20060101); **E02F3/36** (20060101)

U.S. Cl.:

CPC **E01H5/045** (20130101); **A01B59/062** (20130101); **A01B61/02** (20130101); **B60K17/28** (20130101); **B60K25/02** (20130101); **E01C19/20** (20130101); **E01H3/02** (20130101); **E01H5/092** (20130101); **E01H10/007** (20130101); **E02F3/3663** (20130101); **E02F3/3672** (20130101); B60K2025/022 (20130101); E01H5/098 (20130101)

Field of Classification Search

CPC: A01B (59/062); A01B (61/02); E01H (5/045); E01H (5/092)

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) This application is a Divisional of U.S. patent application Ser. No. 16/150,784 filed Oct. 3, 2018, which application claims the benefit of U.S. Provisional Application Ser. No. 62/696,161, filed Jul. 10, 2018, the disclosures of which is incorporated herein by reference.

TECHNICAL FIELD
(1) The present disclosure generally relates to vehicles. More particularly, the present disclosure is directed to a skid steer style vehicle having one or more implements mounted thereon. Specifically, the present disclosure relates to a vehicle with a belt-drive power transfer system, that includes a novel attachment assembly for at least one snow and/or ice removal implement, and that has a novel control system.
BACKGROUND INFORMATION
(2) A large number of snow removal devices are currently on the market. These removal devices range from hand-held shovels, through to small household-sized snowblowers, and on to large snowplows and salting and sanding vehicles used to clear city streets and large areas such as airport runways.
(3) There exists a need for intermediate-sized snow tools capable of handling largescale snow and ice removal in small areas but only a few suitable vehicles for this purpose have been proposed in the past. So-called “walking universities” and large business campuses have miles of sidewalks and paved walkways that need to be cleared of snow and ice quickly and efficiently. However many of the areas that need to be cleared offer very little space to maneuver vehicles that are of a size that would typically be used to remove large quantities of snow and ice. A skid steer is a machine that uses two pairs of tires that are operated independently. A difference in speed between the two pairs of tires is what allows the unit to turn left and right. The tires can sometimes be replaced with tracks. Skid steers are often large units that have a cab and an operator seat. However there are smaller stand-on and walk-behind units available. Control is provided by two levers that control the speeds of the two pairs of tires independently, with another lever or levers controlling the main functionality. Often the main function is a set of lifting arms with a bucket; however, there are skid steers that have snow blade and snow blower options available.
(4) Stand-on skid steers have been created by a number of companies. Some of these stand-on skid steers are designed for snow removal, with an attached blade, a snow scoop, or a snow blower. There are additionally other known skid steer type vehicles that are utilized for winder services.
(5) PRIOR ART snow removal machines that are currently on the market tend to only have one attachment or they do not have an efficient system for changing attachments. Switching between two attachments in less than sixty seconds, such as is possible with the power unit disclosed herein, enables operators more options when clearing snow. The operators are therefore more likely to choose to use an attachment appropriate to a particular situation. For example, plowing snow works well when there is a large amount of snow but is inefficient and difficult when there are smaller

amounts of snow. So when there are large amounts of snow, an operator may select to engage a snowplow blade. When there are small amounts of snow, a rotating snow broom may be engaged with the power unit.

(6) Previously known hydraulic Power Take-Off (PTO) systems are bulky, get hot, and suffer from losses in the system. In addition, repairing problems that occur within these PRIOR ART hydraulic systems is costly in both money and manpower. The power unit in accordance with the present disclosure, on the other hand, includes a belt-drive PTO. The belt-driven PTO allows for a more efficient power transfer between the power unit and any attachments engaged therewith. The belt-drive PTO may also reduce the cost and time commitment for the owner of the power unit in repairs. The belt-drive PTO was developed in order to harness the power of the engine on the power unit without bulky and costly hydraulics. The PTO on the power unit also helps to maximize power transfer efficiency.

(7) PRIOR ART snow and ice removal equipment typically use rotating broadcast spreaders to spread salt or ice-melting materials. Broadcast spreaders are inaccurate and can distribute salt in locations where salt is not required or desired. If, for example, a sidewalk to be cleared runs adjacent a flowerbed, a broadcast spreader may inadvertently distribute some of the salt onto the flowerbed and thereby change the acidity or alkalinity of the soil.

(8) In PRIOR ART machines, brine systems are typically provided with nozzles located proximate a front end of the PRIOR ART machines. This arrangement causes the PRIOR ART machine to drive through the recently laid-down brine. The brine then tends to be thrown back onto the PRIOR ART machine, reducing its effective life span. Driving through the brine also causes some of the brine to be displaced from its intended position on the sidewalk or other surface being cleared of snow or ice, thus reducing the effectiveness of treating the surface with brine.

SUMMARY

(9) While a number of snow removal and snow treatment vehicles have been proposed in the prior art, there remains a need for an effective solution to treat snow and ice-covered walkways in a safe, fast, and efficient manner. The apparatus and method disclosed herein addresses this need. Provided herein is skid steer style snow and ice removal vehicle that may treat a large area of real estate while maintaining maneuverability and effectiveness in tight spaces, such as on sidewalks.

(10) A skid-steer type power unit is disclosed herein that is engageable with an implement using an attachment assembly including an attachment frame and a hitch. An arcuate frame member is located forwardly of the attachment frame and is engaged therewith in such a way that the frame member pivots about a vertical axis located forwardly of the frame member and generally centrally positioned relative to the attachment frame. The frame member pivots in response to actuation of a hydraulic cylinder. The power unit includes a system for transferring weight of the implement rearwardly onto the power unit. A belt-drive power-take off system on the power unit powers the implement's operation. An underbelly drop spreader is located between the front and rear wheels of the power unit and a brine delivery system distributes brine from nozzles located rearwardly of the rear wheels. A unique control panel permits operation of all systems on the power unit and implement.

(11) The power unit disclosed herein may be an articulating tractor that is capable of quickly swapping between multiple different attachments. Everything from a mower deck to a snow blower may be changed in less than sixty seconds when the power unit is under the control of a skilled operator. The changing of the attachments does not require the use of any tools.

(12) The power unit disclosed herein has a tight turning radius and, in some examples, may have a turning radius that may approximate a zero turn radius. The power unit is capable of sustained sidewalk use without the need to have a driveway or larger area to turn around in. A tight turning radius, particularly a zero turn radius may permit the power unit to plow snow without having to resort to time costly “Y” turning patterns.

(13) The power unit in accordance with the present disclosure is a stand-on unit and because of

this, there is a chance that the operator might be thrown off balance by the machine. If this happens, it would be easy for the operator to reflexively grab onto one of the control levers to try and stabilize themselves. This would cause the machine to move in an unexpected way, endangering both the operator and those around the machine. To address this, the power unit disclosed herein is provided with grab handles on the control panel. Additionally, the power unit is provided with a safety kill-switch on the operator platform. If the operator leaves the operator platform when the power unit's engine is running, the safety kill-switch will stop the engine and the operation of any attachments engaged with the power unit.

(14) The power unit in accordance with the present disclosure offers operators an opportunity to run the machine one handed while manipulating the attachment that is engaged with the machine. This one-handed operation is made possible through the provision of an ergonomically designed control panel.

(15) The power unit in accordance with the present disclosure also provide an underbelly salt spreader. The power unit in accordance with the present disclosure uses a different style of salt spreader, namely, a drop spreader. This drop spreader can be mounted between the front and rear wheels of the power unit and in a location that is close to the ground. The drop spreader on the power unit only places salt where the operator wishes to place salt. This enables the power unit to function in such a way that it is unlikely to kill grass on nearby lawns or lay down unnecessarily high quantities of salt.

(16) The power unit in accordance with the present invention may include a brine system that is mounted proximate a front end of the machine but the nozzles for distributing that brine may be located proximate a rear end of the power unit. As a consequence, brine does not splash up onto the power unit, reducing the power unit's life. Furthermore, the brine gets laid down by the power unit on the surface that requires treatment and the power unit moving forwardly of the surface does not affect the treatment of the surface with brine since the brine is sprayed rearwardly of the rear wheels of the device.

(17) In one aspect, the present disclosure may provide a power unit comprising a powered vehicle that has differential steering; an attachment engageable with the powered vehicle; said attachment being adapted to perform a task as the powered vehicle travels over a surface; and a belt-drive power take-off system provided to transfer power from the powered vehicle to the attachment. The belt-drive power take-off system comprises a first belt-drive system provided on the powered vehicle; said first belt-drive system including a first drive belt; and a second belt-drive system provided on the attachment; said second belt-drive system including a second drive belt; and an overlap formed between the first belt-drive system and the second belt-drive system and wherein power from the first belt-drive system is transferred to the second belt-drive system at the overlap.

(18) A connector mechanism may be provided in the one region where the first belt-drive system overlaps the second belt-drive system; and wherein each of the first drive belt and the second drive belt engage the connector mechanism. The connector mechanism may be a double pulley mounted to a frame of the powered vehicle and includes a first groove and a second groove; and wherein the first drive belt is received in the first groove and the second drive belt is received in the second groove.

(19) In another aspect, the present disclosure may provide a method of transferring power from a power unit to an attachment engaged therewith; said method comprising engaging an attachment for performing a task with a power unit that is adapted to travel across a surface, wherein the power unit comprises a powered vehicle that has differential steering; moving a first drive belt along a first belt path on the power unit; overlapping the first belt path with a second belt path, where the second belt path is located partially on the power unit and partially on the attachment; transferring power from the first drive belt as it moves along the first belt path to a second drive belt on the second belt path; moving the second drive belt along the second belt path; and powering the attachment with the power transferred to the second drive belt. The method further comprises

installing the second drive belt on the second belt path after engagement of the attachment with the power unit; and removing the second drive belt from the second belt path prior to removal of the attachment from the power unit. The method further comprises applying tension to at least one of the first drive belt and the second drive belt prior to operating the attachment. The method further comprises operating the attachment to clear a surface over which the power unit travels of snow and/or ice.

(20) In another aspect, the present disclosure may provide a method of transferring power from a power unit to an attachment engaged with the power unit; said method comprising receiving a first drive belt of a first belt-drive system provided on a power unit in a first groove of a double pulley; engaging an attachment to the power unit, wherein the power unit is a powered vehicle having differential steering; receiving a second drive belt of a second belt-drive system provided at least partially on the attachment in a second groove of the double pulley; moving the first drive belt around the double pulley; causing rotation of the double pulley through movement of the first drive belt; causing movement of the second drive belt through the rotation of the double pulley; rotating an attachment pulley provided on the attachment with the second drive belt; and powering the attachment through the rotation of the attachment pulley. The powering includes one or both of powering a pump provided on the attachment and powering a motor provided on the attachment.

(21) In another aspect, the present disclosure may provide a power unit comprising a powered vehicle having differential steering; wherein the powered vehicle has a frame having a front end, a rear end, a left side and a right side; a pair of front wheels mounted proximate the front end of the frame; a pair of rear wheels mounted proximate the rear end of the frame; a spreader for particulate materials provided on the frame at a location between the pair of front wheels and the pair of rear wheels; and wherein the spreader includes an opening that is located proximate a bottom surface of the frame. The spreader may be a drop spreader. The frame of the power unit has a longitudinal axis that extends between the front end and the rear end thereof; and the spreader is oriented at an angle to the longitudinal axis. The spreader may be oriented at right angles to the longitudinal axis.

(22) In another aspect, the present disclosure may provide a method of treating a surface to clear snow and ice therefrom; said method comprising engaging one or both of a spreader and a brine tank on a power unit that has a frame upon which a pair of front wheels and a pair of rear wheels are mounted; and selecting to operate one of the spreader and the brine tank to treat a surface over which the power unit travels. The method may further comprise providing differential steering on the power unit. The step of engaging includes engaging the spreader on the power unit; and positioning the spreader on a frame of the power unit and in a location between the pair of front wheels and the pair of rear wheels. The method may further comprise positioning an opening defined in a bottom end of the spreader adjacent an aperture defined in a bottom surface of the frame; actuating the spreader; dropping particulate materials from the opening in the spreader, through the aperture in the frame and directly onto a surface over which the power unit is traveling. The method further comprises loading a quantity of particulate materials into an interior cavity of the spreader through an opening defined in a portion of a top of the spreader; where the portion of the top extends outwardly for a distance beyond a left side or a right side of the frame of the power unit. In another aspect, the method may further comprise dropping the particulate materials onto a region of the surface that lays in front of the pair of rear wheels before the power unit travels over the region of the surface. The method further comprises detachably engaging the spreader with the power unit. The method according to another aspect comprises selecting to engage the spreader with the power unit; removing a section of a side wall of the frame of the power unit from the frame; inserting the spreader into a hole in the side wall defined by removal of the section of the side wall; positioning the spreader transversely relative to a longitudinal axis of the frame, where the longitudinal axis extends between a front end and a rear end of the frame; and securing the spreader to the side wall of the frame that surrounds the opening.

(23) The method further comprises operatively engaging the spreader with controls on a control

panel of the power unit; and operating the spreader's functions with the controls on the control panel. The method further includes loading particulate materials into an interior chamber of the spreader; and lowering a center of gravity of the power unit when the particulate materials are loaded into the interior chamber of the spreader. In other aspects, the method comprises mounting the brine tank on the frame of the power unit; delivering a quantity of brine from the brine tank to one or more nozzles located on the frame rearwardly of the pair of rear wheels; and spraying brine through the one or more nozzles and onto a region of a surface over which the power unit has already traveled. Still further, the method includes selecting a width of spray to be delivered from the one or more nozzles based upon a width of the surface over which the power unit is to travel. The method may further comprise operatively engaging a hand-sprayer to the brine tank; and spraying a quantity of brine from the brine tank onto a surface with the hand-sprayer.

(24) In another aspect, the present disclosure may provide an assembly for engaging a powered vehicle and an implement together, said assembly comprising a hitch adapted to be provided at a front end of a powered vehicle; an attachment assembly adapted to be provided on a rear end of an implement for performing a task; said attachment assembly being selectively engageable with the hitch to secure the implement to the power unit; wherein the attachment assembly defines a vertical axis that is located centrally and forwardly of the hitch; and wherein the attachment assembly is adapted to permit the implement to rotate about the vertical axis during operation of the implement.

(25) In another aspect, the present disclosure may provide a method of connecting an implement to a powered vehicle and operating the implement comprising steps of aligning a hitch mounted on a forward end of the powered vehicle with an attachment assembly provided on a rear end of the implement; driving the powered vehicle forward and causing the hitch to engage with the attachment assembly; and pivoting the implement about a centrally located, vertically oriented axis that is provided on the attachment assembly a distance longitudinally forward of the hitch. The method may include providing the hitch on a powered vehicle that has differential steering. The aligning of the hitch comprises aligning a first latch on the hitch with a first slot defined in an upper hitch plate provided on the attachment assembly and aligning a second latch with a second slot defined in a second upper hitch plate provided on the attachment assembly; driving the powered vehicle forward towards the implement; and causing the first latch to engage in the first slot and causing the second latch to engage in the second slot. The aligning of the hitch with the attachment assembly occurs while the implement rests on a ground surface.

(26) The method further includes raising the hitch away from the ground surface; lifting the implement upwardly from the ground surface; causing a first lower hitch plate on the attachment assembly to align with a first latch on the hitch; and causing a second lower hitch plate on the attachment assembly to align with a second latch plate on the hitch. The method further includes rotating of an attachment latch handle on the hitch from an open position to a closed position thereby locking the first latch in the first lower hitch plate and the second latch in the second lower hitch plate. The method further includes locking the attachment latch handle in the closed position with a handle lock.

(27) In other aspects, the present disclosure may provide a method that further includes engaging a mounting attachment plate to a housing of the implement; engaging a first end of a support member with a central region of the mounting attachment plate using a first connector; engaging a second end of the support member with the attachment assembly using a second connector; engaging a first end of a hydraulic cylinder and piston to a second end of the mounting attachment plate with a third connector; engaging a second end of the hydraulic cylinder and piston to the attachment assembly using a forth connector. The method further comprises pivotally engaging an arcuate frame member with the attachment assembly; operatively engaging the arcuate frame member with the housing; actuating the hydraulic cylinder and piston to rotate the mounting attachment plate and thereby the housing relative to the attachment assembly; and pivoting the arcuate frame member about the centrally located, vertically oriented axis defined along the first connector.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

(1) A sample embodiment of the disclosure is set forth in the following description, is shown in the drawings and is particularly and distinctly pointed out and set forth in the appended claims. The accompanying drawings, which are fully incorporated herein and constitute a part of the specification, illustrate various examples, methods, and other example embodiments of various aspects of the disclosure. One of ordinary skill in the art will appreciate that in some examples one element may be designed as multiple elements or that multiple elements may be designed as one element. In some examples, an element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

(2) FIG. **1** is a left side elevation view of a power unit in accordance with an aspect of the present disclosure;

(3) FIG. **2** is a top plan view of a frame of the power unit taken along line **2**-**2** of FIG. **1**;

(4) FIG. **3**A is a top plan view of a control panel of the power unit taken along line **3**A-**3**A of FIG. **1**, showing the control panel on its own and illustrated from the perspective of an operator standing on the platform of the power unit;

(5) FIG. **3**B is a front, isometric, perspective view of the control panel of FIG. **3** shown on its own;

(6) FIG. **3**C is a top, left, isometric perspective view of the control panel shown on its own and in in first operational position;

(7) FIG. **3**D is top, left, isometric, perspective view of the control panel shown on its own and in a second operational position;

(8) FIG. **4** is a partial, enlarged left side elevation view of a front end of the power unit of FIG. **1**, showing an attachment assembly in accordance with an aspect of the present disclosure;

(9) FIG. **5** is a top plan view of the attachment assembly in a neutral position;

(10) FIG. **6** is a bottom plan view of the attachment assembly;

(11) FIG. **7** is a front left perspective view of a hitch of the attachment assembly of FIG. **4** shown on its own.

(12) FIG. **8** is a right side elevation view of the attachment assembly shown in FIG. **4**;

(13) FIG. **9** is an enlarged left side elevation view of a weight transfer mechanism taken along line **9**-**9** of FIG. **5**;

(14) FIG. **10** is a top plan view of the weight transfer mechanism taken along line **10**-**10** of FIG. **9**;

(15) FIG. **11** is a rear left perspective view of an attachment frame of the attachment assembly shown on its own;

(16) FIG. **12** is a top plan view of the attachment frame with the upper plates thereof removed and cutting through the bolts;

(17) FIG. **13** is a cross-sectional view of a portion of the pivot mechanism taken along the line **13**-**13** of FIG. **12**;

(18) FIG. **14** is a top plan view of the attachment assembly pivoting the implement in a counter-clockwise direction during use; and

(19) FIG. **15** is top plan view of the attachment assembly pivoting the implement in a clockwise direction during use.

(20) FIG. **16** is an enlarged longitudinal cross-sectional view of a portion of the attachment assembly and the power unit showing the power take off system;

(21) FIG. **17**A is a cross-section of the attachment assembly taken along line **17**-**17**A of FIG. **5**;

(22) FIG. **17**B is a similar view of the attachment assembly as that shown in FIG. **17**A showing the attachment latch handle being pulled back into a position where an operator is just beginning to remove the implement engaged with the power unit;

(23) FIG. **17**C is a similar view of the attachment assembly as that shown in FIG. **17**B showing a lower region of the implement rotating out of the hitch;
(24) FIG. **17**D is a similar view of the attachment assembly as that shown in FIG. **17**C showing the implement being lifted off the hitch;
(25) FIG. **18**A is a left side elevation view of the attachment assembly showing a different implement being positioned for engagement with the attachment assembly;
(26) FIG. **18**B is a left side elevation view showing the attachment engaging the different implement;
(27) FIG. **19** is a partial, enlarged left side elevation view of power unit showing the location of the particulate material spreader system in accordance with an aspect of the present disclosure;
(28) FIG. **20** is a top plan view of the frame similar to FIG. **2**, with the left front fender removed and showing the location of the particulate material spreader on the power unit frame; and
(29) FIG. **21** is a partial, enlarged left side elevation view of the power unit showing the particulate material spreader system exploded away from the power unit.
(30) Similar numbers refer to similar parts throughout the drawings.

DETAILED DESCRIPTION

(31) A power unit in accordance with the present disclosure is illustrated in FIGS. **1**-**21** and is generally indicated herein by the reference number **10**. Power unit **10** is shown and described herein as a powered vehicle that has differential steering. One example of such a powered vehicle is a skid steer-style vehicle that may carry and operate various attachments and implements. Examples of suitable skid steer style vehicles that may be used as power unit **10** are those sold under the name BOBCAT® by The Bobcat Company of North Dakota, USA or those sold under the name JOHN DEERE® by Deere & Company of Illinois, USA.
(32) Power unit **10** has a front **10***a* and a rear **10***b* defining a longitudinal direction therebetween. Power unit **10** further includes a left side **10***c* (FIG. **2**) and a right side **10***d* defining a transverse direction therebetween. Power unit **10** includes a longitudinal axis “Y” (FIG. **2**) extending between front **10***a* and rear **10***b* and a traverse axis “X” extending between left side **10***c* and right side **10***c*. Transverse axis “X” is oriented at 74° relative to longitudinal axis “Y”.
(33) During operation, power unit **10** will typically travel in a forward direction indicated by the arrow “A” (FIGS. **1** & **2**) that is generally parallel to longitudinal axis “Y”. When power unit **10** moves in the forward direction “A”, the front **10***a* comprises the leading end of power unit **10**. (In some instances, power unit **10** may need to reverse, in which case the direction of travel will be opposite to the direction indicated by arrow “A”, and then rear **10***b* will comprise the leading end of the power unit **10**.)
(34) Power unit **10** includes a tractor frame **12** upon which four wheels **14***a*, **14***b* are mounted so that power unit **10** may be driven across a surface “S” (FIG. **1**). Tractor frame **12** may include a generally rectangular-shaped box that has an upper mounting platform **12***a* that is spaced vertically above a lower plate. A portion of lower plate **12***b* is shown in FIG. **2** through an aperture **12***c* defined in upper mounting platform **12***a*. Lower plate **12***b* defines an opening **12***d*. The purpose of opening **12***d* will be later described herein. Tractor frame **12** further includes sides **12***e* (FIG. **21**) that extend between upper mounting platform **12***a* and lower plate **12***b*. One or both sides **12***e* may define a hole **12***f* therein. Hole **12***f* may originally be closed over with a metal plate. The metal plate may be selectively removed to permit access through hole **12***f*, as will be described later herein. It will be understood that tractor frame **12** includes many other component plates and flanges that are not illustrated in the figures. Yet other components and plates of tractor frame **12** may be illustrated but these will then simply be identified in the various figures by the reference number “12” to indicate that they form part of the tractor frame **12**.
(35) Power unit **10** includes a pair of laterally spaced apart front wheels **14***a* and a pair of laterally spaced apart rear wheels **14***b*. Front wheels **14***a* and rear wheels **14***b* are mounted on frame **12** in such a way that they have a fixed orientation relative to frame **12**. In other words, while wheels

14*a*, **14***b* are individually rotatable about a horizontally oriented axis, wheels **14***a*, **14***b* are not able to pivot to the left or to the right relative to the frame. Power unit **10** is steered by applying more or less drive torque to wheels **14***a*, **14***b* on the left side of power unit **10** relative to the drive torque applied to the wheels **14***a*, **14***b* on the right side of power unit **10**. In other words, power unit **10** is a powered vehicle that has differential steering.

(36) Although shown and discussed as having wheels **14***a*, **14***b* and being of a skid steer style, it will be understood that power unit **10** may, instead, be any of a number of different driven vehicles, including but not limited to, a tracked vehicle, a skid steer, a tractor, an all-terrain vehicle, a zero-turn vehicle, or any other similar type of gasoline-powered, electrically-powered or otherwise powered and driven device. For simplicity, the present description will be directed to the skid steer styled vehicle shown in the attached figures but it will be understood that the aspects of the present disclosure could be used on any other similar vehicle.

(37) A pair of front fenders **16***a* and a pair of rear fenders **16***b* are mounted to tractor frame **12** in such a way as to cover a portion of the associated wheel **14***a*, **14***b*. Fenders **16***a*, **16***b* are provided to shield various components of power unit **10** as well as the operator of the power unit. Fenders **16***a*, **16***b* aid in preventing debris from being thrown up from wheels **14***a*, **14***b* during operation of power unit. Front and rear fenders **16***a*, **16***b* may also serve as mounting points for accessories and equipment as discussed further herein.

(38) Power unit **10**, as illustrated, is a stand-on machine. Typically, an operator will be positioned proximate rear **10***b* of power unit **10** and the attachments and implements will be located forward of the operator. An operator platform **18** (FIGS. **1** & **2**) may be mounted on tractor frame **12** and extend rearwardly therefrom proximate rear **10***b* of power unit **10**. Operator platform **18** is configured so that the operator will stand on platform **18**. It will be understood that in vehicles other than the skid steer style power unit **10**, the operator may be seated on a seat instead of standing on a platform. In those instances, the seat for the operator may be located somewhere between front **10***a* and rear **10***b* of power unit **10**.

(39) A safety kill-switch or deadman's switch **20** (FIG. **2**) may be provided on operator platform **18**. Switch **20** will detect when an operator is standing on the operator platform **18** and prevents power unit **10** from being put into drive without an operator standing on the operator platform **18**. Switch **20** also acts as a safety if the power unit's controls become stuck in a forward position (i.e., driving the power unit **10** over the surface “S” or operating an attachment engaged with power unit **10**). Switch **20** also shuts off a Power Take-Off (PTO) provided on power unit **10** if the operator leaves the operator platform **18** for any reason. This PTO will be later described herein. Switch **20** also eliminates access to the PTO while the PTO is turned on, thereby providing another level of safety for the operator. Switch **20** will cut power to power unit **10** if the operator leaves operator platform **18** while the engine **26** is running. If the operator, for example, forgot to turn off the machine off and steps off the platform **18** or if the operator falls off the platform **18**, the kill switch **20** will switch off engine **26** and the power unit **10** will stop moving over the surface “S”. Furthermore, attachments engaged with power unit **10** will stop functioning. For example, a rotating brush mounted on power unit **10**, will cease rotating.

(40) A plurality of component parts of power unit **10** may be operatively engaged or mounted on frame **12**. It will be understood that the attached figures and the following description is not exhaustive and, while describing some components and systems in detail, this document also only identifies other components and systems in passing. With respect to the components that are merely identified in passing, these components may be well-known in the art, both with respect to structure and function, and therefore will not be described in detail. Alternatively, the components mentioned in passing may not be directly relevant to the specific apparatus, system, or method being discussed herein. Yet other components that are present on power unit **10** may not be identified at all in this document.

(41) Referring to FIGS. **1** and **2**, power unit **10** may further include a body **22** that is located on

upper mounting platform **12***a* of frame **12** and a control panel **24** may be provided on an upper end of body **22**. An engine **26** is mounted on upper mounting platform **12***a* in a position forward of body **22**. Engine **26** may be a gasoline-powered engine, an electrically-powered engine, a hybrid thereof, or any other mechanism for providing power to the systems of power unit **10**. Power unit **10** may further include a particulate material spreader system **28**, a liquid-dispensing system **30**, an attachment assembly **32**, a weight transfer system **34** (FIG. **9**), and a power transfer system **36** (FIG. **16**). Each of the particulate material spreader system **28**, liquid-dispensing system **30**, attachment assembly **32**, weight transfer system **34** (FIG. **9**), and power transfer system **36** are in some way operatively engaged with and/or supported by frame **12**. Upper mounting platform **12***a* may further serve as a base for any additional components including, but not limited to, electrical components such as a battery, wiring, hydraulic components such as pumps and hoses, a fuel tank, and the like.

(42) With reference now to FIGS. **3**A, **3**B, **3**C and **3**D the structure and function of control panel **24** will be further described. Control panel **24** has a front end **24***a* located towards front **10***a* of power unit **10** and a rear end **24***b* located towards rear **10***b* of power unit **10**. Front end **24***a* is longitudinally spaced apart from rear end **24***b*. Control panel **24** further includes a left side **24***c* laterally spaced apart from a right side **24***d*, and a top **24***e* upon which are provided a plurality of controls. Top **24***e* may define a generally square shaped aperture **24***f* and a pair of parallel and spaced apart slots **24***g*, **24***h*. As best seen in FIG. **1**, control panel **24** is located atop body **22** of power unit **10** and towards the rear **10***b* of power unit **10**. This location and configuration may allow an operator standing on operator platform **18** to be in constant contact with control panel **24** during operation of power unit **10**.

(43) For purposes of simplicity, control panel **24** will be described in the way in which an operator standing on operator platform **18** will see and experience control panel **24**. The description will begin at a forward left quadrant of control panel **24** (proximate where left side **24***c* intersects with front end **24***a*) as seen in FIG. **3**A and will work clockwise around control panel **24**. With reference therefore to the forward left quadrant, control panel **24** may have an ignition switch **38** for switching power unit **10** on or off. According to one aspect, ignition switch **38** may be a keyed ignition switch while in another aspect, ignition switch **38** may be a keyless ignition switch.

(44) Control panel **24** next includes a first auxiliary power switch **40**, a second auxiliary power switch **42**, and an instrument cluster gauge **44**. First auxiliary power switch **40** may control an electrical implement, for example, one or more rear work lights **46** (FIG. **1**) or one or more forward work lights, if provided, on power unit **10**. Likewise, second auxiliary power switch **42** may control a second electrical implement such as one or more headlights **48** or fog lights if provided on power unit **10**. According to one aspect, a power unit **10** equipped with both rear work lights **46** and headlights **48** may be controlled by first and second auxiliary power switches **40** and **42**, respectively.

(45) Cluster gauge **44** may display relevant information about the operation and status of power unit **10**. By way of a non-limiting example, cluster gauge **44** may include features such as an hour meter, oil pressure light, power take-off indicator light, parking brake light, voltage meter, gas gauge, or any other informational display as chosen of a person skilled in the art relevant to the desired operation of power unit **10**.

(46) Moving now to a center region of control panel **24**, proximate front end **24***a*, and control panel **24** may further include a pressure gauge **50** and nozzle toggle switch **52**. According to one aspect, pressure gauge **50** and nozzle toggle switch **52** may be installed as part of control panel **24** in instances where power unit **10** includes the liquid-dispensing system **30** as discussed later herein. In other examples, power unit **10** may not include liquid-dispensing system **30** and in those instances, pressure gauge **50** and nozzle toggle switch **52** may be omitted from control panel **24**. Pressure gauge **50** may indicate a pressure within liquid-dispensing system **30** while nozzle toggle switch **52** may be utilized to control power to toggle one or more liquid-dispensing nozzles that

may be provided as part of liquid-dispensing system **30**. This will be discussed later herein. Nozzle toggle switch **52** may also be utilized to move liquid-dispensing system **30** between an ON position and an OFF position.

(47) Moving now to the forward right quadrant, control panel **24** may include a throttle control **54**, a power take-off switch **56** (PTO switch **56**), a third auxiliary power switch **58**, a fourth auxiliary power switch **60**, a parking brake lever **62**, and choke control **64**. According to one aspect, throttle control **54** may be activated to control the flow of power or fuel to the power unit's engine **26**. According to another aspect, PTO switch **56** may be utilized to engage or disengage the power transfer system **36** as later described herein. According to another aspect, third auxiliary switch **58** may be utilized to power brine pumps to deliver liquid through the liquid-dispensing system **30** if provided on power unit **10**. According to another aspect, fourth auxiliary power switch **60** may be utilized to control an optional 12 Volt electrical power source that may be connected to a front attachment/implement if such a device is installed on power unit **10**. Many of these optional features will be discussed herein with reference to the appropriate systems to which they belong.

(48) Moving now to the lower right quadrant, control panel **24** may further include a hydraulic control lever **66**. According to one aspect, hydraulic control lever **66** may be utilized to control a front attachment or implement, if provided on power unit **10** and as described further herein. Hydraulic control lever **66** may include a shaft **66***a* with a knob **66***b* at its uppermost end. Hydraulic control lever **66** may have a central float position. In other words, hydraulic control lever **66** may float towards a center of its motion range when not in use. As is evident from FIGS. **3**A and **3**B, the motion of the shaft **66***a* of hydraulic control lever **66** is limited by a stop wall that bounds and defines aperture **24***f* in top **24***e* of control panel **24**. Hydraulic control lever **66** is capable of moving in more than one direction, as illustrated by the arrows "B**1**", "B**2**", "B**3**" and "B**4**" in FIG. **3**A. The shaft **66***a* and therefore hydraulic control lever **66** will tend to move to a central region of the aperture surrounded by stop wall **24***f* when hydraulic control lever **66** is not in use.

(49) Immediately rearward of hydraulic control lever **66** is a wrist support bar **68** that extends upwardly from top **24***e* of control panel **24**. Wrist support bar **68** may be a tube that is generally circular in cross-section and which is formed into a U-shaped member when viewed from the rear **10***b* of power unit **10**. Wrist support bar **68** may provide a comfortable location for the operator to rest his or her wrist and part of their forearm while holding and manipulating hydraulic control lever **66**. Wrist support bar **68** may provide a rest point for the wrist and forearm of the operator, thereby freeing up the operator's hand to work hydraulic control lever **66**. In some examples, wrist support bar **68** may be adjustable in height relative to top **24***e* so that an operator can select the most comfortable height of wrist support bar **68** for their own body. If wrist support bar **68** is adjustable in height, then the bar **68** may also be provided with a locking member to lock bar **68** at the selected adjusted height. It is preferable, however, that wrist support bar **68** be a fixed height relative to top **24***e* so that it provides a stable support for the operator's wrist.

(50) Moving to a rear center portion of control panel **24**, drive controls are shown. The drive controls may include a left drive control lever **70** with a left-hand knob **70***a* attached thereto and a right drive control lever **72** with a right-hand control knob **72***a* attached thereto. Left drive control lever **70** has a shaft that extends outwardly from top **24***e* of control panel **24** through slot **24***g*. Left drive control lever **70** may be utilized to control the left side wheels **14***a*, **14***b* of power unit **10**. Right drive control lever **72** has a shaft that extends outwardly from top **24***e* of control panel through slot **24***h*. Right drive control lever **72** may be utilized to control the right side wheels **14***a*, **14***b* during operation of power unit **10**. As discussed more thoroughly later herein, the specific configuration of left drive control lever **70**, left-hand knob **70***a*, right drive control lever **72**, and right hand knob **72***a* may allow for single-handed operation of power unit **10**.

(51) It should be noted that hydraulic control lever **66**, left drive control lever **70**, and right drive control lever **72** all include small rounded knobs **66***b*, **70***a*, and **72***a*, respectively at their upper ends. The knobs **66***b*, **70***a*, and **72***a* help to enable one-handed operation of power unit **10**. The

levers **66**, **70**, and **72** protrude generally upright from top **24***e* of control panel **24** and allow the operator's hand to move easily around them, thereby allowing for fine control of power unit **10**, even if the operator is only using one hand.
(52) Immediately forward of the left and right drive control levers **70**, **72** is a forward support bar **74** and immediately rearward of left and right drive control levers **70**, **72** is a rear support bar **76**. Forward and rear support bars **74** and **76**, (which are collectively referred to herein as "support bars"), may provide anchor points for the operator's wrist, forearm, and/or fingers to further allow for possible one-handed operation of power unit **10**. Each support bar **74**, **76** may be a generally U-shaped member (when viewed from rear end **10***b*) that extends for a distance outwardly from top **24***e* of control panel **24**. In some examples, one or more of the support bars **74**, **76** may be selectively adjustable in height and may be lockable with a locking member in that selected adjusted height. It is preferably, however, that the forward and rear support bars **74** and **76** be of a fixed height relative to top wall **24***e* of control panel **24**. The U-shaped members may be generally circular in cross-section.
(53) Moving now to the lower left quadrant of control panel **24**, a cup holder **78** may be provided. According to one aspect, cup holder **78** may be omitted from control panel **24** if desired, or cup holder **78** may be replaced with additional controls depending on the desired application and use of power unit **10**.
(54) While various controls provided on control panel **24** have been identified, the operation thereof and the correlation to remaining systems herein described will become apparent throughout the remainder of this specification.
(55) The basic operation of power unit **10** will now be described with reference to the manipulation of the various controls on control panel **24**. With reference to FIG. **1**, power unit **10** may generally operate as a normal ski steer-style vehicle wherein the first pair of wheels **14***a*, **14***b* on the left side **10***c* of power unit **10** and the second pair of wheels **14***a*, **14***b* on the right side **10***d* of power unit **10** are driven independently of each other. Power unit **10** may move in a forward direction, generally indicated by the arrow "A" discussed earlier herein or in a rearward direction (i.e., reverse) opposite to arrow "A". Power unit **10** may also turn left, turn right, and turn in a zero degree circle to the left or to the right through operation of left and right control levers **70** and **72**, as described below.
(56) The starting process and general operation of power unit **10** may proceed according to known steps and functions. To that end, ignition switch **38** may be utilized to start engine **26**. Choke control **64** may be actuated to assist in the starting of engine **26** when the air temperature, power unit **10** or general environment is cold. Once engine **26** is at running and is at an appropriate operating temperature and speed, power unit **10** may be further utilized to perform a task such as clearing snow and/or ice from surface "S", treating surface "S" for snow and/or ice buildup, treating surface "S" to prevent future snow and/or ice buildup, or a combination thereof.
(57) With reference to FIGS. **3**C and **3**D, control panel **24** may allow an operator to drive power unit **10** through manipulation of left and right drive control levers **70**, **72**. Specifically, the left side wheels **14***a*, **14***b* are controlled by left drive control lever **70** and the right side wheels **14***a*, **14***b* may be controlled by right drive control lever **72**. The left drive control lever **70** is configured to only be able to move linearly back and forth within a first slot **24***g* defined in top **24***e* of control panel **24**. The possible linear back and forth motion of left drive control lever **70** is identified in FIG. **3**A by the arrows "C**1**" (forward) and "C**2**" (rearward). The right drive control lever **72** is configured to only be able to move linearly back and forth within a second slot **24***h* defined in top **24***e* of control panel **24**. The possible linear back and forth motion of right drive control lever **72** is identified in FIG. **3**A by the arrows "D**1**" (forward) and "D**2**" (rearward). The linear movements of left and right control levers **70**, **72** are oriented substantially parallel to longitudinal axis "Y" of power unit **10**. The left control lever **70** is configured to move along a first plane that is parallel to axis "Y" and the right control lever **72** is configured to move along a second plane that is parallel to

the axis “Y” and to the first plane.
(58) Moving both of the left and/or right drive control levers **70**, **72** forward in the respective directions “C**1**” and/or “D**1**”, may cause the associated pair of left or right side wheels **14***a*, **14***b* to move power unit forward, i.e., in the direction of arrow “A”. Power unit **10** will then move forwardly across the surface “S” (FIG. **1**). Moving both of the left and/or right drive control levers **70**, **72** rearward, i.e., respective directions “C**2**” and/or “D**2**”, may cause the associated pair of left or right side wheels **14***a*, **14***b* to move power unit **10** in a rearward direction across the surface “S”, i.e., opposite to the direction indicated by arrow “A”.
(59) Moving only one of the left and right drive control levers **70**, **72** forward (in the direction of “C**1**” or “D**1**”) while moving the other of the left and right drive control levers **70**, **72** rearward (in the direction of “C**2**” or “D**2**”) may allow power unit **10** to turn in a circle, i.e., through 360°.
(60) Applicable to all the above-described movements, it will be understood that the further forward or rearward the drive control levers **70**, **72** are moved within the associated slot **24***g*, **24***h*, the faster the associated wheels **14***a*, **14***b* will rotate.
(61) Wheels **14***a*, **14***b* are mounted in a fixed orientation relative to frame **12**. In other words, the wheels **14***a*, **14***b* are mounted so that they do not and cannot pivot relative to the axis about which they rotate. Wheels **14***a*, **14***b* may only rotate about the axis in a forward motion or in a rearward motion. The wheels **14***a*, **14***b* cannot be turned to the left or to the right, i.e., angled relative to the “Y” axis. Instead, they always remain straight and parallel to longitudinal axis “Y”. Accordingly, in order for power unit **10** to turn to the left or to the right as it moves across surface “S”, the speed of the wheels **14***a*, **14***b* on one side may be adjusted relative to the speed of the wheels **14***a*, **14***b* on the opposite side. The difference in the speed of rotation of the wheels **14***a*, **14***b* on the left side **10***c* of power unit **10***d* relative to the speed of rotation of wheels **14***a*, **14***b* on the right side will cause power unit to turn as it travels across surface “S”. The direction of the turn is dependent upon the relative speeds of rotation of wheels **14***a*, **14***b* on the left side **10***c* and right side **10***d*. Specifically, if wheels **14***a*, **14***b* on left side **10***c* of power unit **10** rotate more slowly than wheels **14***a*, **14***b* on the right side **10***d*, power unit **10** will turn left. If the wheels **14***a*, **14***b* on the right side **10***d* rotate more slowly than wheels **14***a*, **14***b* on the left side **10***c*, power unit **10** will turn right.
(62) The configuration of control panel **24** allows an operator to drive power unit **10** with only one hand. With continued reference to FIGS. **3**C and **3**D, operator may place one hand on the left and right hand knobs **70***a*, **72***a* of left and right drive control levers **70**, **72**. If the operator wishes to drive forward in the direction of arrow “A” in FIG. **1**, both of the left and right drive control levers **70**, **72** may be operated using the palm of the one hand, and both levers **70**, **72** may simultaneously be pushed forwardly in the directions “C**1**” and “D**1**” with a substantially equal force being applied thereto. The simultaneous movement may move the left drive control lever and right drive control lever **70**, **72** forwardly within the respective slot **24***g*, **24***h* a generally similar or identical distance. Forward support bar **74** may provide a gripping point for operator's fingers (as shown in FIG. **3**D) to give the operator leverage to move left and right control levers **70**, **72** forwardly towards forward support bar **74** with relative ease. Moving both left and right control levers **70**, **72** in this manner may allow the movement thereof to be even and consistent, As a result, power unit **10** will move forward in a generally straight line, i.e., generally parallel to longitudinal axis “Y”.
(63) If the operator wishes to drive in reverse in a straight line, i.e., in the direction opposite to arrow “A” in FIG. **1** and parallel to the axis “Y”, then left and right control levers **70**, **72** may be operated using the fingers of the hand, while the palm of the operator's hand may rest against the rearward support bar **76** to provide leverage. The operator will grasps knobs **70***a*, **72***b* with their fingers and resting their palm on rearward support bar **76**, the operator will simply pull their fingers inwardly toward their palm. Again, this will result in left and right control levers to move smoothly within their associated slots **24***g*, **24***h*. The controlled movement of left and right control levers **70**, **72** will help assure that power unit **10** will reverse in a generally straight line that is parallel to axis “Y”.

(64) Single handed operation of power unit **10** during a turn may be accomplished through manipulation of the left and right control levers **70**, **72** using the left and right hand knobs **70***a*, **72***a* by holding them in a particular manner in the operator's fingers. Specifically, the operator may control one of the left and right drive control levers **70**, **72** by gripping the associated knob **70***a* or **72***a* with the thumb and forefinger of one hand and operating the other of the left or right drive control levers **70**, **72** with the remaining three fingers. During a turn, one of knobs **70***a*, for example, may be moved rearwardly (in the direction "C**2**") while the other knob **72***a* is moved forwardly in the direction of "D**1**". This engagement will cause power unit **10** to turn to the left. Moving knob **70***a* forwardly in the direction of "C**1**" and moving knob **72***a* rearwardly in the direction of "D**2**" will cause power unit **10** to turn to the right. If the operator feels the need, for example, in a tight turn or similar situation he or she may easily switch from a one-handed operation mode to a two-handed operation mode for the duration of the turn and then switch back to one-handed operation once the maneuver is complete.
(65) The ability to drive power unit **10** with only one hand (i.e., their left hand) tends to free up the operator's other hand (i.e., their right hand) to control other components on power unit **10** without sacrificing the ability to safely and accurately maneuver power unit **10**.
(66) With their free right hand, the operator may activate or deactivate any of the other controls on control panel **24**. For example, as illustrated in FIG. **3**C, the operator may manipulate hydraulic control lever **66** with their right, non-drive hand. Specifically, operator may place the palm or wrist of their right hand on wrist support bar **68** and they may then grasp knob **66***b* and manipulate hydraulic control lever **68** with the fingers and thumb of their right hand. In particular, the operator may push hydraulic control lever **66** in any of the directions "B**1**" or "B**4**" (FIG. **3**A) or may pull hydraulic control lever **66** in any of the directions "B**2**" or "B**3**". When the operator releases knob **66***b*, the control lever **66** will tend to "float" back into a generally central location within aperture **24***f*.
(67) Power unit **10** is designed to be utilized with a variety of different attachments or implements that may be engaged with power unit **10** to perform a variety of different tasks. Some attachments or implements may be engaged with power unit **10** proximate front **10***a* thereof, while other attachments or implements may be engaged on power unit somewhere between front **10***a* and rear **10***b*. (In yet other examples, attachments or implements may be engaged proximate rear **10***b*.) In power unit **10** as illustrated and described herein one or more attachments or implements may be engaged proximate front **10***a* and one or more attachments or implements may be engaged with tractor frame **12** in a position that is generally midway between front wheels **14***a* and rear wheels **14***b*.
(68) Referring now to FIGS. **4**-**15**, the attachment assembly **32** in accordance with the present disclosure is shown in greater detail. Attachment assembly **32** comprises a plurality of components that are utilized to secure any one of a variety of different attachments or implements to front **10***a* of power unit **10**. By way of non-limiting example and with reference to FIGS. **1** and **4**, a powered broom **80** engaged with front **10***a* of power unit **10** by attachment assembly **32**. FIGS. **18**A and **18**B show a snowplow blade **82** engaged with front **10***a* of power unit **10** by attachment assembly **32**. It will be understood that implement **80** may be a number of variable, interchangeable devices such as a snow blower or lifting forks that may include an attachment assembly **32** that allows implement **80** to connect with vehicle frame **84** according to an attachment method discussed later herein. It will be understood that attachment assembly **32** may be modified from the forms shown and described herein to fit the specific implement **80** being used. For the sake of simplicity any and all attachments and implements that may be engaged with front **10***a* of power unit by attachment assembly **32** will be referred to herein as implement **80**.
(69) Referring still to FIGS. **4**-**15**, attachment assembly **32** comprise two main components, namely a hitch and an attachment frame. The hitch is generally indicated at **84** and the attachment frame is generally indicated at **85**. Hitch **84** is operatively engaged with front **10***a* of power unit **10** and is

also selectively operatively engaged with attachment frame **85**. Attachment frame **85** is operatively engaged with implement **80** that will be utilized to perform a task.

(70) Hitch **84** of attachment assembly **32** will now be described in greater detail. FIG. **7** that hitch **84** comprises a second side plate **88** and a first side plate **86**. First and second side plates **86**, **88** are spaced a distance laterally apart from each other such that a space **90** is defined between an interior surface of first side plate **86** and an interior surface of second side plate **88**. First and second side plates **86**, **88** are held in a spaced-apart relationship by an upper crossbar **108**, lower crossbar **94**, and rear support member **96**. First side plate **86**, second side plate **88**, upper and lower crossbars **92**, **94** and rear support member **96** may be welded together or otherwise secured to each other to form a strong and substantially rigid structure. The upper portion of first side plate **86** terminates in a first hitch tab **86***b* and the upper portion of second side plate **88** terminates in a second hitch tab **88***a*. First and second hitch tabs **86***b*, **88***a* extend for a distance upwardly beyond upper crossbar **92**. The purpose of first and second hitch tabs **86***b*, **88***a* will be disclosed later herein. First side plate **86** also includes a front edge **86***c* and second side plate **88** includes a front edge **88***d*. Front edges **86***c*, **88***d* form the leading ends of hitch **84**.

(71) A first hub **98** extends into space **90** from the interior surface of first side plate **86**. A second hub **100** extends into space **90** from the interior surface of second side plate **88**. First and second hubs **98**, **100** are laterally aligned with each other and each may include a spacer or bushing, indicated at **102**. A mounting bolt **104** (FIG. **9**) may be receive through each bushing **102**. Mounting bolts **104** may be utilized to secure hitch **98** to frame **12**. Bushings **102** may allow rotation of hitch **84** relative to frame **12** and about an axis extending between the mounting bolts **104** that are received through aligned first hub **98** and second hub **100**.

(72) Pivotal motion of hitch **84** about the axis extending along mounting bolts **104** may be effected by a hydraulic cylinder **106**. A first end of the cylinder **106***a* may be engaged with a portion of frame **12** and a piston **106***b* extends outwardly from cylinder **106***a* and towards hitch **84**. A free end of piston **106***b* is provided with a sleeve **106***c* (FIG. **5**). An opening **86***a* is defined in first side plate **86** and opening **86***a* extends between the interior and exterior surfaces of first side plate **86**. A mounting bracket **108** (FIG. **5**) extends into space **90** from the interior surface of first side plate **86** adjacent opening **86***a*. An aperture is defined in a portion of mounting bracket **108** that is parallel to the interior surface of first side plate **86**. The aperture in mounting bracket **108** is aligned with opening **86***a*. Sleeve **106***c* is between the portion of mounting bracket **108** that defines the aperture and the interior surface of first side plate **86**. A bore defined within sleeve **106***c* is aligned with opening **86***a* and with the aperture in mounting bracket **108**. A bolt **110** is passed through the aligned opening **86***a*, bore, and aperture and a nut (not numbered) secures the bolt **110** in place and thereby secures piston to hitch **84**. Bolt **110** may define a pivot axis about hitch **84** may rotate. This arrangement may allow adjustments of hitch **84** in a vertical direction, specifically, lifting of hitch by hydraulic cylinder **106**. When piston **106***b* is extended further outwardly from cylinder **106***a*, first side plate **86**, and therefore hitch **84** is pivoted in a first direction. When piston **106***b* is retracted inwardly into cylinder **106***a*, first side plate **86** and therefore hitch **84** is pivoted in a second direction.

(73) Referring still to FIGS. **4**-**15**, hitch **84** further includes an attachment latch handle **112** that is best seen in FIGS. **7** and **17**A. Attachment latch handle **112** is located adjacent an exterior surface of first side plate **86** and is pivotally secured thereto by way of lower crossbar **94**. Lower crossbar **94** defines a pivot axis about which attachment latch handle **112** may rotate. In particular, attachment latch handle **112** is rotatable between a latched position (FIG. **17**A) and an unlatched position (FIG. **17**B). A stop **114** extends outwardly from the exterior surface of first side plate **86** to limit the pivotal motion of attachment latch handle **112**.

(74) Referring to FIG. **17**A, attachment latch handle **112** includes a body **112***a* that has a leading lower end shaped into a first hook **112***b*. The first hook **112***b* forms a first latch for engagement of hitch **84** with attachment frame **85**. A handle **112***c* extends upwardly and outwardly from body

112*a*. Handle **112***c* may have a portion thereof that angles slightly outwardly from first side plate **86** so that an operator may readily grasp handle **112** to manipulate the same. A trailing lower end of body **112***a* is shaped into a second hook **112***d* that forms a lock tab. The first latch that is comprised of the first hook will be referred to hereafter by the reference number **112***b*. The lock tab that is comprised of the second hook will be further referred to hereafter by the reference number **112***d*.

(75) Hitch **84** may include a locking member that holds attachment latch handle **112** in the unlatched position and in the latched position. The locking member comprises lock tab **112***d* on the attachment latch handle **112** and a handle lock **116** that is located rearwardly of attachment latch handle **112** on first side plate **86**. Handle lock **116** has a body **116***a* that is pivotally engaged with first side plate **86** by way of a bolt **118**. Body **116***a* includes a first lock member **116***b*, a second lock member **116***c*, and a release arm **116***d*. Each of the first lock member **116***b* and second lock member **116***c* is configured to selectively engage lock tab **112***d* on attachment latch handle **112** but first lock member **116***b* is configured to contact a different portion of lock tab **112***d* than is second lock member **116***c*. Handle lock **116** also includes a spring **116***e* (FIG. **7**). A section of spring **116***e* extends through an aperture **116***f* defined in body **116***a*. Spring **116***e* biases handle lock **116** in a clockwise direction so that handle lock **116** is urged to maintain attachment latch handle **112** into a latched position that is shown in FIG. **4**.

(76) First lock member **116***b* comprises a slightly curved shoulder region of handle lock **116** that may be brought into contact with a terminal end of the hook shape of lock tab **112***d*. This is shown in FIG. **17**A. When the curved shoulder region of first lock member **116***b* contacts the terminal end of lock tab **112***d*, attachment latch handle **112** is prevented from rotating in the direction indicated by arrow "E" in FIG. **17**A by the handle lock **116**. Attachment latch handle **112** is thereby locked in the latched position by handle lock **116**. Attachment latch handle **112** would theoretically still be able to rotate in the opposite direction to arrow "E" except that an inside edge of handle **112***c* contacts stop **114** extending outwardly from first side plate **86**. Stop **114** prevents rotation of attachment latch handle **112** in the opposite direction to arrow "E".

(77) In order to release attachment latch handle **112** from the locked position, handle lock **116** must be rotated in the direction indicated by arrow "F" in FIG. **17**A. Rotation in the direction "F" moves first lock member **116***b* downwardly and away from the terminal end of lock tab **112***d*. Attachment latch handle **112** is then able to rotate in the direction of arrow "E". Rotation in the direction "F" is made possible by an operator physically pushing on release arm **116***d* and causing handle lock **116** to move in the direction "F".

(78) Second lock member **116***c* of handle lock **116** is shaped like a hook and is configured to interlock with the hook-shape of lock tab **112***d*. FIG. **17**B shows the attachment latch handle **112** rotating in the direction of arrow "E". This is made possible because handle lock **116** has been physically rotated in the direction of arrow "F as described above and this has caused first locking member **116***b* to pivot downwardly and away from lock tab **112***d*. Rotation of handle lock **116** in the direction of arrow "F" is continued until the hook shape of second lock member **116***c* slides past the terminal end of lock tab **112***d* and then into the space between the hook shape and the rest of body **112***a*. When second lock member **116***c* is interlocked with lock tab **112**, then attachment latch handle **112** is able to rotate in the direction of arrow "E" until first latch **112***b* contacts stop **114**. Rotation in the opposite direction to arrow "E" is prevented by second lock member **116***c* being interlocked with lock tab **112***d*. Handle lock **116** therefore holds attachment latch handle **112** in the unlatched position.

(79) Hitch **84** may further form a part of a weight transfer system **34** provided on power unit **10**. Weight transfer system **34** may allow for varying amounts of the weight of the implement **80** to be transferred from implement **80** and onto power unit **10** rather than that weight being carried by implement **80**. The degree to which weight is to be transferred to the power unit **10** may be selected by the operator manipulating controls on control panel **24**, as will be discussed later herein. The transfer of weight from the attachment to power unit **10** may help to improve traction of power unit

10 as it moves through snow by placing more weight on front wheels **14***a*. In addition, because more weight is carried by power unit **10**, less force is placed on the skid shoes of implement **80**. This tends to reduce wear on the skid shoes and helps power unit **10** move over bumps and cracks in the surface "S" over which power unit **10** travels.

(80) Referring to FIGS. **7**-**10**, weight transfer system **34** includes a first slot **120** defined in second side plate **88**. First slot **120** extends between an interior surface and an exterior surface of second side plate **88** and includes a first leg **120***a* that is generally horizontally oriented. Starting at a forwardmost end and moving rearwardly, at a front end, first slot **120** includes a first arm **120***b* that is generally vertically oriented, a second arm **120***c* that is generally vertically oriented and located a distance rearwardly of first arm **120***b*, a rise **120***d* that is located a distance rearwardly of second arm **120***c*, and at a rearmost end, a generally horizontally-oriented third arm **120***e*.

(81) Weight transfer system **34** also includes a second slot **122** that is defined in second side plate **88** a distance vertically downwardly from and rearwardly relative to first slot **120**. Second slot **122** extends between the interior and exterior surfaces of second side plate **88**. Second slot **122** includes a generally horizontally-oriented leg **122***a* and, moving from a forwardmost end to a rearmost end, second slot **122** also includes a first recess **122***b*, a second recess **122***c*, and an arm **122***d*. First and second recesses **122***b*, **122***c* are located along an uppermost edge of leg **122***a*. Arm **122***d* angles upwardly away from leg **122***a* and curves slightly as it does so.

(82) As best seen in FIGS. **9** and **10**, a bracket **124** extends outwardly from the interior surface of second side plate **88**. Bracket **124** defines a slot **126** therein that is substantially identical to and aligned with second slot **122**. As such, slot **126** includes a generally horizontally-oriented leg **126***a* and, moving from a forwardmost end to a rearmost end, slot **126** also includes a first recess **126***b*, a second recess **126***c*, and an arm **126***d*. First and second recesses **126***b*, **126***c* are located along an uppermost edge of leg **126***a*. Arm **126***d* angles upwardly away from leg **126***a* and curves slightly as it does so.

(83) Weight transfer system **34** further includes at least one shaft **128** (FIGS. **9** and **10**) that is pivotally mounted to frame **12** and has a first end **128***a* and a second end **182***b*. The at least one shaft **128** is configured to engage a bracket **129**. Bracket **129** includes a first plate **129***a* that is laterally spaced from a second plate **129***b*. Plates **129***a*, **129***b* are generally parallel to each other and extend outwardly from a base plate **129***c* in a first direction. Base plate **129***c* may be generally triangular when viewed from above. A flange **129***d* extends outwardly from base plate **129***c* in an opposite direction to plates **129***a*, **129***b*. Flange **129***d* is located intermediate plates **129***a*, **129***b*. When viewed from a side (such as in FIG. **9**), bracket **129** has a generally "open-L" shape. Each of the plates **129***a*, **129***b* define a hole there and these holes are aligned with each other. Flange **129***d* also defines a holes therein.

(84) The at least one shaft **128** is inserted through a compression spring **130** that has a first end **130***a* and a second end **130***b*. A first end of the at least one shaft **128** includes a first sleeve **128***a* having a bore defined therein. A fastener **132** passes through a bore of the first sleeve **128***a* and secures the first end **128***a* of the at least one shaft **128** between two parts of frame **12**. Hook **130***a* at the first end of spring **130** is passed around a portion of the circumference of first sleeve **128***a*. The second end **128***b* of the at least one shaft **128** includes a second sleeve **128***b*. Sleeve **128***b* defines a bore therein. A fastener **134** is inserted through a portion of slot **126** in second side plate **88**, through plate **192***b*, through the bore of second sleeve **128***b*, through plate **192***a*, through a bore of a spacer **128***b*′ and through a portion of second slot **122** in bracket **124** to secure sleeve **128***b* to bracket **124** and to second side plate **88**. Hook **130***b* at the second end of spring **130** passes around a portion of the circumference of second sleeve **128***b*.

(85) An adjustment bolt **136** is inserted through the hole defined in flange **129***d* and is utilized to secure flange **129***d* to second side plate **88**. A shaft **136***a* of adjustment bolt **136** extends through a portion of first slot **120** and through the hole (not shown) defined in flange **129***d*. Appropriate washers and nuts secure adjustment bolt **136** in place. Adjustment bolt **136** includes a knob **136***b*.

Knob **136***b* may be rotated in a first direction when it is desired to transfer weight from implement **80** and onto power unit **10**. Rotating knob **136***b* in the first direction releases adjustment bolt **136** to travel along first slot **120**. The actuation of weight transfer system **34** will be later described herein. When actuated however, fastener **134** is able to move along the aligned second slot **122** and slot **126** and therefore the orientation of the at least one shaft **128** is changed. In a first position, fastener **134** may be located in the aligned first recesses **122***b*, **126***b*. In a second position, fastener **134** may be located in the aligned second recesses **122***c*, **126***c*. In a third position, fastener **134** may be located somewhere along the aligned arms **122***d*, **126***d*. As fastener **134** travels along the aligned second slot **122** and slot **126**, adjustment bolt **136** travels along first slot **120**. For example, when fastener **134** is in the third position, adjustment bolt **136** is located in third arm **120***e* of first slot **120**. When fastener **134** is in the second position, adjustment bolt **136** is located in second arm **120***c*. When fastener **134** is in the first position, adjustment bolt **136** is located in first arm **120***b*.
(86) In each instance, when fastener **134** is placed in a desired one of the first second or third positions, the adjustment knob **136***b* is rotated in a second direction to lock adjustment bolt **136** in place and thereby prevents further movement of adjustment bolt **136** in first slot **120**. When movement of adjustment bolt **136** in first slot **120** is stopped by rotating adjustment knob **136***b* in the second direction, then movement of fastener **132** along second slot **122** and slot **126** is halted. It should be noted that wherever fastener **134** is located along slots **122**, **126**, fastener **134** is the pivot axis for rotation of hitch **84**. Spring **130** helps to support hitch **84** and keep the same balanced and leveled during operation of implement **80**.
(87) As indicated earlier herein, the weight transfer system **34** may allow the weight of an installed implement **80** to be shifted rearwardly towards the rear **10***b* of power unit **10**, placing more weight over the front wheels **14***a*. This rearward transfer of weight helps to increase traction of front wheels **14***a* while in operation and also helps to shift the center of gravity of power unit **10** rearwardly, thereby making power unit **10** more balanced during operation.
(88) FIGS. **7** and **8** shows an arm **138** positioned adjacent an exterior surface of second side plate **88**. Arm **138** is pivotally secured to second side plate **88** by lower crossbar **94**. A leading end of arm **138** is shaped into a hook that is substantially similar or identical to the hook on adjustment latch handle **112** that forms first latch **112***b*. The leading end of arm **138** therefore comprises a second latch **138***a* on hitch **84**. First and second latches **112***b*, **138***a* are utilized to operatively engage attachment frame **85** as will be later described herein.
(89) With reference to FIGS. **4-15**, attachment frame **85** may include a first upright member **140** and a second upright member **142** that are spaced apart and therebetween define a transverse direction. First and second upright members **140**, **142** may be fixedly separated by an upper cross-member **144** and a lower cross-member **146** that are vertically spaced apart from each other.
(90) According to one aspect, one or more of first upright member **140**, second upright member **142**, upper cross-member **144**, and lower cross-member **146** may form a sealed storage system that may be utilized as fluid tanks. According to this aspect, one or more of first or second upright member **140**, **142** or upper cross-member **144** may include a fill spout and cap **140***a*. Cap **140***a* may be removed to allow fluid to be adding to the sealed storage system. According to this aspect, in instances where one or more frame members are utilized as a fluid tank, one or more hoses may be operationally attached thereto for delivery of fluid to the appropriate systems as chosen by a person of skill according to the desired application of power unit **10**. These hoses are omitted from the drawings, but may include hydraulic hoses, fuel hoses, or water hoses depending on the fluid carried in the fluid tank. The hoses may be high pressure hoses, or any other hose as chosen by a person of skill in the art.
(91) Attachment frame **85** may further include a first support member **148** and second vertical support member **150**. First vertical support member **148** may include a first upper hitch plate **148***a* and a first lower hitch plate **148***b*. First upper hitch plate **148***a* may be located proximate upper cross-member **144** and first lower hitch plate **148***b* may be located proximate lower cross-member

146. First upper hitch plate **148***a* may be a generally L-shaped bracket that includes a generally vertical leg **148***c* and a generally horizontal leg **148***d*. First upper hitch plate **148***a* may be oriented such that vertical leg **148***c* is located closest to second support member **150**. Horizontal leg **148***d* defines a slot **148***e* therein that extends from an upper surface of leg **148***d* to a lower surface thereof. Slot **148***e* is shaped and sized to permit first hitch tab **86***b* to be received therethrough.
(92) First lower hitch plate **148***b* may be generally rectangular in shape and may be angled slightly downwardly from horizontal. First lower hitch plate **148***b* may define a slot **148***f* therein that extends between an upper surface and a lower surface of first lower hitch plate **148***b*. Slot **148***f* may be shaped and sized so as to be able to receive first latch **112***b* therein when hitch **84** and attachment frame **85** are engaged with each other.
(93) First vertical support member **148** further includes a rearwardly facing surface **148***g* and an interior side surface **148***h*. The relevance of surfaces **148***g* and **148***h* will be discussed later herein.
(94) Second vertical support member **150** may include a second upper hitch plate **150***a* and a second lower hitch plate **150***b*. Second upper hitch plate **150***a* may be located proximate upper cross-member **144** and second lower hitch plate **150***b* may be located proximate lower cross-member **146**. Second upper hitch plate **150***a* may be a generally L-shaped bracket that includes a vertical leg **150***c* and a horizontal leg **150***d*. Second upper hitch plate **150***a* may be oriented such that vertical leg **150***c* is located closest to first support member **148**. Horizontal leg **150***d* defines a slot **150***e* therein that extends from an upper surface of leg **150***d* to a lower surface thereof. Slot **150***e* is shaped and sized to permit second hitch tab **88***a* to be received therethrough.
(95) Second lower hitch plate **150***b* may be generally rectangular in shape and may be angled slightly downwardly from horizontal. Second lower hitch plate **150***b* may define a slot **150***f* therein that extends between an upper surface and a lower surface of second lower hitch plate **150***b*. Slot **150***f* may be shaped and sized so as to be able to receive second latch **138***a* therein when hitch **84** and attachment frame **85** are engaged with each other.
(96) Second vertical support member **150** further includes a rearwardly facing surface **150***g* and an interior side surface **150***g*. Interior side surface **150***g* is laterally spaced apart from interior side surface **148***g* of first vertical support member **150**. A space **151** (FIG. **11**) is defined between interior side surface **148***g* and interior side surface **150***g*. As shown in FIG. **7**, an exterior surface of first side plate **86** of hitch **84** is spaced a distance "L**1**" apart from an exterior surface of second side plate **88**. As shown in FIG. **11**, interior side surface **148***g* is spaced a distance "L**2**" apart from interior side surface **150***g*. Distance "L**2**" is slightly larger than distance "L**1**". When hitch **84** engages attachment frame **85**, a front end of hitch **84** is nested into space **151** and is received between interior side surfaces **148***g*, **150***g*. This nesting between the hitch **84** and attachment frame **85** helps ensure lateral stability in the engagement and helps ensure that the two component remain aligned with each other at all times when they are engaged and reduces the tendency of the attachment frame **85** to twist out of engagement with hitch **84** during operation of implement **80**. It will be understood that in other examples, hitch **84** and attachment frame **85** may be configured such that the first and second vertical mounts **148**, **150** may nest between the interior surfaces of first and second side plates **86**, **88** of hitch **84**.
(97) As best seen in FIG. **11**, a pulley housing **152** may be provided on attachment frame **85**. In particular, pulley housing **152** may be provided on lower cross-member **146** in a location between first and second upright members **140**, **142**. Pulley housing **152** may extend outwardly and rearwardly from lower cross-member **146**. A pulley **154** may be mounted for rotation within pulley housing **152**. A pump **155** is mounted on pulley housing **152** as shown in FIG. **11**, or is mounted adjacent to pulley housing **152**. Pump **155** is operatively engaged with a hydraulic motor **157** (FIG. **1**) provided on implement **80**. Pump **155** may further be operatively engaged with attachment frame **85** and specifically may be connected by hoses to the fluid tanks that are provided by one or more of first upright member **140**, second upright member **142**, upper cross member **144**, and lower cross member **146**.

(98) In one aspect, the pulley **154** may be arranged so as to be rotatable about an axis that is oriented at right angles to longitudinal axis "Y" of power unit **10**. Pulley housing **152** defines an opening **152***a* through which an attachment belt **156** enters and exits pulley housing **152**. Attachment belt **156** is one of two drive belts provided on power unit **10** as disclosed herein. Attachment belt **156** (FIGS. **5** and **16**) wraps around a portion of the circumference of pulley and when attachment belt **156** moves (as will be described later herein), pulley **154** is rotated about its rotational axis. Pulley housing **152**, pulley **154**, and attachment belt **156** may form a part of power transfer system **36**. Specifically, pulley housing **152**, pulley **154**, and attachment belt **156** may form a part of an attachment belt-drive system that is part of the power transfer system **36**. Pulley **154** is operationally connected to one or more of a pump **155** (either a hydraulic pump or an electric pump), a motor **157**, or the like provided on implement **80** and the rotating pulley **154** powers the one or more of the pump **155** and motor **157**. The operation of pulley **154** and attachment belt **156** is discussed further herein with reference to the power transfer system **36**.
(99) In order to describe the other components that form part of attachment assembly **85**, implement **80** is described in greater detail. FIGS. **1-15** show that implement **80** is a powered broom. Powered broom **80** may comprise a brush wheel **158** that may extend transversely across power unit **10**. Brush wheel **158** is mounted for rotation about an axle **160**. Rotation of the brush wheel **158** may be controlled by an electric motor, a hydraulic motor, or any other means as chosen by a person of skill. The electric motor, hydraulic motor or other means of powering powered broom **80** may be dedicated to powering broom **80**. Alternatively, the engine **26** may be operatively engaged with powered broom **80** to power the same.
(100) Powered broom **80** may further include a housing **162** that may contain and partially surround brush wheel **158**. Housing **162** has a front end **162***a*, a rear end **162***b*, a left side **162***c*, and a right side **162***d*. Brush wheel **158** is mounted within housing **162** such that a portion thereof extends downwardly below a bottom edge of housing **162**. Housing **162** serves several purposes including protecting brush wheel **158**, mounting axle **160**, and directing debris, such as snow and ice, forward and away from power unit **10** when powered broom **80** is in operation.
(101) Housing **162** may also serve as the forward-most portion **80***a* (FIG. **1**) of attachment and provides a base upon which several other components are mounted or in which other components are housing. Housing **162** made include a mounting reinforcement plate **164** (FIG. **5**) that includes a first mounting point **166** and a second mounting point **167**. A top of housing **162** may include a mounting reinforcement plate **165** that includes a first forward mounting point **166** and a second forward mounting point **167**. Mounting reinforcement plate **164** may be fixedly attached to the top **162***e* of housing **162** to provide additional structural strength and support. First forward mounting point **166** may be engaged centrally on housing **162** to serve as a central pivot point for turning implement **80** to the left or to the right. Second forward mounting point **167** may be offset from first forward mounting point **166**. According to one aspect, second forward mounting point **167** may be offset to the left of first forward mounting point **166**, when viewed mounting reinforcement plate **164** is viewed from above.
(102) Implement **80** further includes an attachment frame **168** that includes an arcuate frame member **168**, a crosspiece **170**, and left and right support ribs **172**, **174**. Arcuate frame member **168** may be generally C-shaped when viewed from above and crosspiece **170** extends across an opening to the C-shape. Crosspiece **170** may extend in a transverse direction across the rear of housing **162** and may be fixedly attached to housing **162** thereby providing additional structural support thereto and serving as an attachment point for arcuate frame member **168**. According to one aspect, housing **162**, crosspiece **170** and arcuate frame member **168** may be welded together to form a single unit. As best seen in FIG. **8**, the housing **162**, arcuate frame member **168**, and crosspiece **170** may be arranged in a generally semi-circular shape. An opening to the semi-circle may face forward in the direction of travel of power unit **10** when the power unit is moving in the direction indicated by arrow "A" in FIG. **1**. Left and right support ribs **172**, **174** may be laterally spaced apart

from each other and extend in a longitudinal direction between arcuate frame member **168** and crosspiece **170** Support ribs **172** and **174** help strengthen the connection between arcuate frame member **168** and crosspiece **170** and may also serve as rotational limits for arcuate frame member **168** as will be discussed in the operational section below. Attachment frame **168** may further include a left gauge wheel **176** and right gauge wheel **178** that may be selectively adjusted to vary the operating height of implement **80**. Left and right gauge wheels **176**, **178** may be detachably engaged with arcuate frame member **168** via connectors **180** (FIG. **5**). This attachment may allow for height adjustment and pivoting of gauge wheels **176**, **178** as necessary for proper operation of implement **80**. The left and right ends of arcuate frame member **168** may be elongated to accommodate the mounting of gauge wheels **176**, **178**.

(103) With reference to FIGS. **5 6**, and **12-15**, arcuate frame member **176** may further include a first bearing mount **182,** a second bearing mount **184**, and a third bearing mount **186**. Each of the first, second, and third bearing mounts **182**, **184**, **186** may include one or more bearings **188** (FIG. **12**), a top plate **190**, one or more bearing bolts **192**, and a mounting plate **194** (FIG. **6**). According to one aspect, each of first, second, and third bearing mounts **182**, **184**, **186** may each include two bearings **188**. Mounting plate **194** may have a top face **194***a* (FIG. **13**), a bottom face **194***b*, a first end **194***c* (FIG. **6**), and a second end **194***d*. Top face **194***a* may be defined as the face of mounting plate **194** facing in an upward direction when installed, while bottom face **194***b* may be defined as the face of mounting plate **194** facing downwards toward surface "S" when installed. Mounting plate **194** may extend transversely under a rearmost end of arcuate frame member **176**. Mounting plate **194** may comprise a single, unitary component upon which all three bearing mounts **182**, **184**, and **186** are engaged.

(104) Mounting plate **194** may have a spring attachment **194***e* on its second end **194***d* that may connect to spring **212**. The opposite end of spring **212** may connect to spring mounting plate **210** on attachment frame **85** and spring **212** may bias implement **80** to level. Further, the inclusion of one or more pivot stops **208** may define rotational limits of implement **80** to prevent over-rotation about the longitudinal axis, similar to left and right support ribs **172**, **174** preventing over-rotation about the central axis of power broom **10**.

(105) As shown in FIG. **13**, bearing mounts **182**, **184**, **186** are essentially sandwiched between the associated top plate **190** and mounting plate **194**. A first low friction pad **196** may be positioned between top plate **190** and an upper surface **168***a*, lower surface **168***b*, a rear arcuate edge **168***c*, and a front arcuate edge **168***d* of arcuate frame member **168** and an upper surface of the associated bearing **188**. A second low friction pad **196** may be positioned between an upper surface **194***a* of mounting plate **194** and a lower surface **168***b* of arcuate frame member **168** and a lower surface of the associated bearing **188**. Top plate **190** is secured to mounting plate utilizing bearing bolts **192** that are inserted through top plate **190**, through low friction pads **196**, bearings **188**, and mounting plate **194**. The combination of bearing mounts **182**, **184**, and **186**, mounting plate **194**, the associated top plate **190**, and the low friction pads **196** creates a track within which arcuate frame member **168** may be secured and may be rotated. Low friction pads **196** may facilitate movement between bearing mounts **182**, **184**, **186** and arcuate frame member **176** by reducing friction therebetween. According to one aspect, low friction pads **196** may be plates of high density plastic with a low coefficient of friction. By way of non-limiting example, low friction pads **196** may be constructed of high density polyethylene (HDPE), which is known for its low coefficient of friction, self-lubricating properties, and long wear life.

(106) As shown in FIG. **12**, bearing mounts **182** and **186** are located towards a rear edge of arcuate frame member **176**, (i.e., proximate power unit **10**). Bearing mount **184**, on the other hand, is positioned towards a front edge of arcuate frame member **176** and is thus offset relative to bearing mounts **182** and **186**. This configuration aids in preventing arcuate frame member from moving in a forward direction or a rearward direction as it rotates within the track created by top plate **194**, low friction pads **196**, bearings **188**, and mounting plate **194**. Each bearing **188** within bearing mounts

182, **184**, **186**, may rotate relative to arcuate frame member **176**.
(107) With reference to FIGS. **8**, **12** and **13** a pivot sleeve **200** may be welded to bottom face **194***b* of mounting plate **194**. Pivot sleeve **200** may be an elongated tube that is open at both ends, with a forward end **200***a* extending outwardly beyond the second bearing mount **184**. A rear end **200***b* of pivot sleeve **200** sits flush with, or extends slightly beyond a rear edge of mounting plate **194**. A support gusset **195** (FIG. and **13**) is welded to bottom face **194***b* of mounting plate **194** and to sleeve **200**. Support gusset **195** aids in providing structural rigidity to the engagement of sleeve **200** and mounting plate **194**.
(108) A pivot bar **202** is received within a bore defined in pivot sleeve **200**. A region of pivot bar **202** extends forwardly beyond first end **200***a* of sleeve **200** and a distance rearwardly of second end **200***b* of sleeve **200**. Pivot bar **202** may be a solid bar capable of supporting the full weight of implement **80**. Pivot bar **202** has a front end **202***a* and a rear end **202***b* with rear end **202***b* being fixedly secured to a rear abutment **147** and to lower cross-member **146**. A portion of pulley housing **152** may be seated on top of and be welded to a top region of the rear end **200***b* of sleeve **200**. This is illustrated in FIG. **17**A.
(109) As indicated above, pivot bar **202** has a length greater than a length of pivot sleeve **200** such that front end **202***a* of pivot bar **202** extends outwardly beyond forward end **200***a* of pivot sleeve **200**. Front end **202***a* of pivot bar **202** may define a bore **202***c* therein that is oriented at right angles to the length of pivot bar **202** and a cotter pin **204** may be placed through bore **202***c* to prevent pivot sleeve **200** from sliding off from pivot bar **202**.
(110) According to one aspect, pivot bar **202** may have an exterior diameter that is sufficiently small enough relative to an interior diameter of the bore of pivot sleeve **200** that a first bushing **206***a* and a second bushing **206***b* may be positioned between the exterior surface of pivot sleeve **200** and the interior surface of pivot sleeve **200** that defines the bore. First bushing **206***a* is located proximate a free end of pivot sleeve **200** that terminates in forward end **200***a*. A washer **207** may be located forwarded of forward end **200***a* and cotter pin **204** may be separated from washer **207** by a gap **203**. Second bushing **206***b* is located proximate rear end **200***b* of pivot sleeve **200** and abutment plate **147** is provided between bushing **206***b* and lower cross member **46**. Abutment plate **147** may be welded to lower cross member **46**. Bushings **206***a*, **206***b* may provide a tight fit between pivot bar **202** and pivot sleeve **200** while allowing rotational movement therebetween. According to one aspect, bushings **206***a*, **206***b* may be constructed of high density plastic with a low coefficient of friction, such as HDPE, similar to low friction pads **196**.
(111) Attachment frame **85** may further include one or more pivot stops **208** (FIG. **8**) that extend rearwardly from attachment frame **85**, particularly from each of the first and second upright members **140**, **142**. Pivot stops **208** define left and right rotational limits for implement **80**.
(112) Attachment frame **85** may further include a spring mounting plate **210** (FIGS. **5**, **6** & **8**) and a spring **212**. Spring mounting plate **210** may extend outwardly from a front surface of second upright member **142**, for example. Spring **212** is operatively engaged at a first end with spring mounting plate **210** and at second end to mounting plate **194**. Second end **194***d* of mounting plate **194** may include a spring attachment **194***e*. In one aspect, spring attachment point **194***e* may comprise an aperture that is defined in mounting plate **194** and a hooked end of spring **212** may be inserted through this aperture to secure spring **212** to mounting plate **194**. Spring **212** may bias implement **80** to a level/stable position during transport, as discussed with regards to the operation of implement **80** below.
(113) Upper cross-member **144** of attachment frame, as utilized with power broom **80**, may include a first rearward mounting point **214** spaced longitudinally apart from the first forward mounting point **166** on mounting attachment plate **164**. Similarly, upper cross-member **144** may include a second rearward mounting point **216** on a mounting plate **149** (FIG. **5**) that is welded to a forward region of upper cross member **144**. Second rearward mounting point **216** is spaced longitudinally apart from second forward mounting point **167** on mounting attachment plant **164**.

(114) As shown in FIGS. **4** & **5**, implement **80** may include a longitudinal support member **218** that is operatively engaged, at a first end, with first forward mounting point **166** on mounting attachment plate **164** by a connector **220**. Connector **220** is inserted through aligned holes defined in longitudinal support member **218** and in mounting attachment plate **164** at the first forward mounting point **166**. The connector **220** defines a vertical pivot axis about which the implement **80** may rotate. Longitudinal support member **218** is operatively engaged, at a second end, with first rearward mounting point **214** provided on attachment frame **85** by a connector **222**.
(115) Connector **220** engages the first end of longitudinal support member **218** and first forward mounting point **166** to each other in such a manner that longitudinal support member **218** is permitted to flex or rotate about the connector **220**. The specific type of connector **220** utilized for securing longitudinal support member **218** to first forward mounting point **166** may be chosen according to the desired application of implement **80**. For example, the connector **220** may comprise a modified ball and socket style joint. Alternatively, a diameter of the hole defined in longitudinal support member **218** may be sized to be greater than a diameter of connector **220**. This disparity in diameters may allow a degree of "slop" or movement between the hole in longitudinal support member **218** and the connector **220**.
(116) By way of yet another non-limiting example, the hole defined in longitudinal support member **210** may include a flexible bushing that may allow relative movement between longitudinal support member **218** and mounting attachment plate **164** while maintaining a tight connection between longitudinal support member **218** and plate **164**.
(117) The second end of longitudinal support member **218** may be connected to first rearward mounting point **214** by a similar or identical connector **222** to connector **220**. Connector **222** may allow a similar flexing movement of the second end of longitudinal support member **218** as occurs at the first end of longitudinal support member **218**. This flexing motion may further facilitate rotational movement of implement **80** about the longitudinal pivot axis defined by pivot bar **202** and pivot sleeve **200**, as discussed further herein.
(118) Second forward mounting point **167** and second rearward mounting point **216** may be operationally engaged with each other by way of a hydraulic cylinder and piston **224**. The piston is operatively engaged with second forward mounting point **167** and the cylinder may be operative engaged with second rearward mounting point **216**, or vice versa. A connector **226** secures piston to second forward mounting point **167**. Another connector **228** secures cylinder to second rearward mounting point **216**. Hydraulic cylinder and piston **224** may be actuated to cause implement **80** to pivot about the vertical axis "Z" (FIG. **14**) defined by the first forward mounting point **166**. This pivoting movement is discussed in depth below, but may be best seen in FIGS. **14-15**.
(119) With reference to FIG. **16**, power transfer system **36** is shown. Power transfer system **36** (commonly known as a power take-off (PTO)) may direct power from engine **26** to implement **80** if power is required to manipulate and/or operate implement **80**. Previously known power take-off systems used in skid steer-type vehicles are hydraulically driven or utilize a solid drive shaft. These PRIOR ART systems are costly, difficult to maintain and repair, and in some instances may rob the vehicle of power during operation.
(120) Power transfer system **36** disclosed herein is a belt-driven system that has two cooperating belt-drive sections, namely, a first belt-drive system that is provided on the power unit **10** and a second belt-drive system that is provided on the implement **80**. First belt-drive system may be carried on power unit **10** regardless of the presence of implement **80** installed on power unit **10**. The first belt-drive system and the second belt-drive system overlap in one region (that will be described below). The first belt-drive system is powered and that power is transferred to the second belt-drive system in the region where the first and second belt-drive systems overlap each other.
(121) First belt-drive system may include an engine pulley **230** that is operatively engaged with engine **26**, a power take-off drive belt **232** (PTO drive belt **232**), a first pulley **234**, a double pulley **236**, and a first tensioner pulley **238**. PTO drive belt **232** is one of two drive belts disclosed for use

with power unit, the other drive belt being attachment belt **156**. PTO drive belt **232** is part of the first belt-drive system and is configured to move along a first drive path that is located entirely on power unit **10**. Attachment belt **156** is part of the second belt-drive system and is configured to move along a second drive path that is located and operated partially on power unit **10** and partially on implement **80**. Double pulley **236** forms part of each of the first belt path and the second belt. Particularly, double pulley **236** is the overlap between first belt path and second belt path and is the component that is utilized to take power from the first belt path and transfer that power to the second belt path. Double pulley **236** may instead be replaced by two single pulleys that are mounted to a jackshaft or any other means of coupling an engine to a pulley and which serves as a means to connect the second drive belt to the first belt path. In other words, double pulley **236** is one example of a connector mechanism that links the first belt path and the second belt path.

(122) PTO drive belt **232** may be a known belt type, including, but not limited to, a flat belt, a v-belt, a round belt, a multi-grooved belt, a toothed belt, or a ribbed belt. PTO drive belt **232** may form a continuous loop and may have a belt path that circles around the engine pulley **230**, over first pulley **234**, under double pulley **236**, over first tensioner pulley **238**, and back to engine pulley **230**. First pulley **234** may be mounted on frame **12** of power unit **10** in such a manner as to change an orientation of PTO drive belt **232** through an angle of from about seventy degrees up to about eighty degrees. Specifically, when PTO drive belt **232** passes around first pulley **234**, PTO drive belt **232** may make a seventy-four degree turn as it passes over first pulley **234**, changing the path from horizontal to vertical. This is a first of two turns in the first drive path. First tensioner pulley **238** may also be mounted on frame **12** of power unit **10** in such a manner as to change an orientation of PTO drive belt **232** through an angle of from about seventy degrees up to about eight degrees. Specifically, PTO drive belt **232** may also make a second seventy-four degree turn as it passes over first tensioner pulley **238**, placing belt back into a horizontal path as it returns to engine pulley **230**. In other words, whatever angle of turn in PTO drive belt **232** by first pulley **234**, first tensioner pulley **238** should be mounted to cause same size angle turn to return PTO drive belt **232** to be in the correct orientation to return and move around engine pulley **230**.

(123) Each of engine pulley **230**, first pulley **234**, double pulley **236**, and first tensioner pulley **238** may have a groove in which PTO drive belt **232** sits when engaged with each respective component. Double pulley **236** may have a pair of parallel grooves, only one of which engages PTO drive belt **232**. The second groove, i.e. the groove not engaged with PTO drive belt **232**, is discussed further below.

(124) First tensioner pulley **238** may be operatively engaged with a first tension spring **240** which may bias first tensioner pulley **238** against PTO drive belt **232** to help keep PTO drive belt **232** engaged with all components during operation.

(125) Each component of first belt-drive system may be mounted to tractor frame **12** of power unit **10** utilizing known techniques, including the use of mounting plates or additional frame members as necessary. It will be understood by a person of skill in the art that the mounting of each individual component may be modified according to the desired use.

(126) According to one embodiment, first pulley **234** and first tensioner pulley **238** may be mounted to tractor frame **12** of power unit **10** while double pulley **236** may be mounted to rear support member **96** of hitch **84**. In one aspect, double pulley **236** may be mounted on frame **12** in a location that will place double pulley **236** generally between first side plate **86** and second side plate **88**. Double pulley **236** is secured to frame **12** via one or more mounting plates **242**.

(127) Second belt-drive system may include pulley **154**, pulley housing **152**, an attachment belt **156**, double pulley **236**, and a second tensioner pulley **244**. Attachment belt **156** may also be any known belt type, however, it is advantageous to utilize similar or identical belt types for both attachment belt **156** and PTO drive belt **232**. Attachment belt **156** may form a continuous loop and have a belt path that travels around pulley **154**, around the second groove of double pulley **236**, and under second tensioner pulley **244** as it makes the loop between pulley **154** and double pulley **236**.

Second tensioner pulley **244** may be operatively engaged with an adjustable tension spring **246** that includes a spring arm **246***a* extending therefrom to engage tension adjustment plate **248**. Tension adjustment plate **248** may have multiple slots (not shown) defined therein to receive spring arm **246***a*. Adjustable tension spring **246** and spring arm **246***a* may also engage a spring catch plate **250** disposed behind adjustable tension spring **246**. Therefore, the combination of spring arm **246***a*, slots, and catch plate **250** may allow adjustment of the amount of tension second tensioner pulley **244** places on attachment belt **156**. Specifically, the combination of spring arm **246***a*, slots, and catch plate **250** may allow an operator to remove all tension from attachment belt **156** to aid when attaching and detaching implement **80** with power unit **10**, as discussed further herein. Additionally, the space between pulley **154** and double pulley **236** may vary slightly depending on the implement **80** installed. The ability to adjust the tension placed on the attachment belt **156** by second tensioner pulley **244** may allow attachment belt **156** to remain taut during operation of power unit **10**.

(128) Second tensioner pulley **244**, adjustable tension spring **246**, and tension adjustment plate **248** may be mounted to hitch **84**. In one example, second tensioner pulley **244**, adjustable tension spring **246**, and tension adjustment plate **248** may be mounted to rear support member **96**, alongside mounting plate(s) **242** for double pulley **236**. While this configuration causes second tensioner pulley **244**, adjustable tension spring **246**, and tension adjustment plate **248** to be carried by power unit **10** regardless of the presence of an installed implement **80**, these components form a part of the second belt-drive system as they are not engaged or operational unless implement **80** requiring power (and thereby having a pulley **154** attached thereto) is installed on power unit **10**.

(129) Power is transferred from engine **26** to implement **80** from PTO drive belt **232** to attachment belt **156** through double pulley **236**. The use of belt-driven power transfer system **36** lowers manufacturing costs and may reduce maintenance costs and downtime as belts are faster and easier to replace, require little operational maintenance (when compared with a drive shaft or a hydraulic PTO systems). A belt-driven power transfer system **36** is also less expensive to install on power unit **10** and/or to replace at the end of the usable life of the belts.

(130) With reference to FIGS. **18**A and **18**B, implement **80** may be a snowplow **82** instead of a rotatable broom. According to the embodiment shown in FIGS. **18**A and **18**B, arcuate frame member **168** may be omitted and the attachment frame **85** may include a central upper mounting plate **348***d* and central lower mounting plate **354** that extends forwardly therefrom. A second end of each of central upper mounting plate **252** and central lower mounting plate **254** may connect to a vertical support bar **356** provided on the rear end of snowplow blade **358**. Support bar **356** may define a vertical pivot axis about which plow **82** may rotate. First end of central upper and central lower mounting plates **348***d*, **354** may define elongated slots therein that are positioned and configured to receive first and second hitch tabs **86***b*, **88***a*, and first and second latches **112***b*, **138***a* of hitch **84** therein. Central lower mounting plate **354** may further include an attachment point (not shown) for one end of a hydraulic cylinder and piston **360** to cause rotation of plow **82** about the vertical pivot axis defined by vertical support bar **356**. Plow **82** may have other known features and elements as desired by a person of skill in the art, including but not limited to, trip features and mechanisms, adjustable skid shoes, replaceable wear edges, and the like.

(131) With reference to FIGS. **19**-**21**, particulate material spreader system **28** is shown. Particulate material spreader system **28** comprises a drop spreader **262**. Drop spreader **262** may be a completely independent unit that is separate from power unit **10** and is selectively engaged therewith. Drop spreader **262** may also be omitted from power unit or in other instances may be selectively removed from power unit **10** (as shown in FIG. **21**). Drop spreader **262** may include a motor **264**, a drive chain that is located beneath a shroud **266**, an auger **268**, and a material trough **270**. The drive chain is driven by motor **264** to rotate auger **268** in order to move particulate materials through trough **270**. An entrance opening is provided proximate a top end **262***a* of spreader **262** and as indicated by arrows “N”, particulate materials may be loaded into trough **270** from either side of power unit **10**. A slot is provided proximate a bottom end **262***b* of spreader **262**

to allow particulate materials to exit trough **270** and drop directly downwardly and onto surface "S". Drop spreader **262** may hold and distribute particulate matter such as salt, sand, cinders, or the like, therefrom when in operation.

(132) As shown and described herein and in connection with power unit **10**, drop spreader **262** may be adapted to fit within an opening **272** (FIG. **21**) defined in tractor frame **12** of power unit **10**. Drop spreader **262** may extend transversely through tractor frame **12** and extend beyond the outer limits of tractor frame **12**, as seen in FIG. **18**. This may allow the operator access to the trough **270** to replenish particulate matter as it is depleted. This extension also provides easy access to parts of the drop spreader for maintenance and/or repair when required. At least shroud **266** and possibly motor **264** of drop spreader **262** may also at least partially rest on the left front fender **16***a* of power unit **10**.

(133) As is evident from FIG. **21**, opening **272** is located between front wheels **14***a* and rear wheels **14***b*. In PRIOR ART devices, broadcast-type particulate spreaders are typically located proximate the rear end of a vehicle. Furthermore, the location of opening **272** is located below the upper mounting platform **12***a*. The position of opening **272** therefore results in drop spreader **262** being located relative close to the surface "S". The location of drop spreader **262** between front and rear wheels **14***a*, **14***b* and the spreader's low placement on power unit **10** helps to lower the center of gravity of power unit **10** when drop spreader **262** is filled with salt. Furthermore, the location of drop spreader **262** between front wheels **14***a* and rear wheels **14***b* results in the weight of the spreader **262** being more evenly distributed over the four wheels **14***a*, **14***b*. This may have the effect of providing additional traction to power unit **10** in snowy and icy conditions. Further, the position of opening **272** places drop spreader **262** between the front and rear wheels **14** relatively close to the surface "S" to be treated with particulate materials and provides a direct path for the particulate materials to reach the surface "S". Furthermore, particulate materials are dropped onto the surface "S" ahead of rear wheels **14***b* and this may further enhance the traction of power unit **10** on surface "S".

(134) Drop spreader **262** may be bolted onto tractor frame **12** by inserting fasteners **274** (FIG. **19**) through aligned apertures **262***c* on spreader **262** and **276** (FIG. **21**) on frame **12**. The use of fasteners **274** may allow spreader **262** to be quickly and easily detached from power unit **10** when not needed or when it is necessary to perform additional maintenance on spreader **262** or power unit **10**. The plate that initially covered hole **12***f* may be replaced when desired. When it is desired to reinstall spreader **262**, the operator will remove the plate to expose hole **12***f* and will then insert drop spreader **262** through the hole (or trough) in the direction of arrow "P" (FIG. **21**). Fasteners **274** are then used to quickly and easily attach spreader **262** to power unit **10**.

(135) Drop spreader **262** may be operatively engaged with power unit **10** so that the distribution of particulate material therefrom is dependent on the speed of power unit **10** traveling across surface "S" to be treated for its rate of spreading. In this instance, the operator may simply turn the drop spreader **262** on and make no adjustments to the flow of materials from the spreader during operation of power unit. When the task is completed, the operator will then turn drop spreader **262** off.

(136) With reference to FIG. **1**, power unit **10** may include a liquid dispensing system **30**. Liquid dispensing system **30** may be a known liquid dispensing system that includes a pressurized storage tank **278**, one or more spray nozzles **280**, pressurized hoses (not shown), and one or more pumps (not shown). Tank **278** is utilized to hold a quantity of brine that may be used to treat surface "S" for snow and ice removal. Alternatively, the brine may be utilized as a preventative coating to pre-treat surface "S" to prevent snow and ice buildup. Storage tank **278** may be mounted anywhere on power unit **10**. As illustrated in FIG. **1**, storage tank **278** may be mounted to frame **12** at a location that is generally vertically above front wheels **14***a* and forwardly of control panel **24**. Tank **278** may be a top-loading tank that has a cap **278***a* in an upper region thereof. The cap **278***a* may be unscrewed to permit brine to be added to tank **278** and may be replaced when tank **278** is full. In

some examples, tank **278** may include a handle **278***b* that permits tank **278** to be lifted upwardly in order to remove tank **278** from power unit **10** or to place tank **278** onto power unit **10**.
(137) It will be understood that hoses connect tank **278** to one or more spray nozzles **280**. In one example, spray nozzles **280** may be located at the lower rear end of power unit **10** and on either side of operator platform **18** (FIG. **2**). In other examples, the one or more spray nozzles **280** may be mounted underneath the operator platform **18** on the rear **10***b* of power unit **10**. This arrangement will allow liquid dispensing system **30** to deliver a brine solution to surface "S" behind power unit **10**. In other words, the brine solution is delivered to surface "S" after the power unit **10** has already driven over that surface "S" and moved on.
(138) Locating spray nozzles **280** toward rear **10***b* of power unit **10** allows for brine to be sprayed from nozzles after power unit **10** has already moved on. This ensures that a more consistent coat of brine is left on surface "S" without tread marks from wheels **14***a*, **14***b*. As a result, surface "S" that is treated has a more consistent level of removal of snow and ice therefrom because the brine has been applied more evenly over surface "S" and has not been removed by wheels **14***a*, **14***b*. The placement of spray nozzles **280** toward rear **10***b* of power unit **10** also helps to increase the life of power unit **10** because the salt-water mix will be less likely to adhere to the steel of the undercarriage (i.e., to the underbelly of the frame **12**).
(139) Spray nozzles **280** may be configured to have variable spray patterns that can be readily adjusted by the operator according to the desired type and location of application. According to one aspect, multiple nozzles **280** may be operationally connected to liquid dispensing system **30** and shutoff valves may be installed inline to vary the spray pattern and/or a width of the spray path. The operator is able to select whether to place brine on a 36″ or a 48″ wide ground surface and the spray pattern and/or width of spray nozzles **280** will adjust accordingly. The width of spray from spray nozzles **280** may therefore be varied to substantially suit a narrower sidewalk (36″) or a wider sidewalk or surface (48″).
(140) A pressure valve may be provided on tank **278**, or on spray nozzles **280**, or somewhere in the hoses that connect tank **278** and spray nozzles **280** together. The pressure valve helps to eliminate any brine exiting through nozzles **280** after the pump has shut off. This arrangement helps to minimize waste as well as overspray that might kill grass and other vegetation on either side of surface "S" being treated.
(141) Liquid dispensing system **30** may further include a hand sprayer **282** (FIG. **3**B) to allow operator to spray surfaces that cannot be covered or reached by spray nozzles **280**. For example, steps or walkways that are too narrow to allow passage of power unit **10** or are laterally adjacent to one of the sides **10***c*, **10***d* of power unit **10** may be treated using hand sprayer **282**. Hand sprayer **282** may be positioned on power unit **10** so that the end that may be held by the operator extends upwardly from the brine tank and for a short distance over top **22***e* of control panel **24**. FIG. **1** shows a support member **284** that holds the end of hand sprayer **282** (that includes a trigger **282***a*) in a ready-position over top **22***e*. When it is needful to use the hand-sprayer, the operator may simply remove the end of the hand sprayer **282** from support member **284**, direct a nozzle (not shown) on an end of tube **282***b* in a desired direction, and squeeze the trigger **282***a*. It will be understood that hand sprayer **282** is connected to brine tank **278** by a hose that is not illustrated in the attached figures. Tube **282***b* may be substantially rigid so that the nozzle provided thereon is easily controlled and pointed in a desired direction.
(142) Having thus described the components and elements, the method of operation is now provided herein. Depending on the implement **80** installed on power unit **10**, hydraulic control lever **66** may have varying functions which may be chosen by a person of skill in the art to best correlate with the implement **80** chosen. Therefore, the functions described herein may not all be applicable with all foreseeable implements **80** that may be engaged with power unit **10**. Additional functions not described herein may likewise be possible and applicable. It will thus be understood that modifications to the control system for hydraulic control lever **66** may be made if appropriate.

(143) Hydraulic control lever **66** may move in multiple directions such as moving along axes such as a left/right axis (x-axis) and a forward/rearward axis (Y-axis). Hydraulic control lever **66** may have a float position that is substantially the point at which the x-axis and the y-axis meet. This float position may be considered neutral for the hydraulic controls and will effect no movement of the corresponding implement **80**. According to a "standard" control scheme, moving hydraulic control lever **66** along the x-axis may cause an associated implement **80** to rotate from right to left or vice versa, while movement of hydraulic control lever **66** along the y-axis may cause implement **80** to be raised or lowered, depending on whether the lever **66** is moved forwardly or rearwardly on control panel **24**. According to one aspect, implement **80** that is in contact with surface "S" may be raised (lifted off surface "S") by pulling the hydraulic control lever **66** backwards (i.e., in a direction moving from front **10***a* to rear **10***b* of power unit **10**. Once the implement **80** has reached a desired height, hydraulic control lever **66** may be allowed to float back to its neutral position, and implement **80** will maintain its position until hydraulic control lever **66** is moved along the y-axis again. To lower implement **80**, hydraulic control lever is pushed forwardly (i.e., in a direction moving from rear **10***b* to front **10***a*) until implement **80** rests on the surface "S". Hydraulic control lever **66** may then be allowed to float back to its neutral position. The implement **80** will remain on the surface "S" until the hydraulic control lever **66** is moved along the y-axis again.
(144) Implement **80** control will be discussed further below with regards to the operation thereof.
(145) Control panel **24** may include controls for the drop spreader **262** of the particulate material spreader system **28** described herein, if such a system **28** is provided on power unit **10**. Motor **264** of drop spreader **262** may be an electric motor **264** that may be connected to an auxiliary power switch on control panel **24**, such as the third auxiliary power switch **58**, for example. If the operator determines that operation of drop spreader **262** is desired, third auxiliary power switch **58** may be toggled to the ON position to power motor **264**. The activation of motor **264** will cause the drive chain (behind shroud **266**) to rotate auger **268**. Rotation of auger **268** causes the release of particulate matter under power unit **10** through a transverse slot in bottom **262***b* of drop spreader **262** and in the direction of arrow "M", i.e., directly onto surface "S".
(146) Once the store of particulate matter is depleted, or operation of drop spreader **262** is no longer desirable, operator may toggle third auxiliary power switch **58** to the OFF position. As indicated earlier herein, the operator may replenish the particulate material through the openings in the top **262***a* of drop spreader **262** as indicated by arrows "N" in FIG. **20**. It will be understood that covers may be provided to close off access to the trough **270** when drop spreader **262** has been replenished.
(147) In instances where power unit **10** is equipped with liquid dispensing system **30**, as described herein, operation thereof may likewise be managed by operator through control panel **24**. Specifically, operation of liquid dispensing system may involve delivery of power from engine **26** to brine pumps (not shown) which may in turn deliver liquid from the tank **278** to spray nozzles **280** and/or hand sprayer that is operable through contact with hand sprayer **282**. Brine pumps may be operatively connected to an auxiliary power switch on control panel **24**, e.g. third auxiliary power switch **58**. Switch **58** may be toggled between an ON and OFF position according to the judgment of the operator. If liquid dispensing system **30** is desired to be used, once pumps are powered through operation of third auxiliary power switch **58**, spray nozzles **280** may be powered on by placing nozzle toggle switch **52** into the ON position. Fluid pressure within the liquid dispensing system **30** may be monitored via pressure gauge **50** and system may be turned ON or OFF as the operator deems it necessary to spray brine on surface "S" or to cease applying brine to surface "S" according to the conditions present.
(148) In instances where both particulate material spreader system **28** and liquid dispensing system **30** are provided on power unit **10**, third auxiliary power switch **58** may control one of these two systems while the other system may be connected to a separate auxiliary power switch. Control panel **24** is described herein as having four auxiliary power switches, (**40**, **42**, **58**, and **60**), any of

which may be assigned to control any of optional electrical components and/or systems. For example, on a power unit equipped with headlights **48**, rear work lights **46**, particulate matter spreader system **28**, and liquid dispensing system **30**, each of the first through fourth auxiliary power switches **40**, **42**, **58**, **60** may be assigned to one of these components/systems.
(149) By way of a second non-limiting example, if each of the previous four optional components are provided on power unit **10**, and a fifth component, e.g. a powered implement **80**, such as power broom **80**, is also installed, a fifth auxiliary power switch (not shown) may be installed on control panel **24**. It will be understood that each system and/or component provided on power unit **10** should preferably have its own dedicated power control switch on control panel **24**.
(150) Power transfer system **36** may be controlled from control panel **24** by operation of the PTO switch **56**. Specifically, if implement **80** utilizing power transfer system **36** is engaged with power unit **10**, the operator may pull up on PTO switch **56** to engage power transfer system **36**. The engagement of power transfer system **36** may cause an electric clutch (not shown) to engage to rotate engine pulley **230** (FIG. **16**) of the first belt-drive system of system **36**, thereby operating PTO drive belt **232** to engage with first pulley **234**, double pulley **236**, and first tensioner pulley **238** and causing them to rotate. The rotation of double pulley **236** causes attachment belt **156** in the second belt-drive system of system **36** to power pulley **154** on implement **80**, thereby providing power to the implement **80**. To disengage the power transfer system **36**, the operator may depress the PTO switch **56**. This disengages the electric clutch and causes the PTO drive belt **232** to stop operation. This, in turn, stops power from being transferred to implement **80** and attachment ceases to operate. So, in the case of powered broom **80**, activation of the PTO transfer system **36** causes brush wheel **158** to be rotated to clear snow from surface "S". Deactivation of PTO transfer system **36** causes brush wheel **158** to stop rotating.
(151) PTO switch **56** may include a safety mechanism wherein the engine **26** cannot be started if power transfer system **36** is engaged. Therefore, if PTO switch **56** is engaged and the operator steps off the operator platform **18** or otherwise turns off the engine **26**, PTO switch **56** must be depressed to disengage power transfer system **36** before the engine **26** may be restarted.
(152) Having thus described the general operation of power unit **10** and control panel **24**, operation of the individual systems and components of power unit **10** will now be described.
(153) With reference to FIGS. **7**-**10**, weight transfer system **34** may transfer weight rearwardly from implement **80** to front wheels **14***a* of power unit **10**. This rearward weight transfer may increase traction of front wheels **14***a*, aid in lifting the implement **80** off surface "S", and tends to reduce resistance between the implement **80** and surface "S" while power unit **10** is in operation. The operator may select three different transfer rates, represented by a first position **120***e* of adjustment bolt **136** in first slot **120**, a second position **120***c* of adjustment bolt **136** in first slot **120**, and a third position **120***b* of adjustment bolt **136** in first slot **120**. The first position, **120***e*, represents a zero weight transfer, the third position **120***b* represents a maximum weight transfer, and the second position **120***c* represents a weight transfer rate halfway between zero weight transfer and the maximum weight transfer. The total representative weight transferred by weight transfer system **34** will vary dependent upon the implement **80** provided on power unit **10**. The heavier the implement **80**, the more the transfer of weight onto front wheels **14***a* may be beneficial, i.e., provides a most efficient and safest operation of power unit **10** and implement **80**.
(154) To utilize weight transfer system **34**, the operator makes sure the power unit is switched off and then raises the hitch **84** and implement **80** to their highest position off surface "S" using hydraulic control lever **66** as previously described herein. The operator will then loosen adjustment bolt **136** and slide it along first slot **120** to the desired one of the first, second and third positions. Once in the desired position, the adjustment bolt **136** is then tightened so that the selected position is maintained. Once the desired position is locked in, the operator may continue with normal operation of power unit **10**.
(155) With reference now to FIGS. **14** and **15**, the rotation of attachment frame **85** (and therefore

the movement of implement **80** to the left or right) is illustrated. While rotating an attachment from side-to-side is known, the left/right rotation of implement **80** herein is believed to be unique in that the rotation of implement **80** occurs about a central axis defined by the first forward mounting point **166** on the brush wheel housing **162**. The unique semi-circular shape of arcuate frame member **168** and its interaction with other frame components further facilitates this unique rotation about the central axis and provides benefits discussed herein relative to the operation of implement **80**.

(156) The rotation of implement **80** may be controlled by operator using control panel **24**, specifically hydraulic control lever **66**, as discussed previously herein. Hydraulic control lever **66** is operatively engaged with hydraulic cylinder **224**. Rotation of implement **80** is hydraulically controlled through hydraulic cylinder **224** that may be actuated to retract the piston thereof and pull implement **80** to the left or to extend the piston thereof and thereby push implement **80** to the right when the operator moves the hydraulic control lever **66** along the x-axis.

(157) In PRIOR ART implement control, particularly those devices that may rotate between the left and the right, the axis of rotation is typically located at a rear of the attachment. This placement may cause the entire PRIOR ART attachment, including all frame members connected therewith, to rotate in unison. In turn, the rotation of the entire PRIOR ART attachment causes the leading edge thereof, i.e. the edge pointed most forward once rotation has occurred, to move forward in front of the vehicle, and into the path of travel. For example, if a PRIOR ART implement, such as a snowplow blade or a broom is pivoted to the left according to known operations, the right edge of the blade or broom moves forward and towards the center of the vehicle's path. The movement towards the center of the vehicle's path exposes the vehicle's right side wheels to a travel path that is not intended for snow and ice removal and causes the PRIOR ART attachment to clear a path of snow and/or ice that is narrower than the full width of the PRIOR ART attachment. This results in the machine have to move through additional passes to clear the same area, or results in leaving a portion of the area un-cleared. This may be dangerous as most of these areas are roadways and/or sidewalks where people may be injured due to unsafe driving or walking conditions if snow or ice is not adequately removed therefrom.

(158) The operation of the presently described power unit **10** in pivoting the implement **80** to the left or to the right differs from the PRIOR ART devices in that the provision of a centralized axis of rotation “Z” is forward of most of the attachment frame **85**. This configuration allows for rotation of the implement **80** to occur with a nearly zero degree radius. Accordingly, as clearly seen in FIGS. **14** and **15**, the edges of implement **80** remain outside of a plane “P**1**” that extends along left side **10***c* of power unit and outside of plane “P**2**’ that extends along right side **10***d* of power unit **12** when attachment **10** is turned to the left (FIG. **14**) and when implement **80** is turned to the right (FIG. **15**, respectively). As a consequence, the implement **80** clears a pathway through snow and ice on surface “S” that is at least as wide as the width of implement **80** if facing straight forward such as in FIG. **5**.

(159) Furthermore, the semi-circularly shaped arcuate frame member **168** is located entirely behind the axis of rotation and turns within the track created by the combination of first, second, and third bearing mounts **182**, **184**, and **186**, mounting plate **194**, and top plates **190**. As hydraulic cylinder and piston **224** pushes or pulls brush wheel housing **162** to the left or to the right, arcuate frame member **168** turns, causing bearings **188** to rotate about their associated axes (defined by bearing bolts **192**) to permit movement of arcuate frame member **168**. Stops **208** function to limit the extremes to which arcuate frame member **168** may rotate, which in turn defines the limits to which implement **80** may rotate. The provision of stops **208** ensures that implement **80** does not over-rotate and cause damage to any components thereof, nor does it direct snow, ice, and debris in any undesired or unanticipated direction.

(160) Keeping the edges of implement **80** outside the left and right sides **10***c*, **10***d* of power unit **10** ensures that wheels **14***a*, **14***b* have the best possible traction with surface “S” as they travel over surface “S” behind implement **80** and therefore travel on a part of surface “S” that has already been

cleared of snow and ice by implement **80**. This further ensures clearing of the desired area of snow and ice in as few passes as possible and therefore minimizes the operational time and cost of power unit **10**.

(161) Implement **80** may further be rotated about a longitudinal axis that is substantially parallel to the direction of travel of power unit **10**. The longitudinal axis of rotation in question is defined by pivot bar **202** and pivot sleeve **200**. Specifically, pivot sleeve **200**, as discussed above, is fixedly attached to the bottom face **194***b* of mounting plate **194**. Pivot bar **202** is inserted into the bore of pivot sleeve **200**, and the junction of pivot bar **202** and pivot sleeve **200** provides the only connection between implement **80** and attachment frame **85**. The ability to pivot implement **80** about this longitudinal axis may allow implement **80** to more closely follow the contours of surface "S" over which power unit **10** is used. Again, this allows for a more complete snow and ice removal from surface "S". Furthermore, when in raised transport, the longitudinal pivot feature allows the implement **80** to remain level, preventing any snag accidents which may occur when one side of an attachment drops below the opposite side when an obstacle on the surface "S" is encountered.

(162) The inclusion of slop or movement in the first and second forward mounting points **166**, **168**, as previously discussed herein, further facilitates rotation about the longitudinal axis. This movement in mounting points **166**, **168** allows the hydraulic cylinder and piston **224** and longitudinal support member **218** to move relative to the mounting points **166**, **168**. This aids in preventing damage that could otherwise be caused by rotation of implement **80**.

(163) Although described in relation to implement **80**, it will be understood that the arcuate frame member **168**, central axis, and associated components may be adapted to allow similar rotation with attachments other than the powered broom **80** or snowplow blade **82**. Similar advantages would be recognized in adapting this unique configuration to other implements that operate under similar constraints.

(164) With reference to FIGS. **17**A-D, the process of detaching implement **80** from power unit **10** is shown. FIG. **17**A shows the rearward section of implement **80** in engagement with power unit **10** i.e., in a locked position where hitch **84** is locked to attachment frame **85**. Specifically, FIG. **17**A shows hitch tab **86***b* engaged within the slot **148***a* (FIG. **5**) of first support member **148**. This figure also shows first latch **112***b* engaged in slot **148***f* (FIG. **5**) defined in second lower hitch plate **148***b*. The attachment latch handle **112** is in the forward and locked position, and lock tab **112***d* is engaged with handle lock **116** in the locked position. This may be considered to be the "normal" operating position for the attachment frame **85**, i.e., where implement **80** is engaged and may be operated.

(165) In order to disconnect the implement **80** from the hitch **84**, the first step is to make sure power unit **10** is parked on a level surface with parking brake **62** engaged and the implement **80** in a lowered position where it rests on surface "S". Once power unit **10** is in the aforementioned position, the engine **26** is shut off and any power to the implement **80** (if provided) should be disengaged. Next, the operator may release hydraulic pressure within the system by moving the hydraulic control lever **66** left and right on the x-axis and any hydraulic lines going to the implement **80** from power unit **10** may be disconnected. Next, if the implement **80** is engaged with power transfer system **36**, the adjustable tension spring **246** may be disengaged from the mounting plate **242** and engaged with spring catch plate **250**. This may serve to release all tension on the attachment belt **156** thereby allowing attachment belt **156** to be removed from the double pulley **236**. If implement **80** does not utilize power transfer system **36**, the operator may skip the steps of disengaging the adjustable tension spring **246** and removing the attachment belt **156** as the components of power transfer system **36** are not being utilized.

(166) Next, as seen moving from FIG. **17**A to FIG. **17**B, the operator may rotate the handle lock **116** counter-clockwise in the direction of arrow "F" (FIG. **17**B) to disengage first lock member **116***b* from lock tab **112***d*. Simultaneously, operator may rotate attachment latch handle **112**

rearward (clockwise and in the direction indicated by arrow “E”) about the axis defined by lower crossbar **94** and engage locking tab **112***d* with second lock member **116***c*. This removes first latch **112***b* and second latch **140** from engagement with elongated lower slots **148***f*, **150***f* (FIG. **11**) within first and second lower hitch plates **148**, **150**. The bottom portion of hitch **84** is now disengaged from attachment frame **85**, and thereby disengaged from implement **80**. The operator may then restart engine **26** of power unit **12** and lower the hitch **84** down while slowly reversing power unit **10** away from the implement **80**. The lowering of hitch **84** tends to cause implement **80** to rotate in the direction of arrow “G” (FIG. **17**C); pivoting around upper crossbar **92** as it rotates. Additionally, walls **148***g* and **150***g* rotate about the curved forward edges of first and second hitch tabs **86***b*, **88***a*, thereby disengaging the first and second hitch tabs **86***b*, **88***a* from the elongated upper slots **148***e*, and **150***e* within first and second upper hitch plates **148***a*, **150***a*. Implement **80** may then be lifted off hitch **84** in the direction of arrow “H” (FIG. **17**D) to complete the disconnection of implement **80** from power unit **10**.

(167) With reference to FIGS. **18**A-B, attaching a different implement **80** such as snowplow blade **82** to power unit **10** may follow a similar process as detaching implement **80**, the rotating broom, therefrom. The attachment steps are essentially the detachment steps performed in reverse.

(168) As depicted in FIGS. **18**A-**18**B, a snowplow **82** is shown being attached to power unit **10**. As indicated earlier herein, snowplow **82** includes a blade **358** that has a centrally located, vertically extending support **356** mounted on the blade's rear surface. The first step in the attachment process is to align power unit **10** with the implement **80** and drive power unit **10** slowly forwardly and towards the attachment, stopping when the hitch **84** is in close proximity to attachment frame **385**. Next, the operator lowers the hitch **84** in the direction of arrow “I” (FIG. **18**A) using hydraulic control lever **66** on the control panel **24** until the first and second hitch tabs **86***b*, **88***a* are located below the slots (such as slot **348***e* in upper plate **348***d* and the associated slot that is provided on the second support member. The operator may then drive power unit **10** forward slowly. This motion causes hitch **84** to pivot about upper crossbar **92** and the curved surfaces on the forward edge(s) **86***c*, **88***c* of first side plate **86** and second plate **88** until the first and second hitch tabs **86***b*, **88***a* are aligned with and under the elongated upper slots **348***e* and the slot in second support member.

(169) Next, the operator may raise the hitch **84** a distance from the ground surface. This will cause implement to rotate in the direction of arrow “J” and causes the hitch tabs **86***b*, **88***a* to be received within the elongated upper slots **348***e* and the equivalent slot in the second support member. The hitch **84** should continue to be raised until the implement **80** begins to rise off surface “S”. The lifting of implement **80** causes hitch **84** to rotate about upper crossbar **92** so that the lower region of implement **80** moves towards hitch **84**. The lower region of the implement **80** will move into a proper position to engage first and second latches **112***b*, **138***a* in slot **348***f*, and the similar slot in the second support member of attachment frame **385**.

(170) At this point, the operator may shut off engine **26** and engage parking brake **62** to prevent any undesired movement of power unit **10**. The operator then may rotate handle lock **116** in the opposite direction of arrow “L” (FIG. **18***b*) to disengage lock tab **112***d* from second lock member **116***c* while simultaneously rotating attachment latch handle **160** forwardly (i.e., counterclockwise in the direction of arrow “K” (FIG. **18**B). This engages first and second latches **112***b*, **138***a* within elongated lower slots **348***f*, and the slot in the second support member. Handle lock **116** may then be rotated clockwise in the direction of arrow “L” to engage lock tab **112***d* with first lock member **116***b* in order to prevent attachment latch handle **112** from rotating out of the latched position.

(171) If the implement **80** being attached to the power unit **10** is to be engaged with power transfer system **36** components, the next step is to place the attachment belt **156** around the open groove on double pulley **236**. The operator will then secure attachment belt **156** on implement **80** in place by engaging tension spring **246** and spring arm **246***a* with tension adjustment plate **248**. This causes second tensioner pulley **244** to put attachment belt **156** under tension. Next, the attachment belt **156** should be inspected visually to ensure proper engagement within grooves of double pulley **236** and

second tensioner pulley **244** before proceeding. If attachment belt **156** is not properly engaged, tension may be released so attachment belt **156** may be re-seated. If implement includes hydraulic and/or electrical components, the hoses for the hydraulics and the electrical systems may be connected to corresponding outlets on power unit **10**. The power unit may then be operated.

(172) As discussed further herein, attachment frame **85** may include additional elements dependent upon the implement **80** installed therewith. Additionally, if the specific implement **80** installed does not require an element previously discussed herein, such elements may be omitted according to the judgment of a person of skill in the art.

(173) It will be further understood that the implements and operation described herein need not be limited to snow and ice removal and treatment, but could also be modified for use in earth or sand movement/removal, or in other similar and/or related endeavors. It will be appreciated by a person of skill in the art therefore, that this technology has applications beyond the snow and ice removal industry and may be readily adapted for other uses without undue experimentation or modification.

(174) Also, various inventive concepts may be embodied as one or more methods, of which an example has been provided. The acts performed as part of the method may be ordered in any suitable way. Accordingly, embodiments may be constructed in which acts are performed in an order different than illustrated, which may include performing some acts simultaneously, even though shown as sequential acts in illustrative embodiments.

(175) As used herein in the specification and in the claims, the phrase “at least one,” in reference to a list of one or more elements, should be understood to mean at least one element selected from any one or more of the elements in the list of elements, but not necessarily including at least one of each and every element specifically listed within the list of elements and not excluding any combinations of elements in the list of elements. This definition also allows that elements may optionally be present other than the elements specifically identified within the list of elements to which the phrase “at least one” refers, whether related or unrelated to those elements specifically identified. Thus, as a non-limiting example, “at least one of A and B” (or, equivalently, “at least one of A or B,” or, equivalently “at least one of A and/or B”) may refer, in one embodiment, to at least one, optionally including more than one, A, with no B present (and optionally including elements other than B); in another embodiment, to at least one, optionally including more than one, B, with no A present (and optionally including elements other than A); in yet another embodiment, to at least one, optionally including more than one, A, and at least one, optionally including more than one, B (and optionally including other elements); etc.

(176) In the claims, as well as in the specification above, all transitional phrases such as “Comprising,” “including,” “Carrying,” “having,” “Containing,” “involving,” “holding,” “Composed of,” and the like are to be understood to be open-ended, i.e., to mean including but not limited to. Only the transitional phrases “Consisting of” and “Consisting essentially of” shall be closed or semi-closed transitional phrases, respectively, as set forth in the United States Patent Office Manual of Patent Examining Procedures.

(177) An embodiment is an implementation or example of the present disclosure. Reference in the specification to “an embodiment,” “one embodiment,” “some embodiments,” “one particular embodiment,” or “other embodiments,” or the like, means that a particular feature, structure, or characteristic described in connection with the embodiments is included in at least some embodiments, but not necessarily all embodiments, of the invention. The various appearances “an embodiment,” “one embodiment,” “some embodiments,” “one particular embodiment,” or “other embodiments,” or the like, are not necessarily all referring to the same embodiments.

(178) Additionally, any method of performing the present disclosure may occur in a sequence different than those described herein. Accordingly, no sequence of the method should be read as a limitation unless explicitly stated. It is recognizable that performing some of the steps of the method in a different order could achieve a similar result.

(179) In the foregoing description, certain terms have been used for brevity, clearness, and

understanding. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes and are intended to be broadly construed.
(180) Moreover, the description and illustration of various embodiments of the disclosure are examples and the disclosure is not limited to the exact details shown or described.

Claims

1. A powered vehicle comprising: a powered vehicle having differential steering composed of left and right drive control levers; a frame having a front end and a rear end; a pair of front wheels mounted proximate the front end of the frame; a pair of rear wheels mounted proximate the rear end of the frame, wherein the left drive control lever controls wheels on a left side of the powered vehicle and the right drive control lever controls wheels on a right side of the powered vehicle; a weight transfer system provided on the powered vehicle; a hitch assembly provided as a part of the weight transfer system; wherein the hitch assembly is located proximate the front end of the frame and is adapted to engage an attachment to the powered vehicle and to position the attachment forwardly of the pair of front wheels, and wherein said engaged attachment has a weight; wherein the weight transfer system is operable to selectively transfer at least some of the weight from the attachment and in a direction moving rearwardly towards the rear end of the frame; and wherein the at least some of the weight of the attachment is moved onto the pair of front wheels.
2. The powered vehicle according to claim 1, wherein a center of gravity of the powered vehicle is moved rearwardly by the transfer of the at least some of the weight from the attachment onto the pair of front wheels.
3. The powered vehicle according to claim 1, wherein the weight transfer system includes a rate transfer mechanism.
4. The powered vehicle according to claim 3, wherein the rate transfer mechanism is selectively movable between a first position, a second position, and a third position; wherein when the rate transfer mechanism is in the first position, substantially none of the weight of the attachment is transferred from the attachment and onto the pair of front wheels; wherein when the rate transfer mechanism is in the third position, a maximum weight of the attachment is transferred from the attachment and onto the pair of front wheels of the powered vehicle, and wherein when the rate transfer mechanism is in the second position, an intermediate amount of the weight of the attachment is transferred from the attachment and onto the pair of front wheels of the powered vehicle.
5. The powered vehicle according to claim 1, further comprising: a drop spreader engaged with the frame between the pair of front wheels and the pair of rear wheels; wherein a bottom wall of the drop spreader defines an opening therein and the drop spreader is adapted to hold a quantity of particulate materials therein; and wherein the opening allows the particulate materials to drop downwardly therethrough and directly onto the surface over which the powered vehicle is traveling.
6. The powered vehicle according to claim 5, wherein the weight transfer system lowers a center of gravity of the powered vehicle after the particulate materials are loaded into the drop spreader.
7. The powered vehicle according to claim 1, further comprising: a brine tank engaged with the frame between the pair of front wheels and the pair of rear wheels, wherein a width of spray is selected to be delivered from one or more spray nozzles engaged with the brine tank, wherein the width of spray selected is based upon a width of the surface over which the powered vehicle is to travel.
8. The powered vehicle according to claim 7, further comprising: spray nozzles to deliver the width of the spray selected, wherein the width is based on one of a 36″ wide region of the surface and a 48″ wide region of the surface.

9. The powered vehicle according to claim 1, further comprising: a semi-circular mounting connected to the front end of the frame; and a rotatable broom connected to the semi-circular mounting, wherein the rotatable broom is pivotably relative to the frame via the semi-circular mounting.

10. A powered vehicle comprising: a powered vehicle having differential steering; a frame having a front end and a rear end; a pair of front wheels mounted proximate the front end of the frame; a pair of rear wheels mounted proximate the rear end of the frame; a weight transfer system provided on the powered vehicle; a hitch assembly provided as a part of the weight transfer system; wherein the hitch assembly is located proximate the front end of the frame and is adapted to engage an attachment to the powered vehicle and to position the attachment forwardly of the pair of front wheels, and wherein said engaged attachment has a weight; wherein the weight transfer system is operable to selectively transfer at least some of the weight from the attachment and in a direction moving rearwardly towards the rear end of the frame; wherein the at least some of the weight of the attachment is moved onto the pair of front wheels; and wherein the hitch assembly is selectively pivotable about a pivot axis, and wherein the weight transfer mechanism is operable to selectively change a position of the pivot axis relative to a longitudinal axis of the frame of powered vehicle, where the longitudinal axis extends between the front end and the rear end of the frame.

11. The powered vehicle according to claim 10, wherein a center of gravity of the powered vehicle is moved rearwardly by the transfer of the at least some of the weight from the attachment onto the pair of front wheels.

12. The powered vehicle according to claim 10, wherein the weight transfer system includes a rate transfer mechanism.

13. The powered vehicle according to claim 12, wherein the rate transfer mechanism is selectively movable between a first position, a second position, and a third position; wherein when the rate transfer mechanism is in the first position, substantially none of the weight of the attachment is transferred from the attachment and onto the pair of front wheels; wherein when the rate transfer mechanism is in the third position, a maximum weight of the attachment is transferred from the attachment and onto the pair of front wheels of the powered vehicle, and wherein when the rate transfer mechanism is in the second position, an intermediate amount of the weight of the attachment is transferred from the attachment and onto the pair of front wheels of the powered vehicle.

14. The powered vehicle according to claim 12, wherein the rate transfer mechanism includes: a slot defined in a side plate of the hitch assembly, said slot including a first recess, a second recess and a third recess; and an adjustment bolt selectively receivable through the slot; and wherein the adjustment bolt is selectively movable between the first recess, the second recess, and the third recess to select one of the first position, the second position, and the third position of the rate transfer mechanism, respectively.

15. The powered vehicle according to claim 10, further comprising: a brine tank engaged with the frame between the pair of front wheels and the pair of rear wheels, wherein a width of spray is selected to be delivered from one or more spray nozzles engaged with the brine tank, wherein the width of spray selected is based upon a width of the surface over which the powered vehicle is to travel.

16. The powered vehicle according to claim 15, further comprising: spray nozzles to deliver the width of the spray selected, wherein the width is based on one of a 36″ wide region of the surface and a 48″ wide region of the surface.

17. The powered vehicle according to claim 10, further comprising: a semi-circular mounting connected to the front end of the frame; and a rotatable broom connected to the semi-circular mounting, wherein the rotatable broom is pivotably relative to the frame via the semi-circular mounting.

18. A powered vehicle comprising: a powered vehicle having differential steering; a frame having a

front end and a rear end; a pair of front wheels mounted proximate the front end of the frame; a pair of rear wheels mounted proximate the rear end of the frame; a weight transfer system provided on the powered vehicle; a hitch assembly provided as a part of the weight transfer system; wherein the hitch assembly is located proximate the front end of the frame and is adapted to engage an attachment to the powered vehicle and to position the attachment forwardly of the pair of front wheels, and wherein said engaged attachment has a weight; wherein the weight transfer system is operable to selectively transfer at least some of the weight from the attachment and in a direction moving rearwardly towards the rear end of the frame; wherein the at least some of the weight of the attachment is moved onto the pair of front wheels; wherein the weight transfer system includes a rate transfer mechanism and the rate transfer mechanism includes: a slot defined in a side plate of the hitch assembly, said slot including a first recess, a second recess and a third recess; and an adjustment bolt selectively receivable through the slot; and wherein the adjustment bolt is selectively movable between the first recess, the second recess, and the third recess to select one of the first position, the second position, and the third position of the rate transfer mechanism, respectively.

19. A skid steer comprising: a frame; a ground-contacting translation assembly provided on the frame; differential steering composed of left and right drive control levers, wherein the left drive control lever controls a portion of the ground-contacting translation assembly on a left side of the skid steer and the right drive control lever controls a portion of the ground-contacting translation assembly on a right side of the skid steer; a weight transfer system provided on the skid steer; a hitch assembly provided as a part of the weight transfer system; wherein the hitch assembly is located proximate a front end of the frame and is adapted to engage an attachment to the skid steer and to position the attachment forwardly of the translation assembly, and wherein said engaged attachment has a weight; wherein the weight transfer system is operable to selectively transfer at least some of the weight from the attachment and in a direction moving rearwardly towards a rear end of the frame; and wherein the at least some of the weight of the attachment is moved onto the translation assembly.

20. The skid steer according to claim 19, wherein the ground-contacting translation assembly includes a plurality of ground-contacting rotatable elements.