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(54) **STAND-ON ADAPTABLE SURFACE CLEARER**

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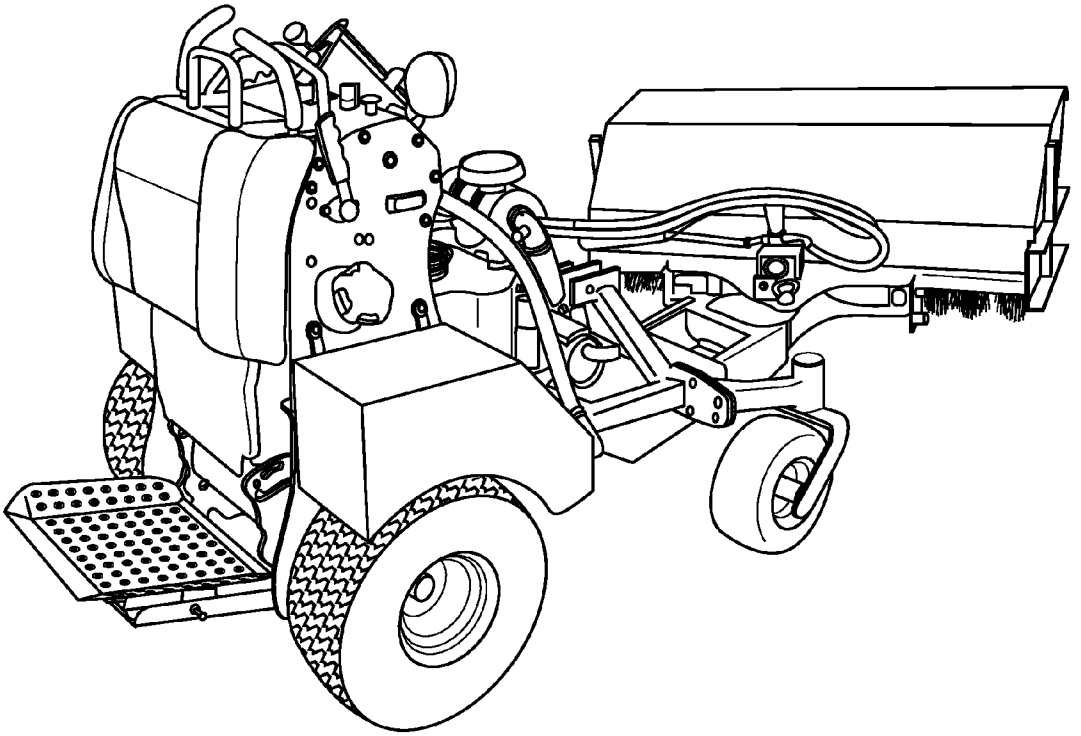
USPC **37/259**; 15/78

(57) **ABSTRACT**

A stand-on adaptable surface cleaner includes an engine, a platform for the operator, a hydraulic system, and a snow blower with an impeller and snow chute, a powered broom, or other attachment. The device may be operated while riding on the platform and results in less fatigue and greater speed of operation than existing walk-behind devices.



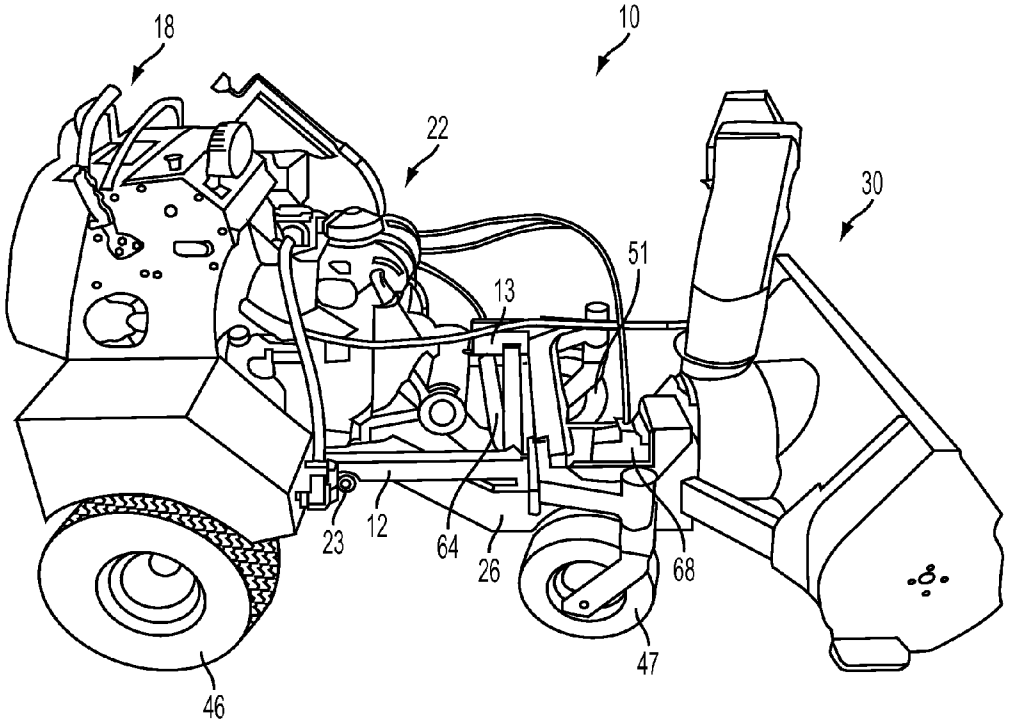


FIG. 1

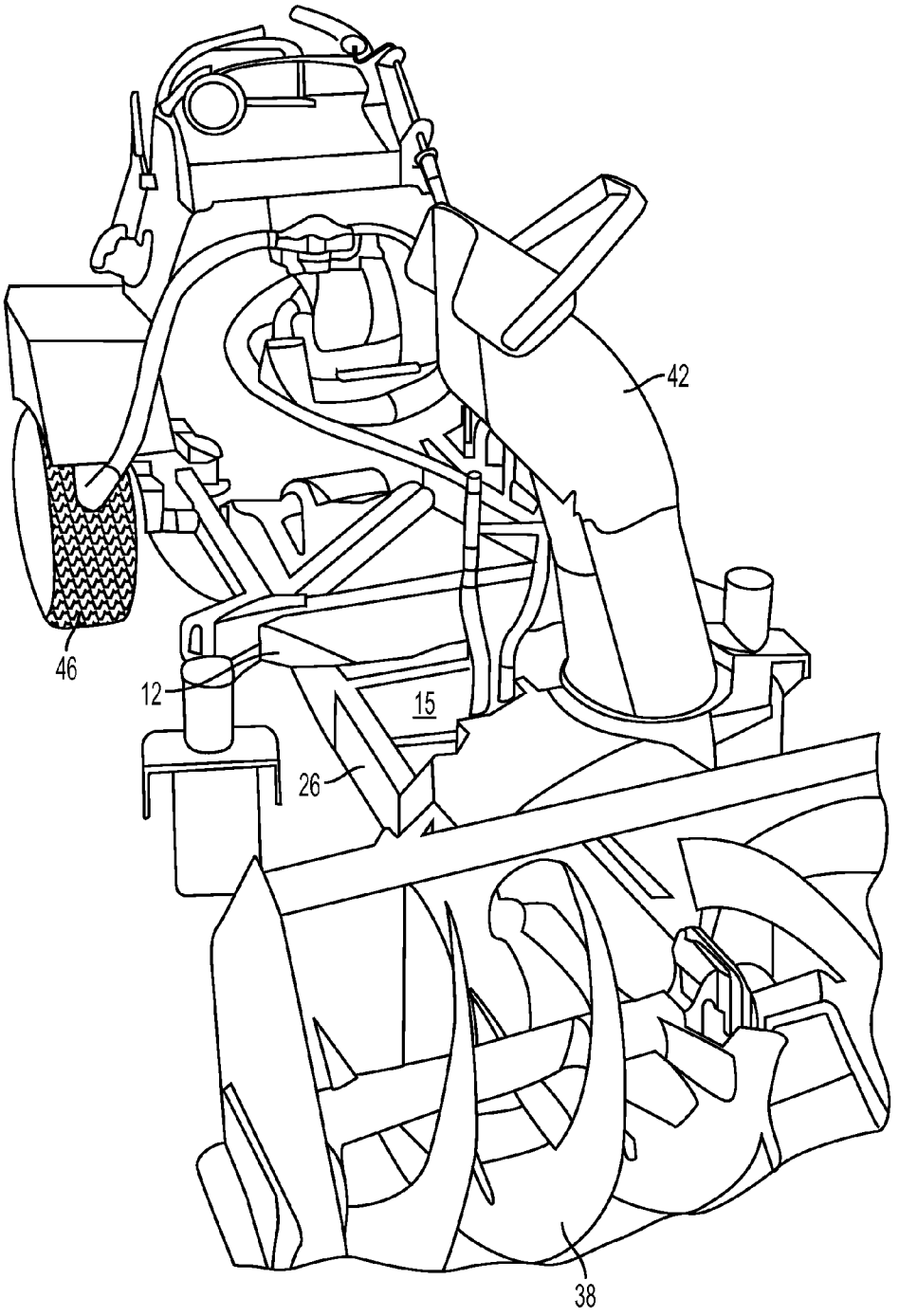


FIG. 2

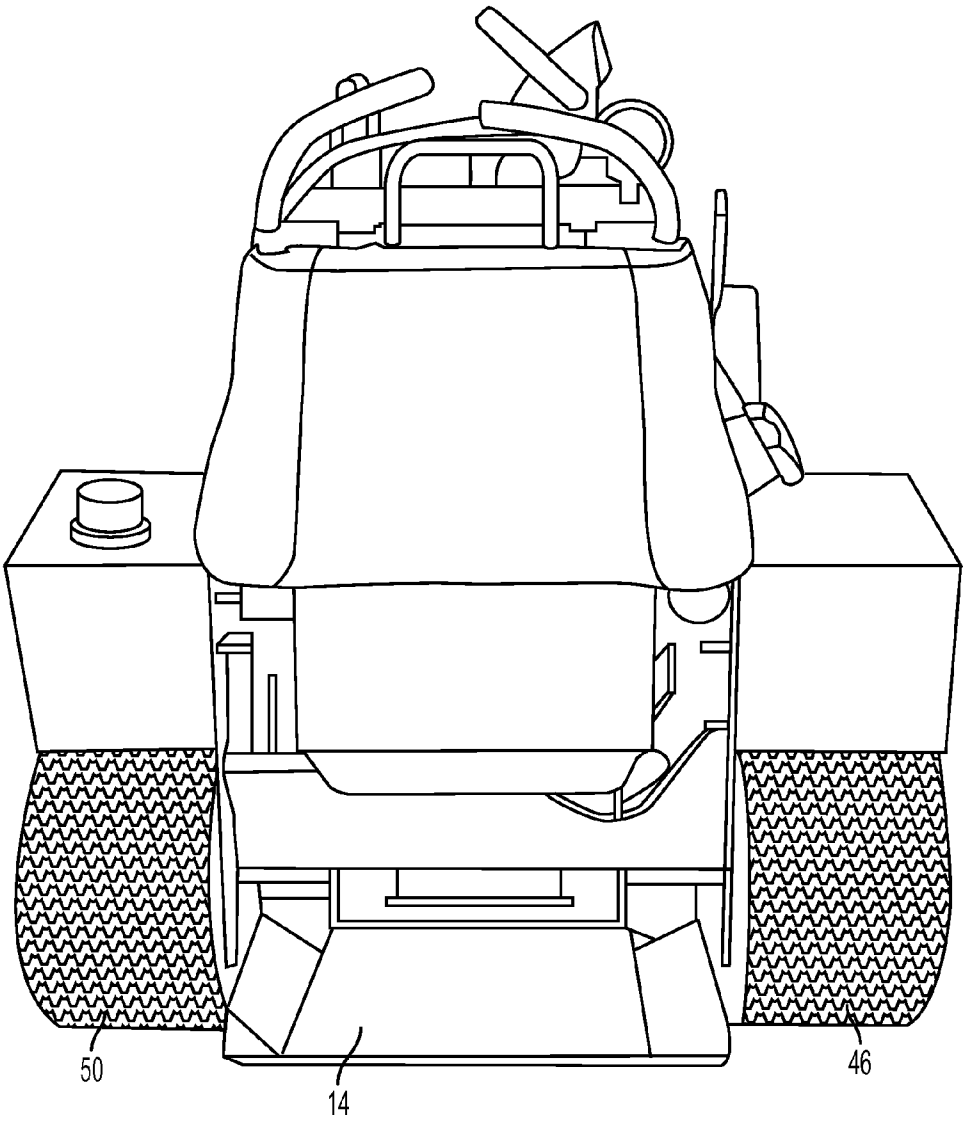


FIG. 3

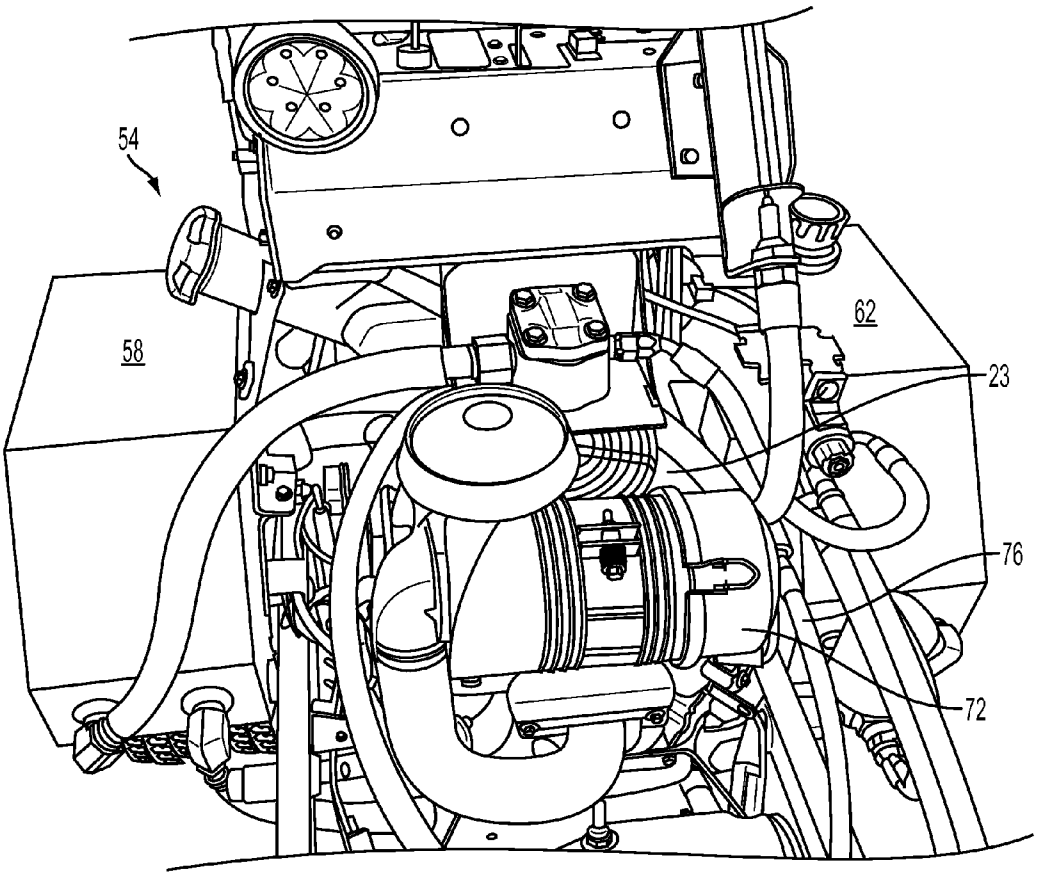


FIG. 4

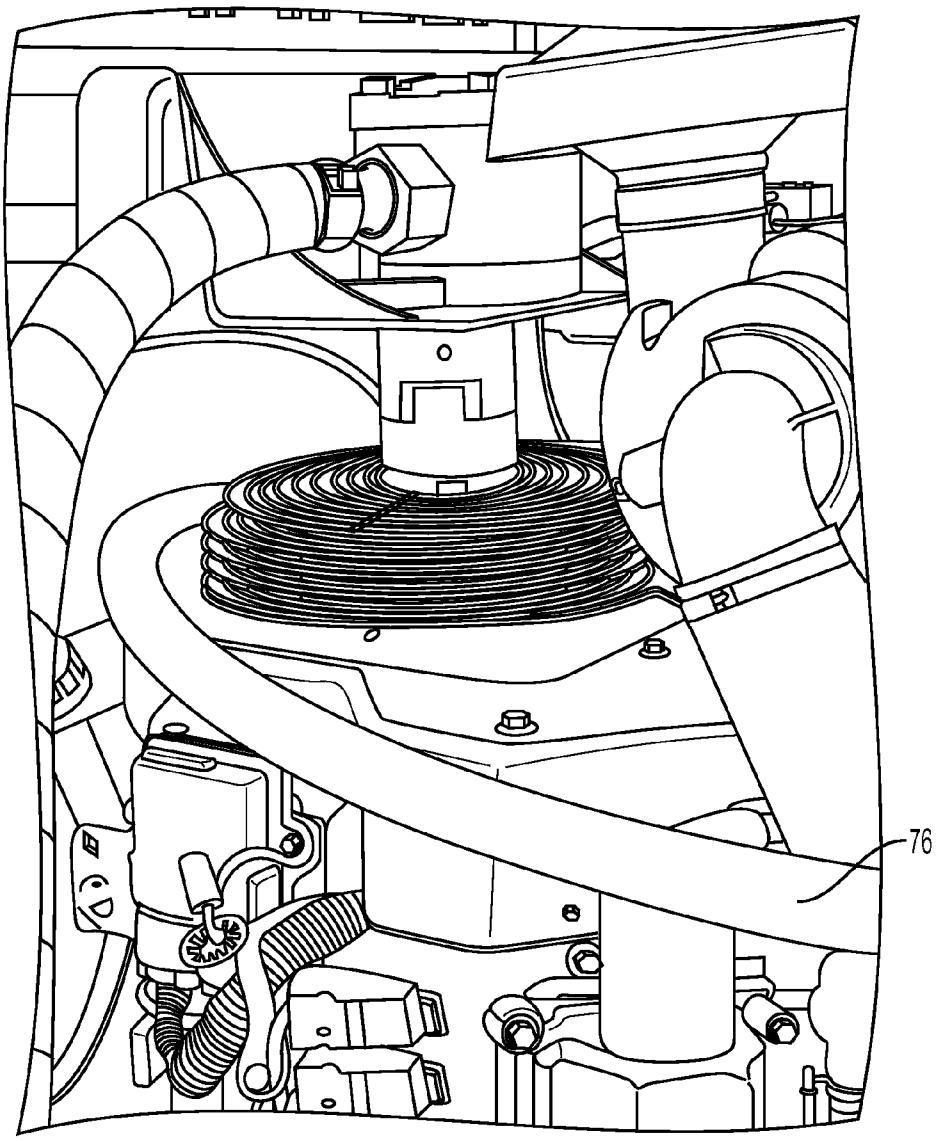


FIG. 5

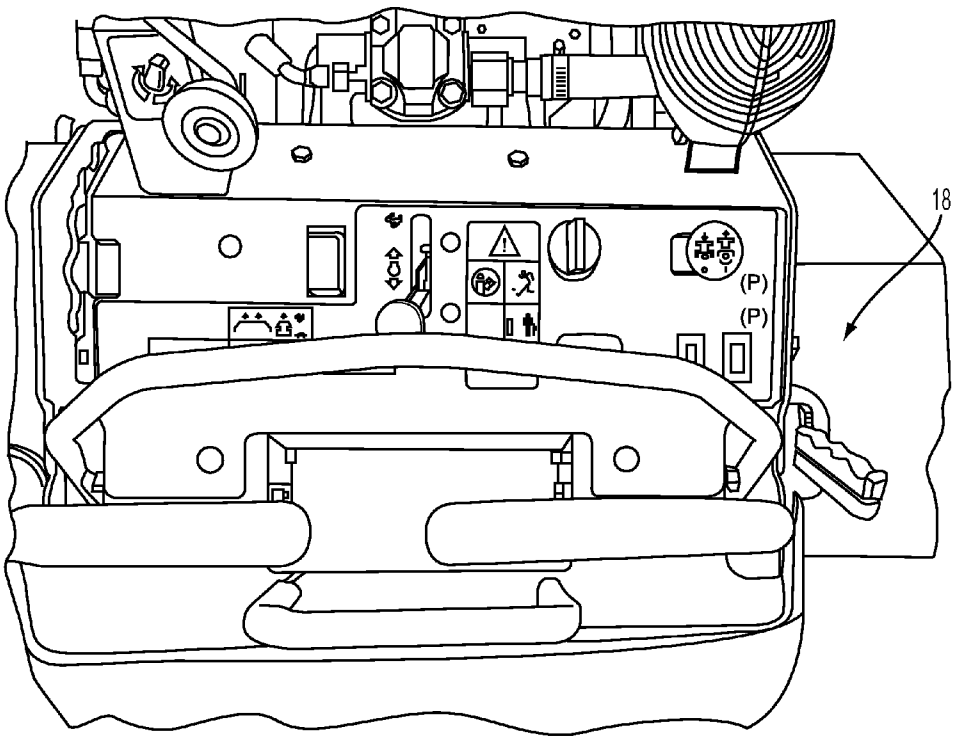


FIG. 6

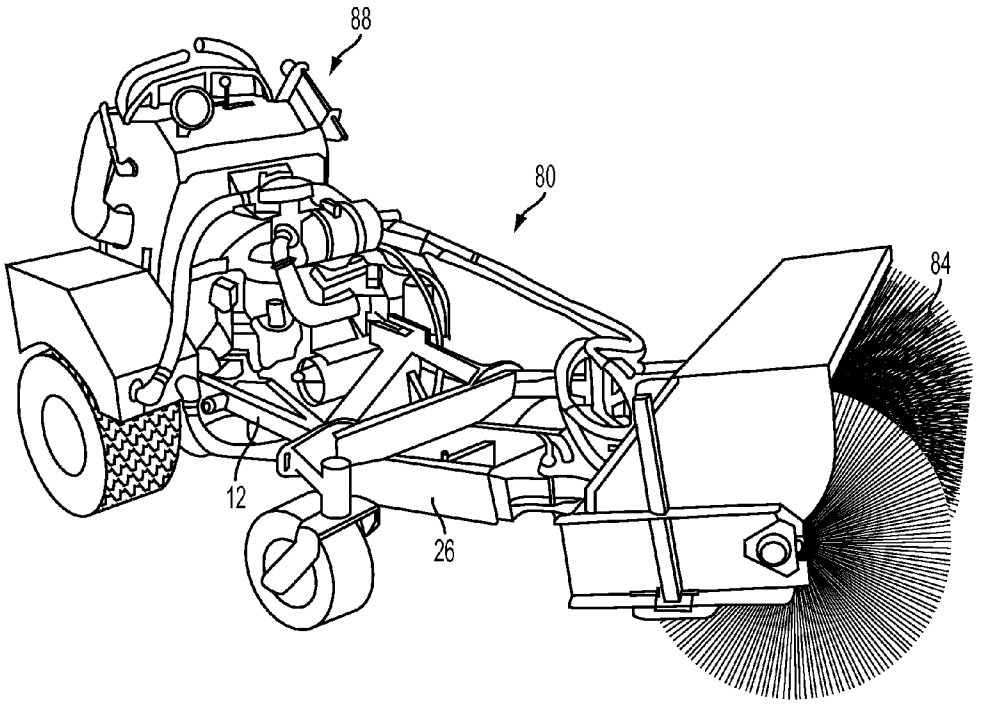


FIG. 7

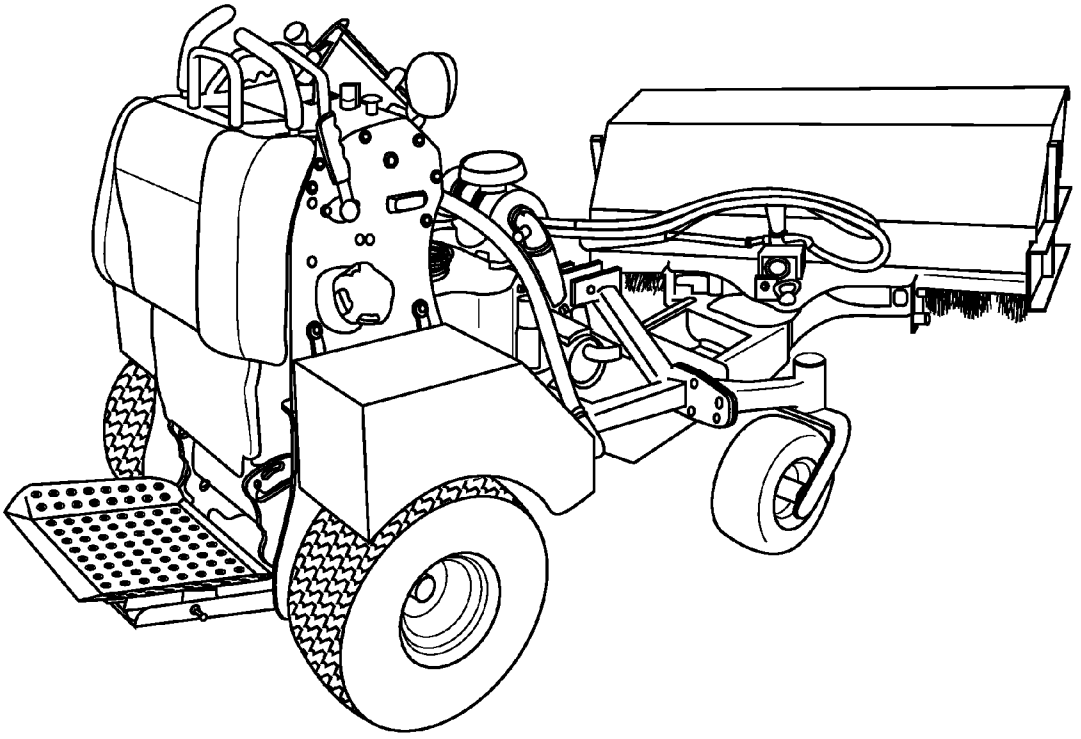


FIG. 8

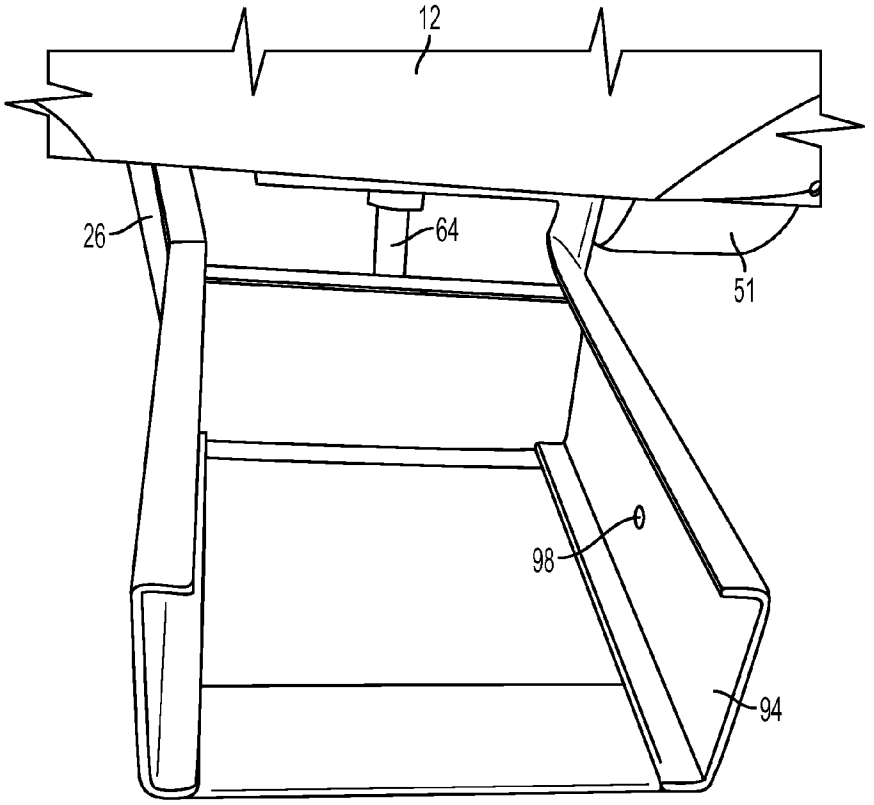


FIG. 9

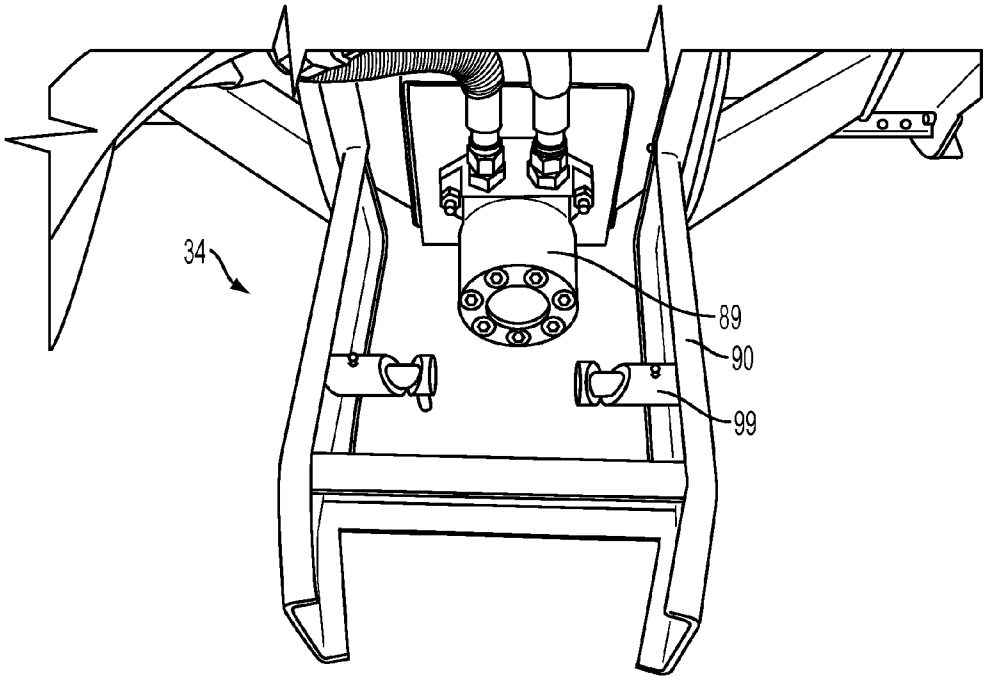


FIG. 10

STAND-ON ADAPTABLE SURFACE CLEARER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of: U.S. Provisional Patent Application Ser. No. 61/867,260, filed Aug. 19, 2013; U.S. Provisional Patent Application Ser. No. 61/980,327, filed Apr. 16, 2014; and U.S. Provisional Patent Application Ser. No. 61/987,306, filed May 1, 2014; the disclosures of which are hereby incorporated by reference herein in their entirety for all purposes.

FIELD OF THE INVENTION

[0002] The present invention relates generally to the field of stand-on work devices used to clear surfaces. More particularly, the present invention relates to devices used to clear snow or dirt from pavement and other surfaces using a stand-on powered snow blower or broom device that can be adapted to different configurations.

BACKGROUND

[0003] Snow removal involves the moving, plowing, hauling, and stacking of snow, along with ice control. Many commercial snow removal companies cater to both residential and commercial markets. Within these markets are parking lots, driveways, walkways, sidewalks, paths, parks, and other paved surfaces where individuals generally walk and/or drive or ride vehicles and equipment. Commercial snow removal is an industry that exists largely due to safety concerns, and transportation needs, as well as maintaining cosmetic appearances.

[0004] Snow removal is generally performed with a truck and a plow for large areas, and either a walk-behind snow blower with an operator, or a snow shovel and an individual, for areas that are too small or narrow for a plow to perform the snow removal. Plows generally handle the task of snow removal from large open areas, such as parking lots. However, snow removal often involves the task of removing snow from areas too small for plow applications. These include, but are not limited to, condominium complexes, shopping centers, municipalities and parks, schools, religious establishments, and any other narrowly paved locations that a plow cannot reasonably handle. Within the snow removal industry, professionals and amateurs alike currently use an individual walking behind a snow blower, or an individual using a shovel, for these applications. Either method creates a number of obstacles, including, but not limited to, operator fatigue, maneuverability, and speed of production. Working in cold, snowy conditions is hard enough on an individual, and having to walk through snowy walkways behind a large heavy snow blower adds to the stress on the operator. Operating a snow blower is a slow, straining process that lessens the productivity of the operator due to fatigue. It is also difficult for the operator to make any sudden movements with the machine due to its size and weight. The task of turning-around and re-positioning the snow blower also adds to operator fatigue. The snow can only be removed as fast as the operator can perform, and as fatigue sets in, the speed of operation slows down. Beyond operating a snow blower, using a snow shovel by hand is an even slower and more physically draining process. Lifting and moving wet, heavy snow is very straining on the body, and productivity quickly decreases due to fatigue.

[0005] As such, there is a need for a more efficient and maneuverable form of snow removal for small, narrow areas that cannot be reached with a plow. There is a need for a faster, more maneuverable method of snow removal that increases productivity and decreases operator fatigue. There is a need for a machine capable of moving a lot of snow a great distance, in a short amount of time, with minimal effort. In addition, it would be advantageous if such a device were adaptable to be used as a powered broom or in other configurations. It should be understood that the references herein to "snow" apply to other substances such as dirt or light debris.

[0006] It will be understood by those skilled in the art that one or more aspects of this invention can meet certain objectives, while one or more other aspects can lead to certain other objectives. Other objects, features, benefits and advantages of the present invention will be apparent in this summary and descriptions of the disclosed embodiment, and will be readily apparent to those skilled in the art. Such objects, features, benefits and advantages will be apparent from the above as taken in conjunction with the accompanying figures and all reasonable inferences to be drawn therefrom.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** is right side perspective view of a stand-on adaptable surface cleaner in accordance the present invention.

[0008] FIG. **2** is a partial front perspective view of the stand-on adaptable surface cleaner of FIG. **1**.

[0009] FIG. **3** is a rear perspective view of the stand-on adaptable surface cleaner of FIG. **1**.

[0010] FIG. **4** is a partial perspective top view of the stand-on adaptable surface cleaner of FIG. **1**, illustrating some of the hydraulic components.

[0011] FIG. **5** is a partial perspective right side view of the stand-on adaptable surface cleaner of FIG. **1**, illustrating some of the hydraulic components.

[0012] FIG. **6** is a top view of the controls for the stand-on adaptable surface cleaner of FIG. **1**.

[0013] FIG. **7** is right side perspective view of another embodiment of a stand-on adaptable surface cleaner in accordance the present invention.

[0014] FIG. **8** is a right rear perspective view of the stand-on adaptable surface cleaner of FIG. **7**.

[0015] FIG. **9** is a front perspective view of a female connector connected to a main frame of the stand-on adaptable surface cleaner of FIG. **7**.

[0016] FIG. **10** is a front perspective view of a male adapter plate connected to an auxiliary frame of the stand-on adaptable surface cleaner of FIG. **7**.

DETAILED DESCRIPTION

[0017] FIGS. **1-10** illustrate embodiments of a stand-on adaptable surface cleaner in accordance with the invention. More particularly, as illustrated in FIGS. **1-3**, the stand-on surface clearer includes a main frame **12**; an operator platform **14** extending from the main frame **12**; and controls **18** positioned on the main frame **12**. The operator platform **14** extends horizontally, and permits an operator to stand on the surface clearer. The surface clearer also includes a drive system **22** for propelling the stand-on surface clearer; and an auxiliary frame **26** pivotally attached at pivot point **23** to the main frame **12**. The auxiliary frame **26** is adapted to receive a surface clearing apparatus thereon, as further explained below.

[0018] More particularly, the pivot connection **23** of the auxiliary frame **26** to the main frame **12** is by a single pin that fits through the pieces of this hinge assembly, to allow for quick and easy mounting and dismounting. Other variations of this hinge are also possible, and could include multiple pins. This connection system can also be used for joining other various types of equipment (not shown) directly to the main frame **12**, including but not limited to: power brushes, dethatchers, mower decks, and other compatible tools.

[0019] More particularly, FIGS. **1-6** illustrate a stand-on snow throwing machine **10**, and the controls **18** are for operating the stand-on snow throwing machine. In this embodiment, the surface clearing apparatus is a snow thrower **30** attached to the auxiliary frame **26** by an adapter **34** (see FIGS. **9-10**), and the snow thrower includes at least one impeller **38** and a snow chute **42**. The blower assembly shown is a modified commercially available hydraulic driven two stage snow thrower. Other drive systems that could be used include a belt driven blower using PTO, but the hydraulic system has been found to exhibit greater performance.

[0020] A shown in FIGS. **1** and **2**, the main frame **12** is a horizontally extending rectangular structure, and the drive system **22** includes two spaced apart rear wheels **46** and **50** rotatably mounted on the main frame **12** and driven by an engine **23**. The engine **23** sits on the main frame adjacent the rear wheels. The auxiliary frame pivot point **23** is about one third of the way down the main frame from the rear wheels. There are also two forward wheels **47** and **51** mounted on the main frame **12**, and the four wheels support the main frame **12**. The stand-on snow throwing machine **10** also includes a hydraulic system **54** including at least two hydraulically connected tanks **58** and **62**, with each tank mounted on the main frame **12** above a respective one of the wheels. Where a battery tray conventionally would be located, an overhung load adapter and hydraulic pump **72** are attached. In this embodiment, three hydraulic tanks are fastened to the main frame; two on either side of a control tower and above the wheels, and one below the mainframe. All three tanks are mated together as one single tank. Hydraulic lines **76** are then routed underneath the fuel tank of the stand-on adaptable surface clearer and around the main frame to a lift cylinder and a quick connect for hydraulic accessories, as further explained below.

[0021] The hydraulic system **54** further includes a hydraulic lift cylinder **64**, connected between and to each of the main frame **12** and the auxiliary frame **26**, for moving the auxiliary frame relative to the main frame. More particularly, one end of the hydraulic cylinder **64** is pivotally connected to a rearward extending tab **13** at the top of the main frame, and the other end of the hydraulic cylinder is pivotally connected to a central plate portion **15** of the auxiliary frame midway between the pivot point **23** and the snow thrower **30**. The position of the snow thrower **30** can be adjusted up and down relative to the surface supporting the snow throwing machine **10**. In other embodiments (not shown) other lifting systems may include but are not limited to multiple hydraulics lift cylinders, electric winch(es) and/or human powered lever arm lifts. The lift system connects to the frame of the stand-on mower by means of an A-frame which transfers the weight of the blower assembly to the main frame of the stand-on snow throwing machine **10**.

[0022] In one embodiment, the snow thrower **30** is hydraulically powered, and the hydraulic system **54** further includes an auxiliary hydraulic quick connect **68** adapted to be connected to the hydraulic powered snow thrower **30**. The hydraulic pump **72** is driven by the engine **23** and is in communication with the tanks **58** and **62**, and the hydraulic pump **72** provides pressurized fluid via the hydraulic pressure lines **76** to the hydraulic cylinder **64** and to the auxiliary hydraulic quick connect **68**. For the hydraulic hoses, quick connect hydraulic couplers are used instead of permanent connections. Using this quick-connect configuration enables a switch from the snow thrower to a powered broom, as described below, to be done in about five minutes using only an adjustable wrench to take off the chute control on the snow blower.

[0023] The embodiment of the stand-on snow blowing machine **10** shown in FIGS. **1-6** is started using key start on the control panel and adjusting throttle to no more than half-throttle (approximately 1900 RPM) and engaging PTO. RPM is raised to full throttle (3800 RPM creating approximately 2700 psi in the hydraulic system) using the throttle lever. These first two steps will activate pressure to the hydraulic valve. Using 2 electric switches to activate hydraulic functions, the snow blower can be raised and lowered, and the hydraulic motor for the impeller is controlled. The steering controls are used to maneuver the machine and the discharge chute lever to adjust the chute left or right. During use, if snow blower hits hard packed snow and becomes "jammed", the bypass will open at approximately 3000 psi to relive pressure to tank so the lines will not get blown out. The operator can then back up from snow pile, hit the reverse hydraulics button which will spin the auger in reverse, clearing the jam. The snow blower attachment may also be exchanged for other attachments as well, including but not limited to: power brushes, dethatchers, mower decks, etc.

[0024] Of course, other configurations of stand-on propelling systems could be used and other configurations of snow blowers could be used. The overall length of the snow blower is reduced by optimizing the frame length and blower attachment position; with the hydraulic pump having been moved so it is directly driven by the engine; and having the hydraulic fluid reservoirs repositioned over the rear wheels to enhance weight distribution, balance, and traction. And having the flexibility to work as a powered ride-on device with capabilities beyond moving snow, enables the device to be used year round.

[0025] FIGS. **7-8** illustrate a stand-on surface cleaner **80**, and controls **88** are for operating the surface cleaner. In this embodiment, the surface clearing apparatus is a brush **84** attached to the auxiliary frame **26** by the adapter **34** (see FIGS. **9-10**). The brush **84** is rotated by a hydraulic motor **89** (see FIG. **10**).

[0026] To accommodate different attachments, the auxiliary frame **26** allows for either the snow blower or the broom to be easily received and secured without needing special tools or equipment. As best seen in FIGS. **9-10**, the adapter **34** includes a male adaptor plate **90** on the broom or the snow blower. The male adapter plate **90** is received by a female frame piece **94**. Two holes **98** are drilled in the auxiliary frame **26**, so that, when the male adaptor plate is slid into place, two twist and lock plunger latches **99** lock the unit into place.

[0027] The hydraulically powered broom that is shown in FIGS. **7-8** is one example of an additional attachment that can be used, and is a relatively standard broom with the addition of the male adaptor plate. Using the same pump as the snow blower, together with quick connect hydraulic couplers, the brush attachment is easily mounted on the unit in the same

manner as the snow blower. The broom itself is mounted to a brush frame with a hydraulic motor on one side, and a bearing on the other side. The hydraulic motor spins counter-clockwise, causing the polyurethane bristled brush to sweep the surface. The polyurethane brush can be used for sweeping up dirt, snow, pebbles, or any other unwanted thing off of a hard surface. The broom, in addition to being mounted straight, can be angled, if desired.

[0028] Although the invention has been herein described in what is perceived to be the most practical and preferred embodiments, it is to be understood that the invention is not intended to be limited to the specific embodiments set forth above. Rather, it is recognized that modifications may be made by one of skill in the art of the invention without departing from the spirit or intent of the invention and, therefore, the invention is to be taken as including all reasonable equivalents to the subject matter of the appended claims and the description of the invention herein.

What is claimed is:

1. A stand-on surface clearer comprising:

a main frame;

an operator platform extending from the main frame;

controls positioned on the main frame;

a drive system for propelling the stand-on surface clearer; and

an auxiliary frame pivotally attached to the main frame and adapted to receive a surface clearing apparatus thereon.

2. A stand-on snow throwing machine comprising:

a main frame;

an operator platform extending from the main frame;

controls positioned on the main frame for operating the stand-on snow throwing machine,

a drive system for propelling the stand-on snow throwing machine;

an auxiliary frame pivotally attached to the main frame, and

a snow thrower attached to the auxiliary frame, the snow thrower including at least one impeller and a snow chute.

3. The stand-on snow throwing machine of claim **2**, wherein the drive system includes two spaced apart wheels rotatably mounted on the main frame, and wherein the stand-on snow throwing machine further includes:

a hydraulic system including two hydraulically connected tanks, with each tank mounted on the main frame above a respective one of each of the wheels, and

a hydraulic cylinder, connected between and to each of the main frame and the auxiliary frame, for moving the auxiliary frame relative to the main frame.

4. The stand-on snow throwing machine of claim **2**, wherein the snow thrower is hydraulically powered.

5. The stand-on snow throwing machine of claim **2**, wherein the hydraulic system further includes an auxiliary hydraulic quick connect adapted to be connected to a hydraulic powered surface cleaner, and a hydraulic pump in communication with the tanks, and providing pressurized fluid via hydraulic pressure lines to the hydraulic cylinder and to the auxiliary hydraulic quick connect.

6. A stand-on surface cleaner machine comprising:

a main frame;

an operator platform extending from the main frame;

controls positioned on the main frame for operating the stand-on surface cleaner machine,

a drive system for propelling the stand-on surface cleaner machine;

an auxiliary frame pivotally attached to the main frame, and

a surface cleaner attached to the auxiliary frame, the surface cleaner including a brush.

7. The stand-on surface cleaner machine of claim **6**, wherein the drive system includes two spaced apart wheels rotatably mounted on the main frame, and wherein the stand-on surface cleaner machine further includes:

a hydraulic system including two hydraulically connected tanks, with each tank mounted on the main frame above a respective one of each of the wheels, and

a hydraulic cylinder, connected between and to each of the main frame and the auxiliary frame, for moving the auxiliary frame relative to the main frame.

8. The stand-on surface cleaner machine of claim **6**, wherein the surface cleaner is hydraulically powered.

9. The stand-on surface cleaner machine of claim **6**, wherein the hydraulic system further includes an auxiliary hydraulic quick connect adapted to be connected to a hydraulic powered surface cleaner, and a hydraulic pump in communication with the tanks, and providing pressurized fluid via hydraulic pressure lines to the hydraulic cylinder and to the auxiliary hydraulic quick connect.

10. The stand-on adaptable surface cleaner of claim **6** where in the surface cleaning apparatus is a snow thrower mounted to the frame that includes at least one impeller and snow chute.

11. The stand-on adaptable surface cleaner of claim **6** wherein the surface cleaning apparatus is a powered rotating broom.

* * * * *