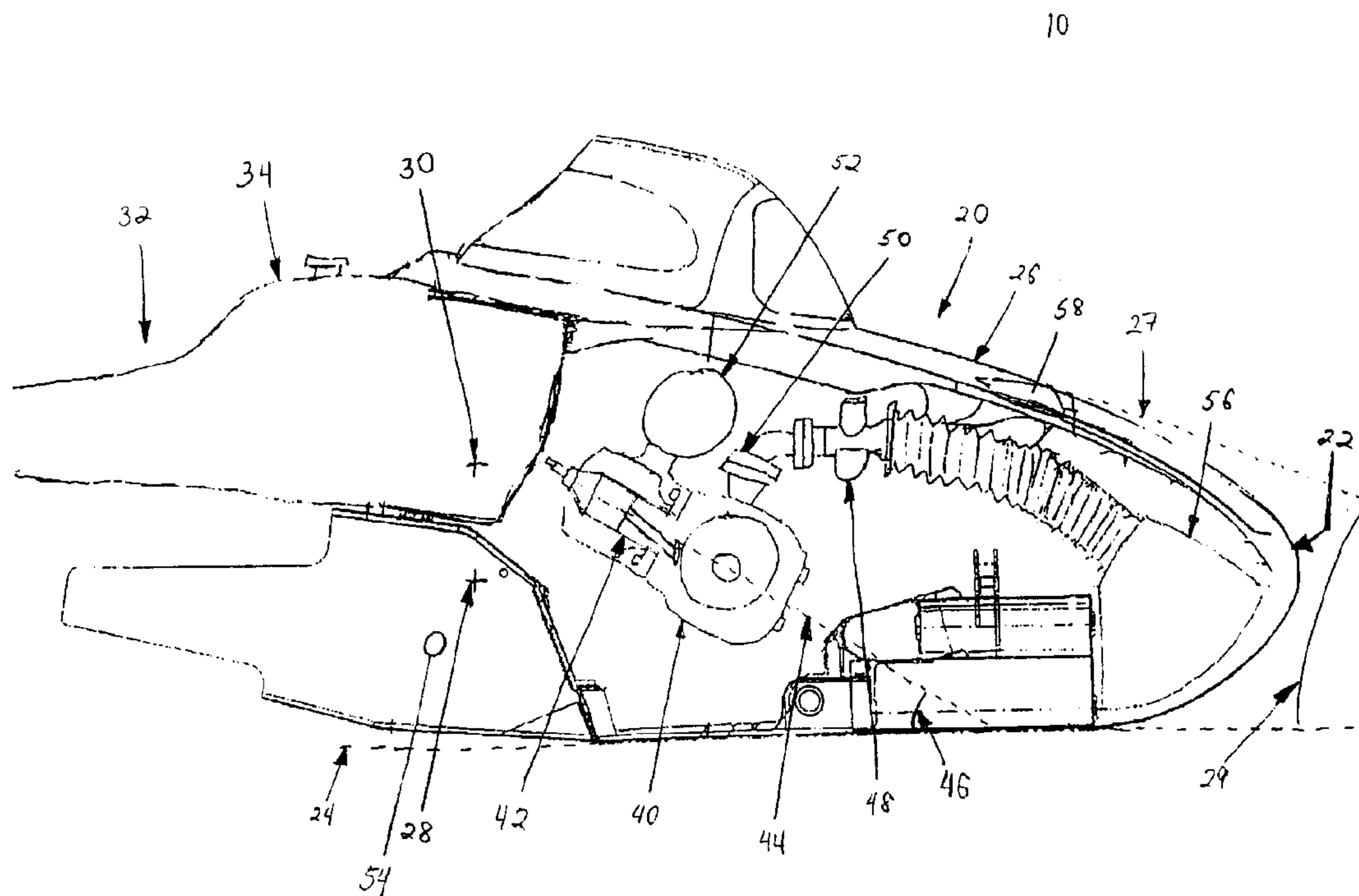




(22) Date de dépôt/Filing Date: 2002/11/07
(41) Mise à la disp. pub./Open to Public Insp.: 2004/05/07

(51) Cl.Int.⁷/Int.Cl.⁷ B60K 5/00
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(54) Titre : VEHICULE A MOTEUR INCLINE
(54) Title: VEHICLE WITH INCLINED ENGINE



(57) **Abrégé/Abstract:**

A vehicle having a vehicle body and an engine disposed therein. The engine is backwardly inclined within the vehicle, such that the angle between the axes of the engine cylinders and the plane of the surface upon which the vehicle rests form an angle of less than 90 degrees in a direction away from the front end of the vehicle. The center of mass of the vehicle with the engine inclined may be lower than if the engine were not inclined. The center of mass of the vehicle with the engine inclined may be further from the front end of the vehicle than if the engine were not inclined. The center of mass of the vehicle with the engine inclined may be aligned vertically with the vehicle operator, the drive shaft of the vehicle, or the geometric center of the vehicle. The performance of the vehicle with the engine inclined may be better than if the engine were not inclined. The engine air intake, engine exhaust port, and carburetor or other fuel and/or air inlet device may extend from the engine towards the front end of the vehicle.

Abstract

A vehicle having a vehicle body and an engine disposed therein. The engine is backwardly inclined within the vehicle, such that the angle between the axes of the engine cylinders and the plane of the surface upon which the vehicle rests form an angle of less than 90 degrees in a direction away from the front end of the vehicle. The center of mass of the vehicle with the engine inclined may be lower than if the engine were not inclined. The center of mass of the vehicle with the engine inclined may be further from the front end of the vehicle than if the engine were not inclined. The center of mass of the vehicle with the engine inclined may be aligned vertically with the vehicle operator, the drive shaft of the vehicle, or the geometric center of the vehicle. The performance of the vehicle with the engine inclined may be better than if the engine were not inclined. The engine air intake, engine exhaust port, and carburetor or other fuel and/or air inlet device may extend from the engine towards the front end of the vehicle.

VEHICLE WITH INCLINED ENGINE

Background of the Invention

Field of the Invention

The invention relates to a vehicle such as a snowmobile having an
5 engine disposed therein that is backwardly inclined with respect to the front of the
vehicle, to a method for arranging an engine in a vehicle with a backward incline,
and to a method for changing the center of mass of a vehicle by backwardly
inclining the engine thereof.

Description of Related Art

10 Vehicles for carrying persons and/or cargo are well known. Many
such vehicles have engines disposed inside of them to enable such vehicles to move
under their own power.

Conventionally, vehicles, such as snowmobiles, include a vehicle
body with an engine disposed at some location within the body. In conventional
15 vehicles, the engine is mounted vertically, as seen from the point of view of the
pistons and cylinders. That is, the axis defined by the engine's cylinders is generally
perpendicular relative to the plane upon which the vehicle rests, i.e. the ground.

In such conventional vehicles, the engine's air intake normally is
arranged on the side of the engine furthest from the front of the vehicle. The
20 engine's exhaust outlet typically is mounted on the side of the engine closest to the
front of vehicle.

However, such an arrangement has disadvantages.

Typically, the engine is mounted within the body in an engine
compartment occupying some portion of the front of the vehicle. In order to allow
25 space for the air intake, and oftentimes for additional equipment such as a carburetor
or other fuel and/or air inlet device, the engine is mounted relatively far forward in
the engine compartment, and thus relatively far forward in the vehicle.

However, in order to turn and otherwise maneuver a vehicle
effectively, it is generally desirable to have the vehicle's center of mass coincide

with or be relatively close to the center of rotation of the vehicle in a particular maneuver. This enables rapid and efficient turns with low stress upon the vehicle body. Generally, the center of rotation of the vehicle is at or near its geometric center. Thus, it is desirable for the center of mass of the vehicle to be at least
5 approximately coincidental with the geometric center of the vehicle.

In addition, vehicles with their center of mass aligned with their geometric center tend to be more stable, and are less affected by pitching and rolling motions. This is at least in part because, with the center of mass and the geometric center aligned, the angular moment of inertia of the vehicle is relatively low.

10 For example, in a vehicle with a large amount of mass near its front end, if the front end is made to pitch, for example by traversing rough or uneven terrain, the pitching motion has a relatively high total angular momentum, because of the heavy, unbalanced front end. In contrast, if a vehicle with the center of mass and geometric center aligned is made to pitch, the pitching motion has a relatively
15 low total angular momentum.

Thus, in a vehicle with the center of mass and geometric center aligned the pitching motion is more readily damped out or compensated for than would be the case in a vehicle with, for example, a large mass in its front end.

This is true to at least some extent with regard to rolling and yawing
20 motions, as well. As a result, aligning the center of mass and geometric center of a vehicle is advantageous in providing stable and controllable operation.

For vehicles that move across a surface, these considerations are somewhat simplified. For purposes of surface movement, if the center of mass aligns vertically with the geometric center of the vehicle from front to back and side
25 to side (i.e. within the plane of the surface on which it travels), it is equivalent to having the vehicle's center of mass coincidental with the vehicle's geometric center.

In other words, for a conventional surface vehicle, it is advantageous for vehicle's center of mass to "line up" with the vehicle's midpoint. It may also be advantageous for certain vehicles if the vehicle's center of mass aligns with the
30 location of the vehicle operator, or with the location of a drive component such as the drive shaft.

However, because the engine is mounted far forward within a conventional vehicle, and because the mass of the engine often makes up a

significant portion of the total mass of the vehicle, the center of mass of a conventional vehicle often is relatively close to the front of the vehicle, and relatively far from the vehicle's midpoint, the location of the vehicle operator, and the location of the drive shaft or other relevant drive components.

5 In addition, in order to provide stability, responsiveness, and smoothness of ride in a vehicle, it is generally desirable to have the vehicle's center of mass be as low as possible, that is, close as possible to the surface upon which the vehicle rests.

10 However, because vehicle engines conventionally are mounted vertically, and typically are greater in height than in length (as measured front to back in the vehicle body), their center of mass is relatively high. Again, because the engine often makes up a significant portion of the vehicle's mass, this means that the center of mass of the vehicle as a whole is relatively high.

15 Furthermore, the arrangement of the air intake behind the engine with the exhaust in front of the engine, as is conventional in vertical-engine vehicles, has disadvantages in itself.

20 In many vehicles, the fuel tank is located behind the engine. However, when the air intake, fuel and/or air inlet device, etc. is also disposed behind the engine, the space available for the fuel tank is reduced. As a result, less fuel can be carried than might otherwise be the case, and the vehicle's range is reduced.

25 Also, in many vehicles the vehicle operator is positioned behind the engine. Because of this arrangement, the air intake is often quite close to the vehicle operator in conventional vehicles. As a result, engine noise can be readily transmitted to the operator via the air intake in such vehicles.

Summary of the Invention

It is the purpose of the claimed invention to overcome these difficulties, thereby providing a vehicle with an improved maneuverability, greater stability, increased fuel capacity, and/or decreased perceived noise during operation.

30 An exemplary embodiment of a vehicle in accordance with the principles of the claimed invention includes a vehicle body adapted to rest

substantially on a plane, such as ground, snow, water, etc. The vehicle has an engine disposed within the vehicle body.

The engine is inclined backwardly within the vehicle body. The engine oriented such that the axes defined by the engine's cylinders form an angle with the plane. The angle between the axes and the plane, in the direction away from the front of the vehicle body, is less than 90 degrees.

In certain embodiments, the angle may be smaller, i.e. less than 75 degrees, less than 60 degrees, less than 45 degrees, or less than 30 degrees.

In some embodiments, the angle of the engine may correspond approximately to the slope of the surface of the body near the engine. For example, the angle of the engine may be within 10 degrees of the slope of the body surface, or may be within 5 degrees of the slope of the body surface.

With the engine inclined to form an angle of less than 90 degrees as noted, the center of mass of the vehicle may be lower than it otherwise would be if the engine were not so inclined. In certain embodiments this feature may not derive entirely from the change in the location of the center of mass from the angling of the engine, per se. Inclining the engine as indicated also, for certain embodiments, may enable the engine to be mounted lower than it otherwise could be.

Likewise, with the engine inclined to form an angle of less than 90 degrees as noted, the center of mass of the vehicle may be further from the front of the vehicle than it otherwise would be if the engine were not so inclined.

In certain embodiments, the center of mass of the vehicle may be substantially vertically aligned with the location of a vehicle operator. In certain embodiments, the center of mass of the vehicle may be substantially vertically aligned with the drive shaft of the engine. Also, in certain embodiments, the center of mass of the vehicle may be substantially vertically aligned with the geometric center of the vehicle.

The turning radius of a vehicle with the engine inclined to form an angle of less than 90 degrees with the plane on which the vehicle rests may have a turning radius smaller than that of the vehicle if the engine were not so inclined.

The vehicle may include an air intake in communication with the engine, with the air intake extending from the engine towards the front end of the body so as to draw air into the engine from the direction of the front end of the body.

The vehicle also may include an air exhaust in communication with the engine extending from the engine towards the front end of the body so as to expel air from the engine towards the direction of the front end of the body.

The vehicle may include a fuel and/or air inlet device in
5 communication with the engine. The inlet device may be in communication with the air intake. The inlet device may be disposed closer to the front end of the vehicle than the engine.

The vehicle may be a snowmobile.

A method of mounting an engine in a vehicle in accordance with the
10 principles of the claimed invention includes the step of providing a vehicle body adapted to rest substantially on a plane. An engine is provided, and is disposed within the body inclined in the direction away from the front end of the body, such that the angle between the axes of the engine cylinders and the plane less than 90 degrees.

15 A method in accordance with the principles of the claimed invention for changing the center of mass of a vehicle having a vehicle body adapted to rest substantially on a plane, and an engine disposed within the body, includes steps as follows. The engine is inclined in the direction away from the front end of the body, such that the angle between the axes of the engine cylinders and the plane less than
20 90 degrees. When the engine is so inclined, the center of mass of the vehicle moves.

The center of mass of the vehicle may be lower after the engine is inclined. The center of mass of the vehicle may be farther from the front end of the vehicle after the engine is inclined.

The method may include the step of disposing an air intake for the
25 engine on the front side of the engine, such that the air intake extends from the engine towards the front end of the body, and draws air into the engine from the direction of the front end of the body. The method also may include the step of disposing an exhaust for the engine on the front side of the engine, such that the exhaust extends from the engine towards the front end of the body, and expels
30 exhaust from the engine towards the direction of the front end of the body.

The method further may include the step of disposing a fuel and/or air inlet device in communication with the engine on the front side of the engine, such that the inlet device is closer to the front end of the vehicle than the engine is.

Brief Description of the Drawings

Like reference numbers generally indicate corresponding elements in the figures.

Figure 1 is a partial cross-sectional of an exemplary embodiment of a vehicle in accordance with the principles of the claimed invention.

Figure 2 is an full-view illustration showing an exterior and partial cut-away of an exemplary embodiment of a vehicle in accordance with the principles of the claimed invention.

Detailed Description of the Preferred Embodiment

Referring to Figure 1, a vehicle **10** in accordance with the principles of the claimed invention includes a vehicle body **20** with a front end **22**. An engine **40** is disposed within the vehicle body **20**.

For simplicity, Figure 1 illustrates only the forward portion of the vehicle body **20**, that portion with the engine **40** disposed therein. For some vehicles, the body **20** may extend further back than is illustrated.

Figure 2 illustrates the exterior of a complete vehicle **10**, with a forward portion similar to that shown in Figure 1.

However, the invention does not require a specific body shape, form, or configuration; the vehicle body **20** as illustrated is exemplary only. In particular, although the vehicle **10** illustrated in Figure 2 and the partial vehicle body **20** as illustrated in Figure 1 are representative of a snowmobile body, this is exemplary only, and a variety of other vehicles and vehicle bodies may be equally suitable.

The body **20** is adapted to rest substantially on a plane **24**, such as the plane defined by the ground, a snow-covered surface, etc. The plane **24** need not be geometrically perfect.

The engine **40** defines at least one cylinder **42** therein. Each cylinder **42** in turn defines an axis **44**. The engine **40** is inclined backwardly within the body **20**, such that each of the axes **44** forms an angle **46** with the plane **24** in a direction away from the front end **22** of the body **20**. The angle **46** is less than 90 degrees.

In a preferred embodiment, the angle **46** is less than 75 degrees.

In a more preferred embodiment, the angle **46** is less than 60 degrees.

In a yet more preferred embodiment, the angle **46** is less than 45 degrees.

In a still more preferred embodiment, the angle **46** is less than 30 degrees.

5 Figure 2 shows the cylinder axes **44** in relation to a vehicle **10** as a whole, and also illustrates the angle **46** between the cylinder axes **44** and the plane **24** on which the vehicle **10** rests.

Returning to Figure 1, although it shows only one cylinder **42** in the engine **40** illustrated therein, this is exemplary only. Engines **40** with two or more
10 cylinders **42** may be equally suitable.

Many types of engine **40** may be suitable for use in the vehicle **10**. In a preferred embodiment, the engine **40** is an internal combustion engine. In a more preferred embodiment, the engine **40** is a four-stroke internal combustion engine. However, this is exemplary only, and other types of engine **40**, including but not
15 limited to diesel and two-stroke internal combustion engines, may be equally suitable.

In engines **40** with more than one cylinder **42**, the cylinders **42** may be aligned with one another, such that the axis **44** of each cylinder **42** forms approximately the same angle **46** with the plane **24** on which the vehicle body **20**
20 rests.

However, in certain embodiments, the cylinders **42** may not all be aligned with one another. For example, in a conventional "V" arrangement engine, two rows of cylinders are defined, the rows being angled slightly with respect to one another. Such engines, as well as other engines having multiple non-aligned
25 cylinders may be equally suitable for use in the claimed invention. In embodiments having such engines **40**, although the axes **44** of the cylinders **42** may not all be equal, the engines **40** nevertheless are disposed in a similar fashion to that described above, namely, they are inclined such that each of the axes **44** of the cylinders **42** forms an angle **46** of less than 90 degrees with the plane **24** upon which the vehicle
30 **10** rests, in a direction away from the front end **22** of the body **20**.

In certain embodiments, the angle **46** may be similar to an angle **29** formed between the slope **27** of the surface **26** of the body **20** and the plane **24** upon which the body **20** rests, in the area proximate the engine **40**.

In a preferred embodiment, the angle **46** and the angle **29** differ by 10 degrees or less.

In a more preferred embodiment, the angle **46** and the angle **29** differ by 5 degrees or less.

5 However, this is exemplary only. In certain embodiments, it may be equally suitable for the angles to differ by more than 10 degrees.

With the engine **40** inclined, the center of mass **28** of the vehicle **10** is lower than it otherwise would be if the engine **40** were not inclined, i.e. if the angle **46** were 90 degrees.

10 Similarly, with the engine **40** inclined, the center of mass **28** of the vehicle **10** is further from the front end **22** than it otherwise would be if the engine **40** were not inclined, i.e. if the angle **46** were 90 degrees.

 These changes in the position of the center of mass **28** owe at least in part to the change in mass distribution as the engine **40** is inclined. As the engine **40**
15 inclines, its center of mass moves backwards and downwards, which thus moves the center of mass **28** of the vehicle backwards and downwards.

 However, these changes in the position of the center of mass **28** of the vehicle **10** do not exclude the possibility of moving the center of mass **28** in other ways. Indeed, inclining the engine **40** may also enable further changes in the
20 location of the center of mass **28**, i.e. backwards and/or downwards. For example, in its inclined configuration, the engine **40** may be translated backwards or downwards within the vehicle body **20** to a degree that might not be possible if the engine **40** were not inclined. However, this is exemplary only.

 At least in part through inclination of the engine **40** to an angle **46** of
25 less than 90 degrees, the center of mass **28** of the vehicle **10** may be made to substantially align vertically with the drive shaft **54** of the vehicle. Alternatively, the center of mass **28** of the vehicle **10** may be made to substantially align vertically with the geometric center **30** of the vehicle. As a further alternative, the center of
30 mass **28** of the vehicle **10** may be made to substantially align vertically with the operator's location **32** on the vehicle.

 Figure 2 illustrates the relationship between the center of mass **28** and the geometric center **30** of an exemplary vehicle **10**.

However, each of the aforementioned positions for the center of mass **28** with reference to both Figures and 2 is exemplary only. In certain embodiments, it may be suitable for the center of mass **28** to be located at other positions.

In addition, it is noted that the inclination and position of the engine **40** are not the only factors affecting the center of mass **28** of the vehicle **10**. For example, for vehicles **10** adapted to carry more than one person, the number, size, and positions of persons on the vehicle will influence the location of the center of mass **28**. Likewise cargo, varying quantities of fuel in fuel tank(s), etc. may affect the center of mass **28**. In particular, the center of mass **28** may move from place to place within the vehicle **10** for a given embodiment.

Thus, it is to be understood that although the present invention may enable advantageous positioning of the center of mass **28**, the center of mass **28** of the vehicle **10** is not entirely determined by the position and orientation of the engine **40**, and is not fixed for any given vehicle **10**.

Returning to Figure 1, when the center of mass **28** is positioned advantageously by tilting the engine **40** to an angle **46**, the performance of the vehicle **10** may be improved.

For example, for a vehicle **10** having an engine **40** inclined to an angle **46**, the angle being less than 90 degrees, and consequently having a center of mass **28** that is substantially vertically aligned with the drive shaft **54**, the geometric center **30** of the vehicle, the operator's location **32** on the vehicle, or some other advantageous location, the turning radius of that vehicle **10** may be less than would be the case if the engine **40** were not inclined, i.e. if the angle equals 90 degrees.

Similarly, for a vehicle **10** having an engine **40** inclined to an angle **46**, the angle being less than 90 degrees, and consequently having a center of mass **28** that is lower than would be the case if the engine **40** were not inclined, the vehicle **10** may be more stable than it would be if the engine **40** were not inclined.

In addition, advantageous placement of the center of gravity **28** may be used to produce other improvements in the performance of the vehicle **10**, including but not limited to a smoother ride, improved pitch control, and improved responsiveness to control by rider body position.

Furthermore, a vehicle **10** having an engine **40** inclined to an angle **46**, the angle being less than 90 degrees, may demonstrate other advantages than

those specifically described herein, including but not limited to advantages directly related to engine inclination and/or position, advantages indirectly related to engine inclination and/or position, and advantages unrelated to engine inclination and/or position.

5 For example, in certain embodiments the inclination of the engine **40** and the changes associated therewith (about which more description is provided below) may provide for more efficient cooling of the engine **40**. In turn, in some embodiments improved cooling of the engine **40** may enable greater power output per pound of engine, thereby increasing the performance of the vehicle **10**.

10 However, such advantages are exemplary only.

The vehicle **10** includes an air intake **50** in communication with the engine **40** for drawing air into the engine **40**, and an exhaust port **52** in communication with the engine **40** for expelling exhaust gases from the engine **40**.

15 In certain embodiments, the air intake **50** may extend from the engine towards the front end **22** of the vehicle body **20** so as to draw air into the engine in the direction of the front end **22**. For example, as shown in Figure 1 the air intake **50** is in communication with an air plenum **56**, which in turn draws air in through an intake vent **58**.

20 Similarly, in certain embodiments the exhaust port **52** may extend from the engine towards the front end **22** of the vehicle body **20** so as to expel exhaust in the direction of the front end **22**.

25 In certain embodiments, both the air intake **50** and the exhaust port **52** may extend towards the front end **22**. Such an arrangement may be advantageous at least insofar as facilitating inclination of the engine **40**. Since neither the air intake **50** or the exhaust port **52** extends backwards in such an arrangement, they do not obstruct inclination of the engine **40**.

In addition, in some embodiments such an arrangement of the air intake **50** and the exhaust port **52** may facilitate other advantages besides enabling inclination of the engine **40**.

30 For example, arranging the air intake **50** to extend towards the front end **22** of the vehicle body **20** may enable air to be drawn in from at or near the front end **22**, i.e. through an external air vent at or near the front end **22**. With such an arrangement, engine noise as perceived by the operator may be reduced, since the

path from the engine **40** through the air intake **50** does not open to the outside of the vehicle near the operator, that is, the distance between operator and outside air vent is increased.

Also, in embodiments wherein the air intake **50** and exhaust port **52** extend towards the front end **22** of the vehicle body **20**, more space may be available behind the engine **40** for structures such as the fuel tank **34**. Thus, in some embodiments inclination of the engine **40** may enable a greater fuel capacity and increased range than with a non-inclined engine.

Furthermore, arranging the air intake **50** and exhaust port **52** so as to extend towards the front end **22** of the vehicle body **20** may enable the operator location **32** to be moved closer to the center of mass **28**. For example, because neither the air intake **50** nor the exhaust port **52** extend towards the rear of the engine **40**, it is not necessary to provide space behind the engine **40** for those components. Consequently, in certain embodiments the operator location **32** may be moved forward to better align with the center of mass **28**.

However, an arrangement wherein the air intake **50** and/or exhaust port **52** extend towards the front end **22** of the vehicle body **20** is exemplary only, and other arrangements may be equally suitable.

Furthermore, it is noted that even when either or both of the air intake **50** and the exhaust port **52** extend towards the front end **22** of the vehicle body **20**, it is not necessary that the path from either the air intake **50** or the exhaust port **52** extend continuously toward the front end **22**.

For example, as shown in Figure 1 the air intake **50** is in communication with an air plenum **56**, which in turn draws air in through an intake vent **58**. However, the plenum **56** is closer to the front end **22** than the intake vent **58**, so even though air enters the engine **40** from the direction of the front end **22**, the air is not always moving from front to back, i.e. while traveling from intake vent **58** to air plenum **56** it is moving back to front.

In addition, it is not necessary that the path from either the air intake **50** or the exhaust port **52** extend ultimately toward the front end **22**. Although the intake vent **58** is shown disposed forward of the engine **40** in Figure 1, this is exemplary only. In certain embodiments, the intake vent **58** may be approximately aligned with or behind the engine **40**. Likewise, an exhaust vent for venting exhaust

to the outside of the vehicle (not shown) may be ahead of, even with, or behind the engine **40**.

In other words, although in certain embodiments the air intake **50** and/or the exhaust port **52** may draw air from and/or expel exhaust in the direction of the front end **22**, they will not necessarily draw air at and/or expel exhaust to the vicinity of the front end **22**. Indeed, in certain embodiments exhaust ultimately might be expelled to another location entirely, i.e. behind or beside the engine **40**, and air ultimately might be drawn in from another location entirely as well.

In some embodiments the vehicle **10** may include an inlet device **48** in communication with the engine **40**, and/or in communication with the air intake **50**, for controlling fuel and/or air fed to the engine **40**. The inlet device **48** may extend from the engine towards the front end **22** of the vehicle body **20** so as to draw air into itself from the direction of the front end **22**.

A variety of inlet devices **48** may be suitable for use with the claimed invention. Suitable inlet devices **48** include, but are not limited to, carburetors, fuel injector systems such as fuel inlet throttle bodies, and air inlet systems such as air inlet throttle bodies. The use of multiple inlet devices **48**, i.e. one for controlling fuel and one for controlling air, may be equally suitable for certain embodiments. In addition, inlet devices **48** that control the inlet of both fuel and air into the engine also may be suitable for some embodiments. Suitable inlet devices **48** are well known, and are not described further herein.

Although the inlet device **48** in the exemplary embodiment illustrated in Figure 1 is shown to be in communication with the engine **40** via the air intake **50**, this is exemplary only. Other arrangements may be equally suitable. Suitable arrangements for a inlet device **48** may depend at least in part on the structure and operation of the inlet device **48** itself. For example, in certain embodiments, the inlet device **48** may include a so-called "direct fuel injection" system for introducing fuel directly into the engine **40**; in such an embodiment, the inlet device **48** will not necessarily be connected with the air intake **50**.

As with the exemplary arrangement described above wherein the air intake **50** and the exhaust port **52** extend towards the front end **22**, an arrangement wherein the inlet device **48** extends towards the front end **22** may be advantageous at least insofar as facilitating inclination of the engine **40**. Since the inlet device **48**

does not extend backwards in such an arrangement, it does not obstruct inclination of the engine **40**.

In addition, as with the exemplary arrangement described above wherein the air intake **50** and the exhaust port **52** on extending towards the front end **22**, an arrangement wherein the inlet device **48** extends towards the front end **22** may facilitate other advantages besides enabling inclination of the engine **40**.

However, such an arrangement for the inlet device **48** is exemplary only, and other arrangements may be equally suitable.

Furthermore, the use of a inlet device **48** is exemplary only, and embodiments without an inlet device **48** may be equally suitable.

The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

15

CLAIMS

1. A vehicle comprising:
a body comprising a front end, said body being adapted to rest substantially on a plane; and
5 an engine disposed within said body, said engine comprises at least one cylinder therein, and each of said at least one cylinder defining an axis thereof; wherein an angle between each of said axes and said plane in a direction away from said front end of said body is less than 90 degrees.
2. The vehicle according to claim 1, wherein said angle is less than 75 degrees.
- 10 3. The vehicle according to claim 1, wherein said angle is less than 60 degrees.
4. The vehicle according to claim 1, wherein said angle is less than 45 degrees.
5. The vehicle according to claim 1, wherein said angle is less than 30 degrees.
6. The vehicle according to claim 1, wherein a center of mass of said vehicle with said angle being less than 90 degrees is lower than a center of mass of said
15 vehicle with said angle being equal to 90 degrees.
7. The vehicle according to claim 1, wherein a center of mass of said vehicle with said angle being less than 90 degrees is farther from said front end of said body than a center of mass of said vehicle with said angle being equal to 90 degrees.
8. The vehicle according to claim 1, wherein a center of mass of said vehicle is
20 substantially vertically aligned with a location of an operator disposed on said vehicle.
9. The vehicle according to claim 1, wherein said vehicle comprises a drive shaft therein in engagement with said engine, and a center of mass of said vehicle is substantially vertically aligned with said drive shaft.
- 25 10. The vehicle according to claim 1, wherein a center of mass of said vehicle is substantially vertically aligned with a geometric center of said vehicle.

11. The vehicle according to claim 1, wherein a turn radius of said vehicle with said angle being less than 90 degrees is smaller than a turn radius of said vehicle with said angle being equal to 90 degrees.
12. The vehicle according to claim 1, wherein said vehicle further comprises an air inlet in communication with said engine, said air inlet being disposed closer to said front end of said vehicle than said engine.
13. The vehicle according to claim 1, wherein said vehicle further comprises:
an air intake in communication with said engine, said air intake extending from said engine in a direction towards said front end of said body so as to draw air into said engine from said direction towards said front end of said body; and
an exhaust port in communication with said engine, said exhaust port extending from said engine in a direction towards said front end of said body so as to expel exhaust from said engine in said direction towards said front end of said body.
14. The vehicle according to claim 1, wherein said vehicle is a snowmobile.
15. Method of mounting an engine in a vehicle, comprising the steps of:
providing a vehicle body adapted to rest substantially on a plane, said vehicle body comprising a front end;
providing an engine comprising at least one cylinder therein, each of said at least one cylinder defining an axis thereof;
disposing said engine within said body such that an angle between each of said axes and said plane in a direction away from said front end of said body is less than 90 degrees.
16. Method of changing a center of mass of a vehicle comprising:
a body adapted to rest substantially on a plane, said body comprising a front end; and
an engine disposed within said body, said engine comprising at least one cylinder therein, each of said at least one cylinder defining an axis thereof;
the method comprising the step of:

inclining said engine within said body such that an angle between each of said axes and said plane in a direction away from said front end of said body is less than 90 degrees;

whereby as said engine is inclined, said center of mass of said vehicle moves.

5 17. Method according to claim 16, wherein:

a center of mass of said vehicle after inclining said engine is lower than a center of mass of said vehicle before inclining said engine.

18. The vehicle according to claim 16, wherein a center of mass of said vehicle after inclining said engine is farther from said front end of said body than a center of mass of said vehicle before inclining said engine.
10

19. Method according to claim 16, wherein said vehicle further comprises an inlet device in communication with said engine;

the method further comprising the step of disposing said inlet device closer to said front end of said vehicle than said engine.

15 20. Method according to claim 16, wherein said vehicle further comprises an air intake in communication with said engine and an exhaust port in communication with said engine;

the method further comprising the steps of:

20 disposing said air intake to extend from said engine in a direction towards said front end of said body, so as to draw air into said engine from said direction towards said front end of said body; and

disposing said exhaust port to extend from said engine in a direction towards said front end of said body so as to expel exhaust from said engine in said direction towards said front end of said body.

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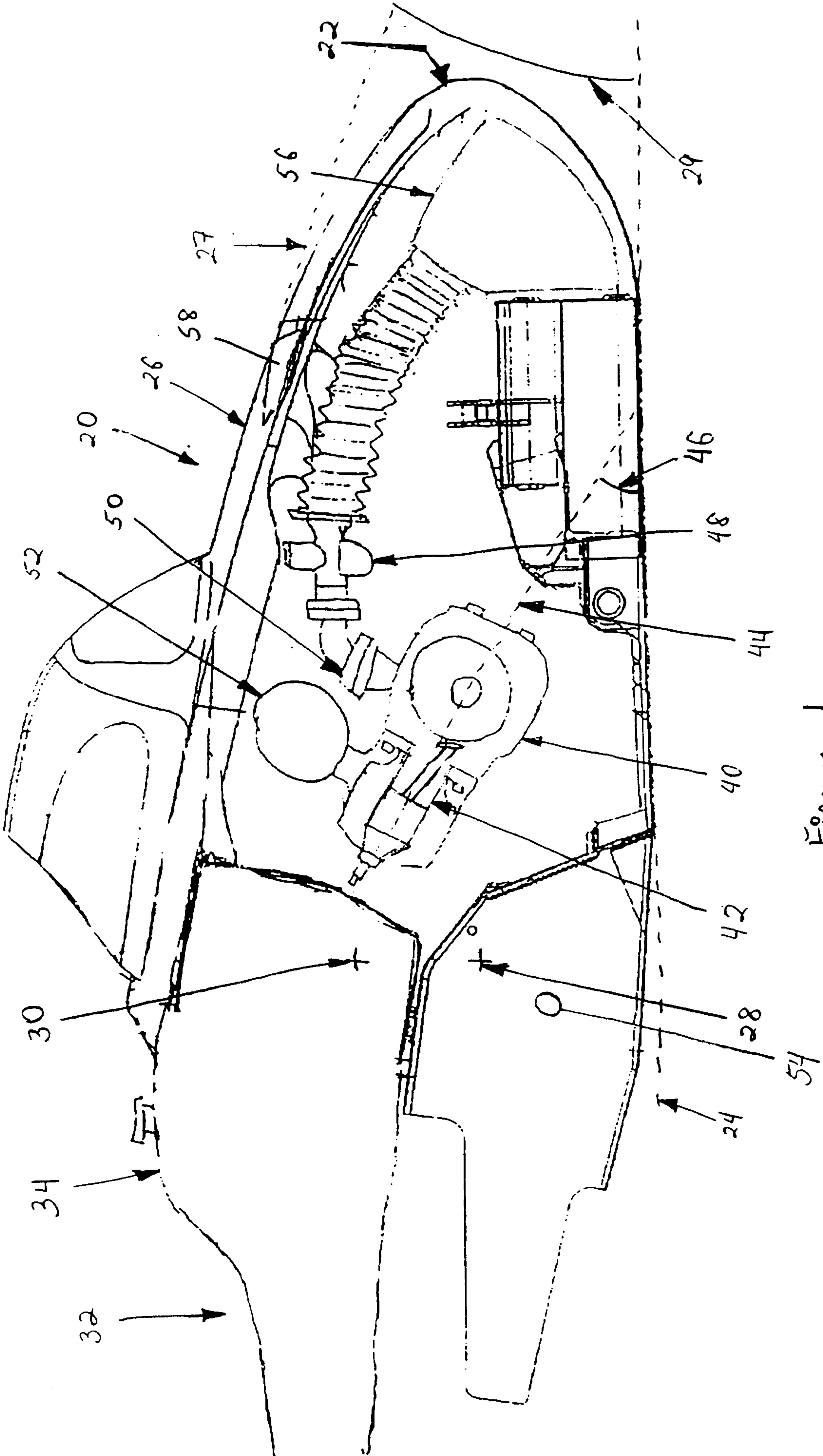


Figure 1

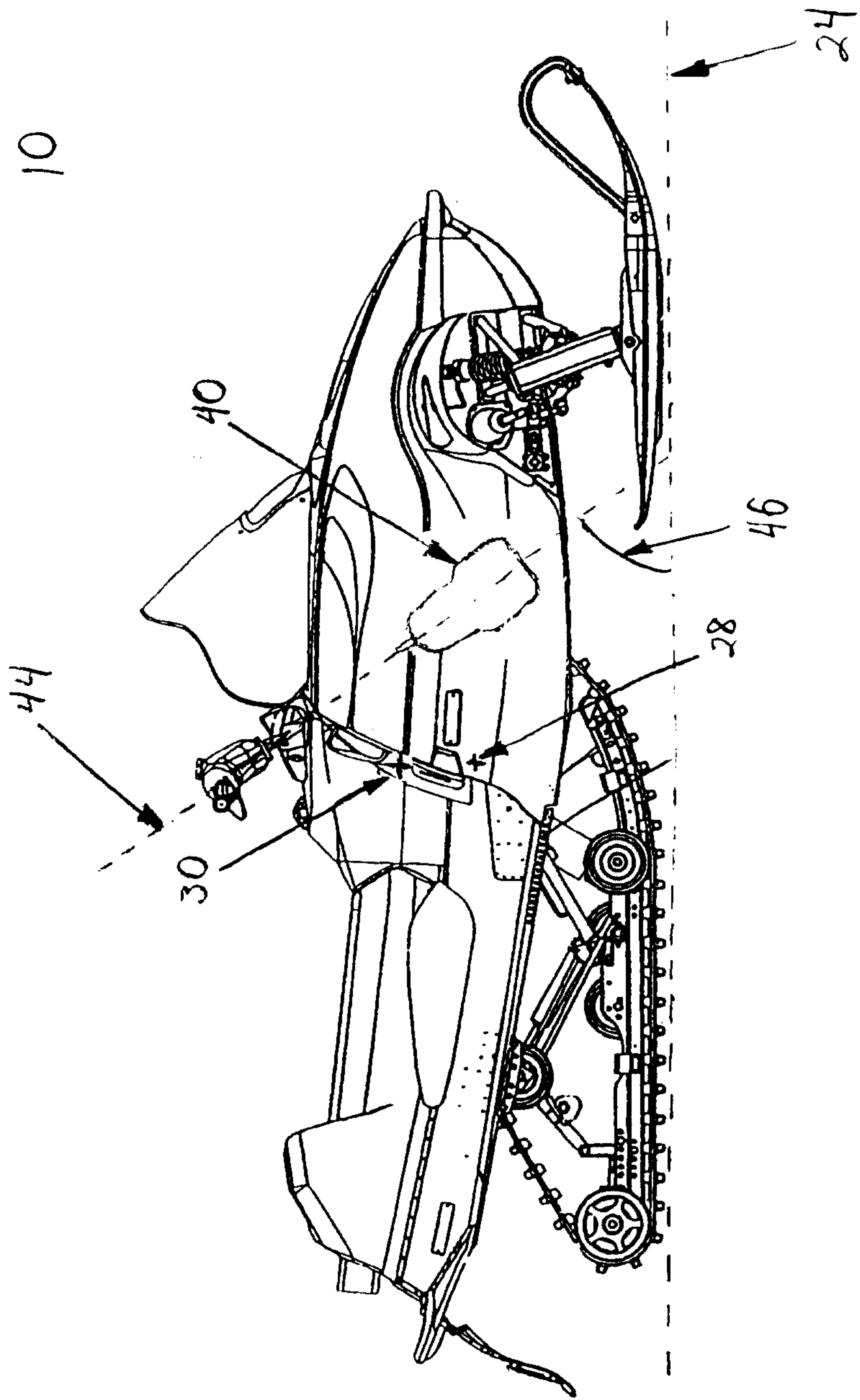


Figure 2

