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(54) **MODULAR VEHICLE SYSTEM HAVING VARIABLE CONFIGURATIONS AND ITS ASSOCIATED METHOD OF ASSEMBLY**

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(51) **Int. Cl.**[7] **A63C 17/12**
(52) **U.S. Cl.** **180/180**; 180/11; 180/219
(58) **Field of Search** 180/180, 19.1, 180/19.2, 19.3, 13, 11, 219, 220

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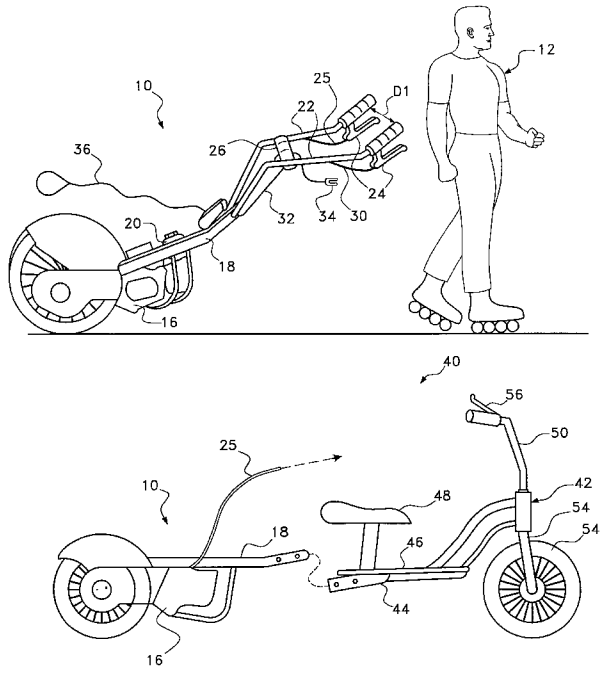
(57) **ABSTRACT**

A modular vehicle system consisting of a rear propulsion device and a variety of different front-end assemblies that can be attached to the rear propulsion device to create different types of motorized vehicles. The rear propulsion device contains a frame, an engine mounted to that frame and a drive wheel that is driven by the engine. The front-end assemblies contain a frame, a steering fork element and a steering mechanism for turning the steering fork element. The steering fork supports either a front wheel or a ski. The frame of the front-end assembly attaches to the frame of the rear propulsion device in order to create a vehicle upon which a person can sit. At any time, the front-end assembly can be exchanged with another of a different configuration in order to change the physical characteristics of the resultant vehicle.

7 Claims, 5 Drawing Sheets



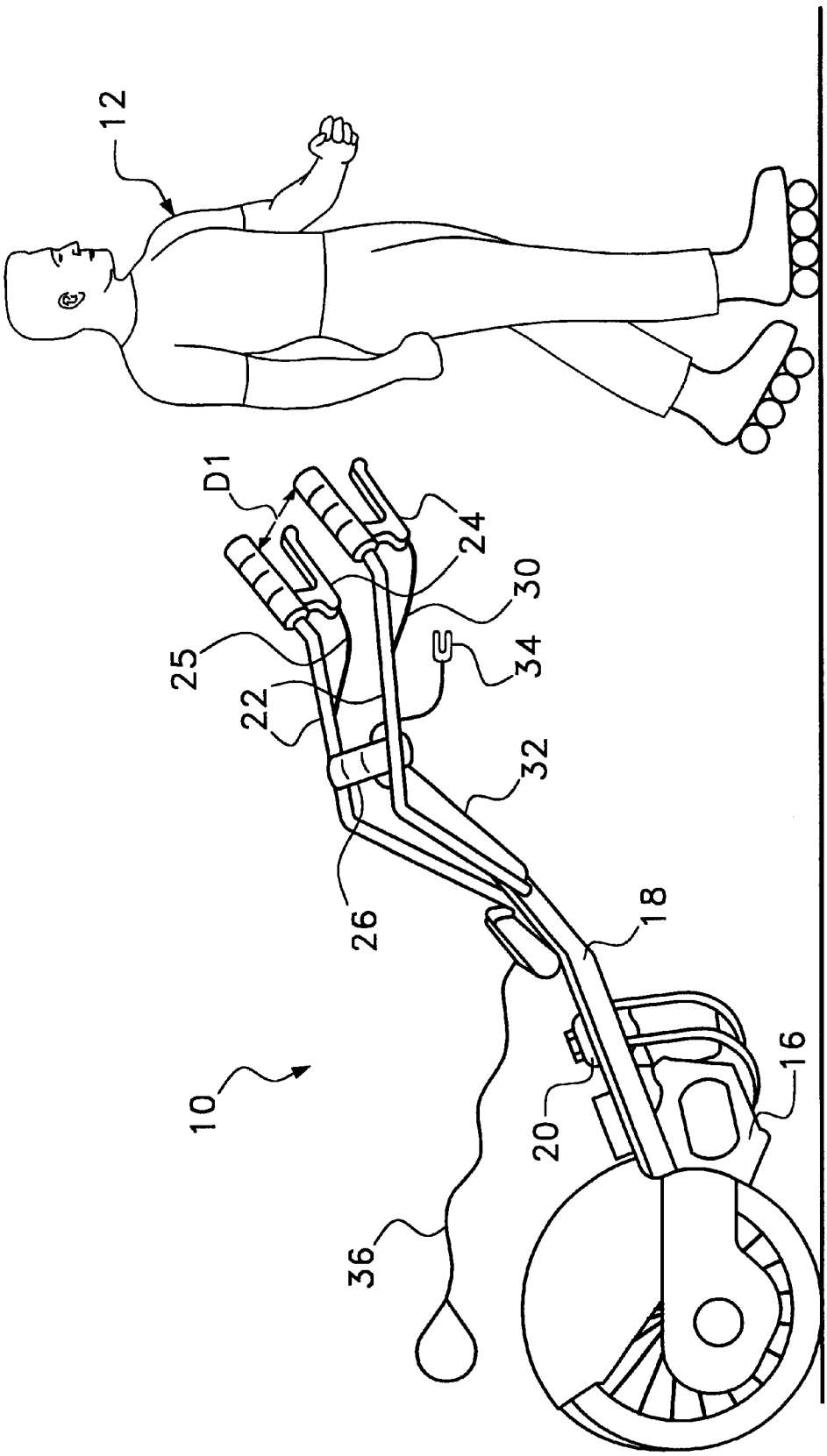


Fig. 1

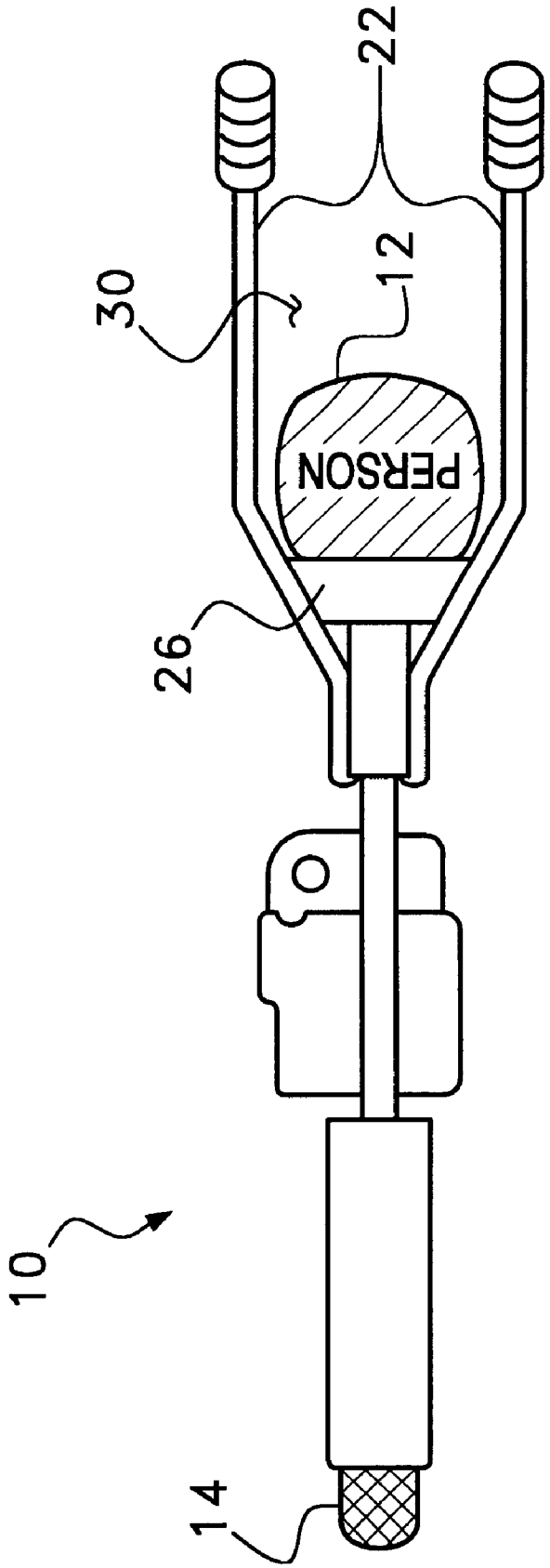


Fig. 2

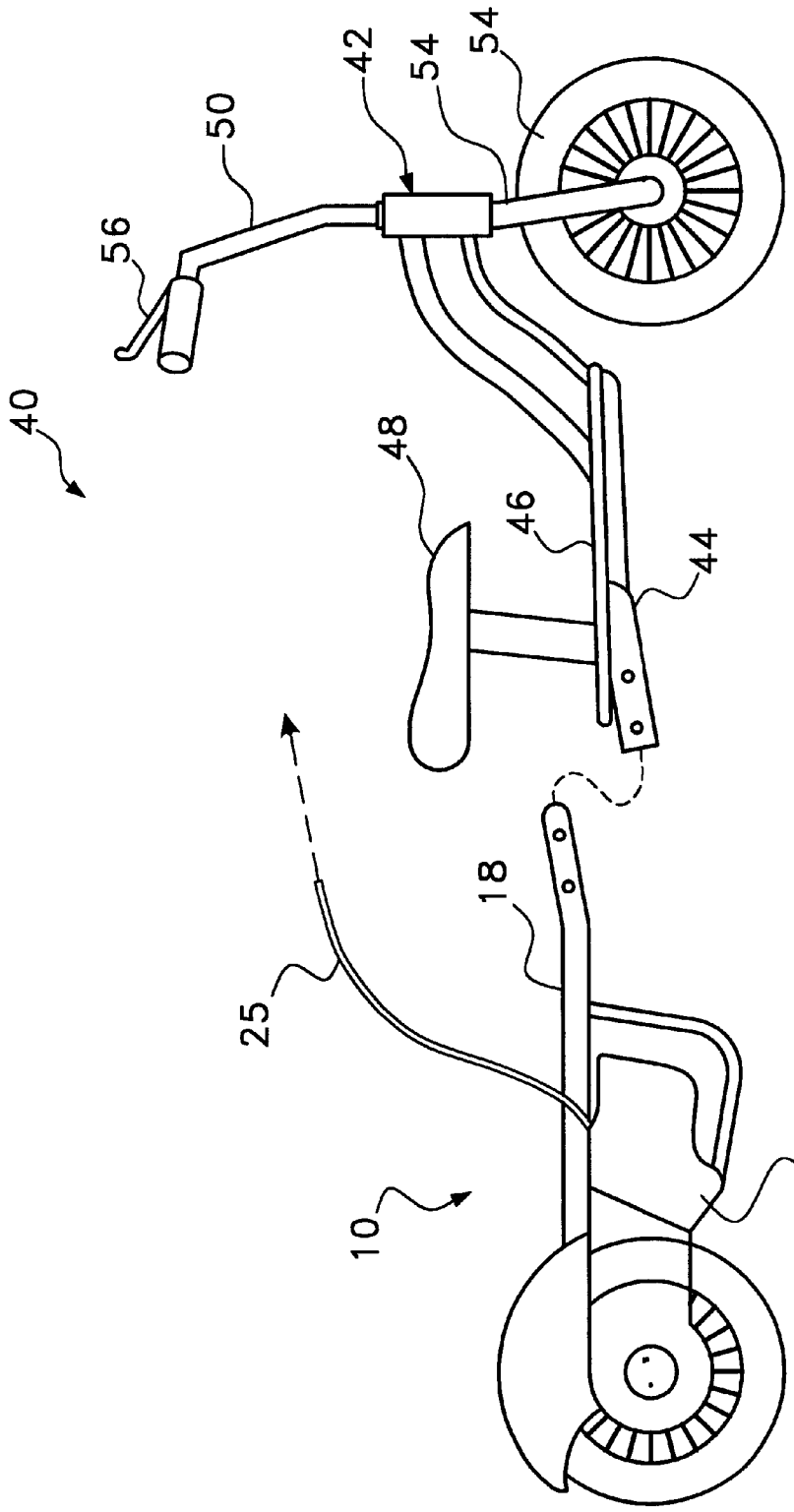


Fig. 3

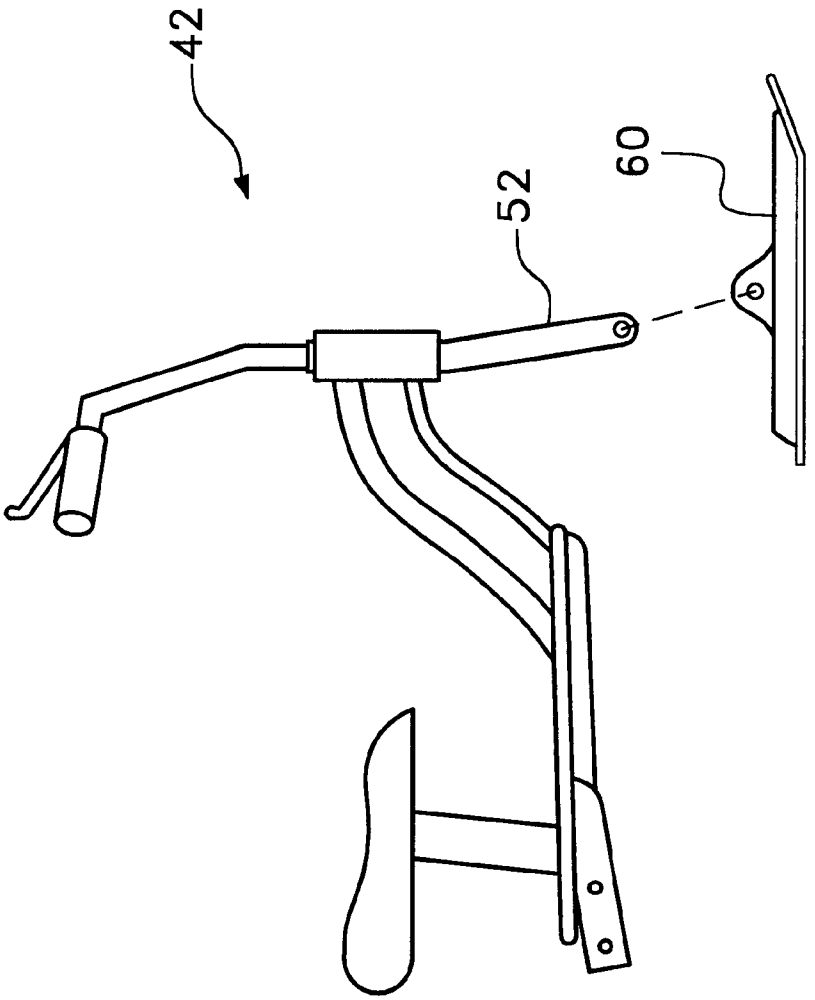


Fig. 4

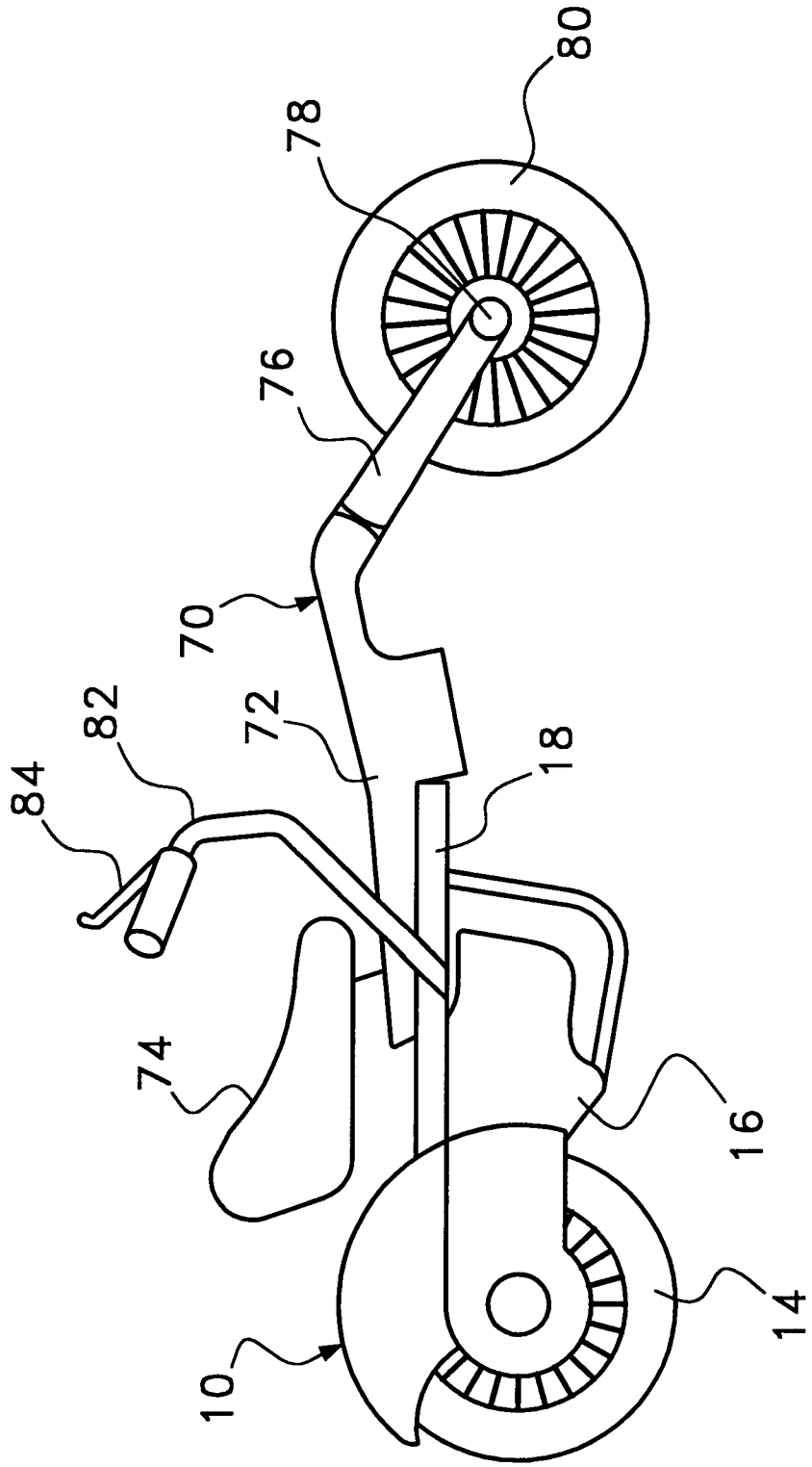


Fig. 5

MODULAR VEHICLE SYSTEM HAVING VARIABLE CONFIGURATIONS AND ITS ASSOCIATED METHOD OF ASSEMBLY

RELATED APPLICATIONS

This application is a Continuation-In-Part of U.S. patent application Ser. No. 09/455,512, filed Dec. 06, 1998, now abandoned entitled SYSTEM AND METHOD FOR PROPELLING A PERSON.

BACKGROUND OF THE INVENTION

1. Field of the Invention

In general, the present invention relates to low horsepower vehicular systems used to transport a single person. More particularly, the present invention relates to low horsepower vehicular systems that can be converted into different configurations for different purposes.

2. Description of the Prior Art

The first time man ever connected wheels to his shoes is long lost in history. Since that day, countless versions of skates, skateboards, scooters and like inventions have been developed that share the same basic idea. That idea being that it is fun and entertaining to propel yourself on a set of small wheels.

Since the very beginning of skates, people have sought ways to propel themselves on the skates, other than through physical exertion. For example, many a child has used the family dog to pull them on skates. Over the years, several people have developed motorized propelling systems that take the place of the family dog. Prior art motorized propelling systems typically have a wheel mounted to an elongated frame. The wheel is turned by a small gasoline engine. A person on skates is propelled by hanging on to the elongated shaft as the gasoline engine drives the motor.

Such prior art propelling systems come in two styles. In the first style, the motorized propelling system is positioned in front of a person and is used to tow that person. Such prior art devices are exemplified by U.S. Pat. No. 5,385,210 to Harvey, entitled Tow Vehicle System. Such systems are not very powerful because the weight of the person being pulled is not used to bias the drive wheel against the ground. Accordingly, when the ground is not smooth and level, such prior art devices tend to spin their wheels. Furthermore, since the person being propelled is being pulled, a person needs great strength in his arms to pull himself toward the motorized propelling system in order to maintain an upright position and maintain balance. Additionally, since the person using such a motorized device is being pulled, the motorized device is also used to steer. The skates on the person merely follow the direction of the motorized device.

Recognizing the disadvantages of motorized systems that pull a person, inventors have designed rear positioned propelling systems. In a rear propelling system, the motor and drive wheel are positioned behind the person being propelled. Consequently, the person is pushed by the propelling device. The weight of the person acts to bias the drive wheel against the ground. Accordingly, rear propelling systems have much better traction and power than do front propelling systems. Furthermore, the skates are now used to steer, since the skates are positioned in front of the rear propelling system. Examples of rear propelling systems can be found i in U.S. Pat. No. 4,456,089 to Kuwahara, U.S. Pat. No. 5,562,176 to Lucernoni and United Kingdom Patent Application GB 2246751 A to Kneale.

However, a disadvantage of the rear propelling system is that the frame of the propelling system extends between the legs of the person being propelled. Accordingly, a person using such a device is prevented from crossing his legs. This severely limits the movements of a person wearing in-line skates, wherein certain maneuvers require that a person cross his/her legs in order to successfully complete the maneuver.

Another problem with prior art propelling systems is that they only have a single configuration. As such, a person can only be propelled by such devices in a single manner. As such, some propelling devices only propel people who are wearing skates. Some prior art propelling devices only propel people who are on bicycles. However, prior art devices used for bicycle cannot be adapted for use by a person with skates and vice versa.

A need therefore exists for a rear motorized propelling system that can propel a person from the rear without extending through that person's legs or otherwise limiting the maneuverability of a person's legs. A need also exists for a rear motorized propelling system that is modular in construction and can be selectively reconfigured for different applications. These needs are met by the present invention as it is described and claimed below.

SUMMARY OF THE INVENTION

The present invention is a modular vehicle system consisting of a rear propulsion device and a variety of different front-end assemblies that can be attached to the rear propulsion device to create different types of motorized vehicles. The rear propulsion device contains a frame, an engine mounted to that frame and a drive wheel that is driven by the engine. The front-end assemblies contain a frame, a steering fork element and a steering mechanism for turning the steering fork element. The steering fork supports either a front wheel or a ski.

The frame of the front-end assembly attaches to the frame of the rear propulsion device in order to create a vehicle upon which a person can sit. At any time, the front-end assembly can be exchanged with another of a different configuration in order to change the physical characteristics of the resultant vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference is made to the following description of exemplary embodiments thereof, considered in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view of an exemplary embodiment of a rear propulsion device, shown in conjunction with a person wearing in-line skates;

FIG. **2** is top view of the embodiment shown in FIG. **1**;

FIG. **3** is a side view of both a rear propulsion device and an exemplary cycle front-end subassembly;

FIG. **4** is a side view of the cycle front-end subassembly of FIG. **3** shown with a ski element substituted for the front wheel; and

FIG. **5** is a side view of both a rear propulsion device and an exemplary recumbent cycle front-end subassembly.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. **1**, a first embodiment of the present invention propulsion assembly **10** is shown next to a person **12** wearing a pair of in-line skates. The propulsion assembly **10** includes a drive wheel **14** that rests upon the ground. It

is the rotation of the drive wheel **14** that propels both the propulsion assembly **10** and the person **12** forward. The drive wheel **14** can be of any diameter. However, a diameter of between eight inches and twenty four inches is preferred. The use of a drive wheel is preferred on paved and earthen surfaces. However, when used in snow, it should be understood that a track, such as that used on a snowmobile, can be substituted for the drive wheel.

The drive wheel **14** is rotated by an engine. The engine can be an electric motor, a diesel engine, a propane engine or the like. However, in the preferred embodiment a gasoline engine **16** is used. Although any gasoline engine **16** can be used, the gasoline engine **16** is preferably a two stroke gasoline engine that is air cooled. The gasoline engine **16** can be electrically started. However, to eliminate the weight and cost of a starter motor and battery, the gasoline engine may alternately be started by manually pulling a pull cord.

Every state has regulations regarding gasoline powered vehicles with respect to the state registration of those vehicles. In most all states, registration is not required for vehicles with gasoline motors below a predetermined size and horsepower. It is preferable that the gasoline engine of the assembly be below the state requirements for registration. However, most any sized gasoline engine can be used.

In the shown embodiment of the assembly, the gasoline engine **16** has an engine displacement of approximately 40 cubic centimeters and a horsepower rating of about 1.5 horsepower. Such power ratings are typically below the registration requirements of most states and therefore do not require registration, inspection or insurance.

Both the drive wheel **14** and the gasoline engine **16** are connected to a common frame **18**. The drive wheel **14** is free rotating with respect to the frame **18** and the gasoline engine **16** is fixed to the frame **18**. The drive wheel **14** is interconnected to the gasoline engine **16** in one of a variety of different ways. The drive wheel **14** can be driven by a chain that is turned by the gasoline engine **16**. Alternately, the drive wheel **14** can be connected to the gasoline engine **16** with a direct gear drive, a belt drive or any other drive train system used in the prior art to connect a wheel to a gasoline engine.

The frame **18** also supports a small gas tank **20** that stores the gasoline used by the gasoline engine **16**. The size of the gas tank **20** is dependent upon the size and power of the gasoline engine **16**. The gas tank **20** preferably holds enough gasoline to power the gasoline engine **16** for at least one hour.

Two removable handle bars **22** extend from the frame **18**. The removable handle bars **22** selectively connect to the frame **18** at a common point on the frame **18**. However, once connected to the frame, the two handle bars **22** diverge away from each other as they extend from the frame **18**. As such, the handle bars **22** terminate at a predetermined distance D1 apart from each other, wherein that predetermined distance D1 is between eighteen inches and three feet.

At the ends of the removable handle bars **22** are lever controls **24**. The lever controls **24** engage control cables **25**. On one of the handle bars **22**, the lever control **24** controls the throttle of the gasoline engine **16**. On the second handle bar, the lever control controls the brake.

In between the handle bars **22** is positioned a removable support element **26**. It is the removable support element **26** that physically contacts a person and pushes a person when the assembly **10** is used. The removable support element **26** is preferably padded so as not to cause injury to a person when pressed against that person. Referring to FIG. **2**, it can be seen that the removable support element **26** and the handle bars **22** define a generally U-shaped space **30**. When a person **12** is utilizing the assembly **10**, a person **12** stands within the U-shaped space **30**. As the drive wheel **14** turns, the propulsion assembly **10** presses the support element **26** against the body of the person **12**. The propulsion assembly **10**, therefore propels a person forward without interfering with a person's ability to move their legs or cross their legs.

The handle bars **22** of the propulsion assembly **10** are grasped by the person using the propulsion assembly **10**. The points where a person grasps the handle bars **22** are similar to the position in which a person would hold ski poles. A person can therefore turn the propulsion assembly **10** by pushing, pulling and tilting the handle bars **22**. Accordingly, a person can angle the propulsion assembly **10** or cause the propulsion assembly **10** to contact the back of the person at different angles. This provides great agility and steerability to the propulsion assembly **10** that is unavailable in the prior art.

Returning to FIG. **1**, it can be seen that a removable secondary support element **32** extends from the frame **18** to the center of the first support element **26**. The secondary support element **32** may contact a person's back if a person holds the propulsion assembly **10** at a particularly steep angle of inclination. Since the secondary support element **32** may contact the person using the propulsion assembly **10**, the secondary support element **32** is also preferably padded.

When a person utilizes the propulsion assembly **10**, they stand in between the handle bars **22**. Once the throttle on the handle bar **22** is activated, the gasoline engine **16** powers the drive wheel **14**. The turning of the drive wheel **14** propels the propulsion assembly **10** forward and biases the propulsion assembly **10** against the back of the person **12**. Depending upon the angle at which the propulsion assembly **10** is held, either the support element **26** contacts the back of the person **12** or both the support element **26** and the secondary support element **32** contact the person **12**. As the propulsion assembly **10** biases the support element **26** against the back of the person **12**, the person **12** is propelled forward.

People on skates, skateboards, skis and the like often fall. To prevent the propulsion device from accidentally running over a fallen person, the propulsion device comes with a safety shut off. The safety shut off is a kill switch that automatically stops the gasoline engine **16**. The kill switch is activated when a tethered clip **34** is pulled from a connector port on the propulsion assembly **10**. The tethered clip **34** attaches to a person utilizing the propulsion assembly **10**. Consequently, if a person falls while using the propulsion assembly **10**, the tethered clip **34** will be pulled from the assembly and the gasoline engine **16** will automatically stop.

The present invention propulsion assembly **10** also comes with a retractable tow cord **36**. The tow cord **36** is attached to the rear of the frame **18**. The tow cord **36** can be held by another skater, skier, skateboarder or the like, thereby enabling the propulsion device **10** to simultaneously propel at least two different individuals.

Referring to FIG. **3**, an alternate embodiment of the present invention assembly **40** is shown. In this embodiment, the handle bars **22** (FIG. **1**), first support element **26** (FIG. **1**) and second support element **32** (FIG. **1**) of the previously described propulsion device **10** are removed from the front of the frame **18**. A cycle front-end subassembly **42** is then attached to the frame **18**, thereby creating a motorized two-wheel cycle assembly.

The cycle front-end subassembly **42** contains a secondary frame **44** that attaches to the primary frame **18** of the propulsion device **10** using mechanical fasteners, such as pins, bolts or the like. The secondary frame **44** of the cycle front-end subassembly supports a foot platform **46**, a seat **48**, a set of cycle handle bars **50** and a front fork element **52**. A front wheel **54** mounts to the front fork element, thereby providing the overall assembly with two wheels.

Once the cycle front-end subassembly **42** is mounted to the frame **18** of the propulsion device **10**, a motor scooter is created. A person can sit on the seat **48** and place his/her feet on the foot platform **46**. The motor scooter is steered by moving the handle bars **50**. The control cables **25** extending from the gasoline engine **16** are attached to control levers **56** on the handle bars **50**. As such, a person riding the motor scooter can control the operations of the engine from the handle bars **50**.

Referring to FIG. **4**, it can be seen that the front wheel **54** (FIG. **3**) of the cycle front-end subassembly **42** can be replaced with a ski **60**. The ski **60** mounts to the front fork element of the cycle front-end subassembly in place and stead of the previously described wheel. In this configuration, the overall assembly is configured to ride on snow, wherein the front ski **60** is used to steer through the snow.

In the embodiments of FIG. **3** and FIG. **4**, the seat is positioned in the middle of the overall assembly. This seat position enables a person to sit upright and hold onto the handle bars to steer. Referring now to FIG. **5**, an alternate embodiment of the present invention is shown. In this embodiment a recumbent cycle front-end subassembly **70** is shown. The recumbent cycle front-end subassembly **70** has a frame **72** that also selectively attaches to the frame **18** of the original propulsion device **10**. The frame **72** of the recumbent cycle front-end subassembly **70** supports a seat **74** above the propulsion device **10** between the engine **16** and the rear drive wheel **14**. The frame **72** of the recumbent cycle front-end subassembly **70** also supports a fork element **76** in front of the propulsion device **10**. Foot supports **78** extend horizontally from opposite sides of the fork element **76**. When a person sits on the seat **74**, that person's feet rest upon the foot supports **78**. By pressing the foot supports **78** with a person's feet, the orientation of the fork element **76** can be changed. Thus a person can use his/her feet to steer the overall assembly.

The fork element **76** supports either a front wheel **80** (shown) or a front ski (not shown), depending upon the intended terrain.

In the embodiment of FIG. **5**, a person sitting in the assembly must be able to control the engine **16** and the brakes of the recumbent vehicle. For this purpose, two handle bars **82** can be mounted to the assembly so that the handle bars **82** extend on either side of the seat **74**. On the handle bars **82** are positioned the control levers **84** that are used to control the engine and brakes.

It will be understood that the embodiments of the present invention system described and illustrated herein are merely exemplary and a person skilled in the art can make many variations to the embodiment shown without departing from the scope of the present invention. For example, the prior art is replete with different types of gasoline engines, transmissions and braking systems. Any such prior art devices can be adapted for use in the present invention. All such variations, modifications and alternate embodiments are intended to be included within the scope of the present invention as defined by the appended claims.

What is claimed is:

1. A modular motor vehicle system, comprising:

a rear propulsion assembly containing:
- a first frame;
- an engine supported by said first frame;
- a single drive wheel supported by said first frame and coupled to said engine, wherein said engine selectively drives said drive wheel; and

a handle bar assembly containing:
- a set of handle bars;
- at least one support element coupled to said set of handle bars; and

a front-end assembly containing;
- a second frame;
- a foot platform supported by said second frame;
- a seat supported by said second frame;
- a steering fork element supported by said second frame;
- a single ground engagement element connected to said steering fork element, wherein said ground engagement element is selected from a group consisting of a wheel and a ski;
- a steering mechanism extending from said steering fork element;

wherein said first frame of said rear propulsion assembly is selectively connectable with said handle bar assembly to produce a single wheel personal propulsion device and said first frame of said rear propulsion assembly is selectively connectable with said second frame of said front-end assembly to form a passenger supporting vehicle that rides only on said drive wheel and said ground engagement element.

2. The system according to claim **1**, wherein said ground engagement element is a wheel and said first frame of said rear propulsion assembly and said second frame of said front-end assembly are selectively attachable to form a two-wheeled vehicle.

3. The system according to claim **1**, wherein said ground engagement element is a ski and said first frame of said rear propulsion assembly and said second frame of said front end assembly are selectively attachable to form a vehicle having a single wheel and a single ski.

4. The system according to claim **1**, wherein said steering mechanism is selected from a group consisting of foot pedals and handle bars.

5. The system according to claim **1**, wherein said steering mechanism includes a set of handle bars attached to said steering fork element.

6. The system according to claim **1**, wherein said steering mechanism includes a set of foot supports extending horizontally from opposite sides of said steering fork element.

7. A modular vehicle having a selectively convertible form, comprising:

a rear propulsion assembly having a motor, a single rear wheel that is driven by the motor and a first frame for supporting said rear wheel and said motor;

a handle bar assembly containing handle bars and a support element that interconnects said handle bars; and

a front-end assembly containing a single front wheel, a seat, a foot platform, a steering mechanism and a second frame that supports said front wheel, seat, foot platform and steering mechanism;

wherein the first frame of said rear propulsion assembly is selectively connectable to said handle bar assembly to form a single wheeled personal propulsion vehicle, and

wherein the first frame of said rear propulsion assembly is selectively connectable to the second frame of said front-end assembly to form a two-wheeled vehicle which is supported only by said front wheel and said rear wheel.

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