

(19) AUSTRALIAN PATENT OFFICE

(54) Title
Tracked ATV

(51)⁶ International Patent Classification(s)
B62M 27/02 20060101AFI2006072
(2006.01) OBHEP
B62M 27/02 PCT/CH2006/000001

(21) Application No: 2006206010 (22) Application Date: 2006 .01 .03

(87) WIPO No: W006/074559

(30) Priority Data

(31) Number	(32) Date	(33) Country
11/035,925	2005 .01 .14	US

(43) Publication Date : 2006 .07 .20

(71) Applicant(s)
swissauto offroad ag

(72) Inventor(s)
Wenger, Urs; Kohler, Beat; Jenni, Hans-Rudolf

(74) Agent/Attorney
Griffith Hack, Level 3 509 St Kilda Road, Melbourne, VIC, 3004

(56) Related Art
DE 717514 C
CA 2141777 A1

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 July 2006 (20.07.2006)

PCT

(10) International Publication Number
WO 2006/074559 A1

- (51) International Patent Classification:
B62M 27/02 (2006.01) *B62D 55/06* (2006.01)
- (21) International Application Number:
PCT/CH2006/000001
- (22) International Filing Date: 3 January 2006 (03.01.2006)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
11/035,925 14 January 2005 (14.01.2005) US
- (71) Applicant (for all designated States except US): WENKO AG [CH/CH]; Buchmattstrasse 46, CH-3400 Burgdorf (CH).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): WENGER, Urs [CH/CH]; Mülbacherweg 8, CH-4539 Rumisberg (CH). KOHLER, Beat [CH/CH]; Selzweg 12, CH-3422 Kirchberg (CH). JENNI, Hans-Rudolf [CH/CH]; Neumattweg 2, CH-3365 Grasswil (CH).
- (74) Agent: AMMANN PATENT ATTORNEYS LTD. BERNE; Schwarzlörstrasse 31, P.O. Box, CH-3001 Bern (CH).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

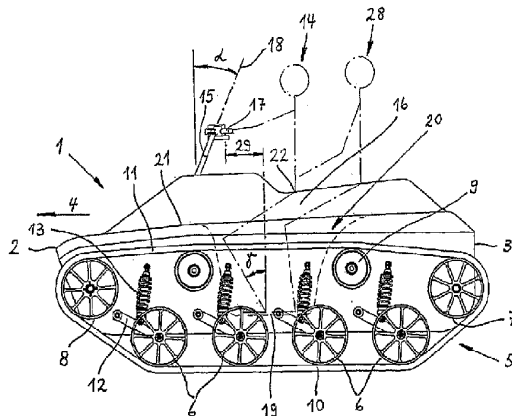
— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TRACKED ATV



(57) Abstract: The invention relates to a tracked ATV which is fully supported, driven and steered by a pair of parallel endless tracks (5) driven by means of an internal combustion engine. Steering means (15) are arranged to control the differential speed between the tracks (5) for steering the vehicle. A handlebar (15) is pivotally mounted to a vehicle body (1) in front of a driver seat (16) for steering of the vehicle by rotation of the handlebar (15). According to another aspect of the invention the driver seat (16) is a straddle-type seat and footrests (9) are arranged on the body (1) to the left and to the right of this seat (16), which footrests (9) are situated vertically in between an upper run (11) and a ground engaging lower run (10) of the tracks (5).

WO 2006/074559 A1

- 1 -

TRACKED ATV

BACKGROUND OF THE INVENTION

5

The invention relates to a tracked ATV. The term All Terrain Vehicle (ATV) designates in the following text vehicles for off-road use which have a relatively small footprint and are intended for use by a driver alone or for a driver and one
10 passenger.

A general distinction is to be made between wheeled and tracked ATVs: A wheeled ATV usually has four wheels, a straddle-type seat for a driver and a handlebar for the
15 steering of the front wheels. Its driver can ride it actively, adapting his position on the seat and hence the balance of the vehicle to a particular driving situation. This allows high driving speeds in off-road conditions. However, wheel drives are not sufficient for universal off-
20 road use, since they lack grip or tend to sink on soft grounds or in deep snow for example.

For use on soft grounds, a tracked ATV is perfect since its ground force is distributed over the ground engaging portion
25 of the tracks and therefore greatly reduced. A track conversion kit for a wheeled ATV is described in the Canadian patent application CA-2,374,657, but the best ground engagement and ground force distribution is offered by full-track vehicles.

30

The Canadian patent application CA-2,141,777 describes such a full-track ATV. It has a pair of parallel, ground engaging tracks and a joystick allows the driver to control the differential speed between the two tracks for steering the
35 vehicle. A driver seat of the type known from cars gives the

driver a stable position with respect to the joystick which is arranged in front of him. However, with this type of steering control (the joystick) and the driving posture given due to the type and position of the seat, it is impossible for the driver to move spontaneously in order to improve the balance of the vehicle with respect to a particular driving situation.

SUMMARY OF THE INVENTION

One aspect of the invention provides a tracked ATV comprising a vehicle body having a front end and a rear end defining its straight direction of travel, a pair of ground engaging endless tracks rotatably mounted around wheels in parallel with the straight direction of travel and fully supporting the vehicle body, each of the tracks having an upper run and a lower, ground engaging run and the track wheels comprising support wheels supporting the upper run and carrying wheels supporting the body on the inner surface of the lower run of each of the tracks, with suspension means resiliently suspending the carrying wheels from the body, an internal combustion engine operably connected to the tracks for driving the same, a driver seat supported on the body, as well as speed control means and steering means operably connected to the tracks and arranged to control the common and differential speed of the tracks for speed control and steering of the vehicle respectively, wherein the steering means is a handlebar pivotally mounted to the body in front of the driver seat and arranged to be turned left or right for left or right steering respectively, wherein

the driver seat is a straddle-type seat, footrests for the left and right feet of the driver are provided left and right of the driver seat and situated behind the handlebar, between the tracks and vertically below the upper run of the

tracks, allowing a standing driving posture of the driver, the handlebar is pivotable with respect to the vehicle body about a single pivoting axis, so that it is suitable to be used by the driver to exert forces on the vehicle body, and
5 speed control means is arranged on the handlebar for manual speed control of the vehicle by the driver.

The invention will be described in detail hereinafter with reference to the drawings illustrating an exemplary
10 embodiment thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

- 15 Fig. 1 shows a simplified side view of a tracked ATV;
Fig. 2 shows a simplified elevational view of the vehicle of Fig. 1;
Fig. 3 shows a simplified perspective view of the vehicle
20 of Fig. 1 and
Fig. 4 shows a perspective view into the body of the same vehicle, according to line IV-IV in Fig. 2.

25 DESCRIPTION OF A PREFERRED EMBODIMENT

The tracked ATV shown in side view in Fig. 1 has a vehicle body 1 with a front end 2 and a rear end 3. The direction from the rear end 2 towards the front end 2 indicates its
30 straight direction of travel 4. The vehicle has a pair of parallel endless tracks 5, only the left one of which is visible in this view. These tracks are mounted around track wheels comprising carrying wheels 6, a drive wheel 7, a tensioning wheel 8 and support wheels 9. The carrying wheels

- 4 -

6 are engaged with an inner surface of a lower run 10 of the tracks 5 and fully support the vehicle body 1, while the support wheels support an upper run 11 of the tracks.

5 The use of separate wheels 6, 9, respectively engaged with the lower and the upper run 10, 11 of the tracks, makes it possible to use a resilient suspension of the carrying wheels allowing a long vertical excursion of these wheels of preferably 10 cm at least. In this example, each of the
10 carrying wheels 6 is mounted to an individual swing arm 12 which is pivotally connected to the body 1 and supported in an inclined position by a shock absorber 13. This suspension system absorbs shocks from bumpy ground even at high driving speeds.

15

The drive wheels 5 are operably connected to an internal combustion engine for driving the tracks. Further details about this drive system are given with reference to Fig. 4 hereinafter. The steering of the vehicle is possible through
20 the control of the differential speed between its left track and its right track, there is no pivoting carrying element engaged with the ground, such as the front wheels of a wheeled ATV or the front skis of a snowmobile, which are usually connected to a pivoting handlebar for steering.

25 However, the inventor has found that such a handlebar 15, arranged on a full-track ATV to be used by its driver much like the handlebar of a wheeled ATV, allows superior handling of the vehicle than the joysticks which have previously been used.

30

A driver seat 16 is supported on the body and a handlebar 15 is mounted to the body in front of the driver seat 16. This handlebar 15 is the steering control of the vehicle: It is operably connected to the tracks and arranged to control the
35 differential speed of the same for steering the vehicle. The

- 5 -

steering action may imply positive or negative acceleration of one track only, or acceleration of both tracks in opposite directions. The handlebar 15 is pivotally mounted to the body and arranged to be turned left or right for left or right steering respectively. The connection between the handlebar and the tracks may comprise mechanical, electrical or hydraulic components, or various combinations of these technologies, depending in particular on the technology which is used to drive the tracks. The handlebar is arranged to be turned left or right by the driver in order to command a left or a right turn of the vehicle respectively.

Compared to a joystick one advantage of the handlebar is that it has a handle 17 at each of its ends and these handles 17 are substantially on opposite sides of its pivoting axis, which makes it easy to transmit forces to the vehicle body by acting on both handles simultaneously, without causing a rotation of the handlebar.

While driving, the hands of the driver rest on the handles of the handlebar and lateral movements of the driver's torso may cause vertical forces of varying strength acting on each of the handles, which are not intended as steering commands. This is even more the case if the driver takes a standing driving posture. A steering effect of vertical forces onto the handles should therefore be avoided. A handlebar is inert to vertical forces if its pivoting axis is vertical. However, an inclination of this pivoting axis towards the driver seat has the advantage that the handle's distance from the driver varies less due to a rotation of the handlebar. For these reasons, the pivoting axis of the handlebar is preferably inclined with respect to a vertical line by an angle α between 0 and 40°.

- 6 -

Where reference is made to a vertical or horizontal orientation, it is supposed that the vehicle stands on a horizontal ground.

- 5 The handlebar is shaped in such a way that in its middle position, when it is neither turned to the left nor to the right, its handles are oriented substantially in parallel with a horizontal plane and slightly inclined with respect to one another by an angle β , so that their free ends point
10 towards the rear end of the vehicle body. The advantage of this shape is that when holding the handles, the driver's hands and forearms are in line, and this both in a standing and sitting driving posture. The optimal angle β between the handles depends on the distance between the handles.
- 15 Handlebars of the size and shape known from wheeled ATV's are preferably used. Handlebars with a width of at least 0.5 m between the outer ends of the handles allow a fairly good handling of the vehicle, but handlebars with a width of at least 0.7 m are preferably used. The angle of inclination β
20 between the handles should be such that the driver's forearms are substantially at a right angle with the respective handle. However, a straight handlebar with exactly parallel handles may also be used, for instance.
- 25 The steering means presented hereinbefore is a pivoting handlebar arranged to be operated by turning it left or right, much like the handlebar of a four wheel ATV. However, the handlebar could also be mounted differently or individual handles for the left and right hands of the
30 driver could be arranged on the body, preferably in positions corresponding to the positions of the handles of the pivoting handlebar in its neutral position.

- Speed control means, operably connected to the tracks for
35 the control of their common speed, which is the travel speed

- 7 -

of the vehicle, are arranged on the handlebar as well (not represented in the figures). A rotatable grip like the throttle grip of a motorbike or a throttle lever arranged to be operated with the thumb of one of the driver's hands, as
5 known from wheeled ATV's, are possible examples.

The tracked ATV is further provided with a brake system comprising brake control means such as a brake lever, which are arranged on the handlebar as well, enabling the driver
10 to brake the vehicle with at least one of his hands. This concentration of important controls for driving the vehicle on the handlebar gives a driver maximum freedom to adapt his posture to a particular driving situation at any time.

15 The driver seat 16 is a straddle-type seat and footrests 19 for the feet of the driver are arranged to the left and to the right of this driver seat 16. This configuration gives the driver sufficient hold while allowing movements of the driver's torso. In the straight direction of travel 4, the
20 footrests 19 are arranged in such a position that the ankles of the driver are at a distance 29 behind the handlebar, allowing him to take a comfortable standing driving posture and to change between a standing and a sitting driving posture without moving his feet. The position of the
25 footrests 19 with respect to an intended sitting position 22 on the driver seat is preferably such that the lower leg of the driver is inclined with respect to a vertical line by an angle χ , his knees being closer to the front end 2 of the vehicle body than his ankles. This allows him to stand up
30 easily.

In this example, the seat 16 extends towards the rear of the vehicle and is long enough to accommodate a passenger 28 behind the driver. The footrests 19 are long enough to

- 8 -

accommodate the feet of the passenger 28 behind the feet of the driver 14 as well.

A footrest may be any surface on which a driver can place
5 his foot. The position of the footrests in the present
example is more readily apparent from Fig. 2, showing the
top view of the same vehicle. The body comprises a
watertight hull, a lower portion of which is situated
between the two tracks. This hull has a substantially closed
10 deck 21, which keeps water out of the hull when the vehicle
is exposed to rain. Each of the footrests 19 is arranged in
a corresponding recess in the deck 21 and situated
vertically in between the lower run 10 and the upper run 11
of the tracks. This low position of the footrests allows to
15 place the driver seat relatively low as well, contributing
to a low center of gravity of the whole unit consisting of
the vehicle and its driver.

For off-road driving the weight distribution is considered
20 to be optimal if the center of gravity of the vehicle and of
its driver are both perpendicularly above the center of
gravity of the vehicle's footprint. The footprint is the
surface on which the vehicle stands, it consists of the
surface of the lower, ground engaging runs 10 of the two
25 tracks. In the straight direction of travel the center of
gravity of this footprint is in the middle of the lower runs
of the tracks. Therefore the driver seat is preferably
arranged in a position where, in the straight direction of
travel, the deviation of the intended sitting position of
30 the driver on this seat from the middle of the lower runs 10
does not exceed 30 % of their length.

The possibility of the driver to influence with his
movements the balance of the vehicle also depends on the
35 footprint and on the total weight of the vehicle. The

- 9 -

smaller its footprint and the lower its weight, the more can its balance be affected by movements of the driver. Preferably the length of the lower runs 10 of the tracks 5 does not exceed 2 m and the unfueled weight of the vehicle 5 does not exceed 450 kg.

In Fig. 3 the same vehicle is shown in a perspective view, in which the shape of the vehicle body 1 with the watertight hull 23 and the deck 21 are more readily apparent. The 10 volume of this watertight hull 23 is sufficient for the vehicle to swim in water. The upper runs 11 of the tracks of the swimming vehicle are above the water surface, so that the tracks can propel the swimming vehicle as well.

15 Fig. 4 shows the same vehicle in a sectional perspective view, where the hull 23 and the deck 21 of the body are cut open according to the plane IV-IV indicated in Fig. 2, opening the view to the inside of the vehicle. It can be seen that the vehicle body comprises a frame structure 24, 20 to which the hull 23 and the deck 21 are mounted. The footrests 19 are an integral part of the deck 21 and each of them is situated in a recess in the deck 21.

An internal combustion engine and gearbox assembly 25 is 25 supported on the frame as well. This assembly 25 is best arranged in the middle of the vehicle, so that its center of gravity is perpendicularly above the center of gravity of the vehicle's footprint. In the straight direction of travel, the distance of the combustion engine and gearbox 30 assembly 25 from the middle of the ground engaging lower runs 10 of the tracks does preferably not exceed 30% of their length. The same applies for the combustion engine alone if there is no gearbox or if a detached gearbox is used.

35

A transmission 26 which connects a shaft of the combustion engine to the drive wheels 7 of the tracks via a differential gearing 27 is shown as well. However, many other drive systems are conceivable: The combustion engine
5 might drive a generator producing electricity, the drive wheels being driven by electromotors, or the combustion engine might drive a hydraulic pump, the drive wheels being driven by hydraulic motors, for example. The steering system
10 requires means to control the differential speed between the two tracks. For each of the different drive technologies various steering systems for full-track vehicles are already known to the one skilled in the art.

Numerous variations of the described methods and embodiments
15 are obvious for the one skilled in the art and the foregoing description shall not be construed as a limitation to the scope of the invention, which is solely defined by the following claims.

20 It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

25 In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or
30 "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

Claims

1. A tracked ATV comprising a vehicle body having a front
end and a rear end defining its straight direction of
5 travel, a pair of ground engaging endless tracks rotatably
mounted around track wheels in parallel with the straight
direction of travel and fully supporting the vehicle body,
each of the tracks having an upper run and a lower, ground
engaging run and the track wheels comprising support wheels
10 supporting the upper run and carrying wheels supporting the
body on the inner surface of the lower run of each of the
tracks, with suspension means resiliently suspending the
carrying wheels from the body, an internal combustion engine
operably connected to the tracks for driving the same, a
15 driver seat supported on the body, as well as speed control
means and steering means operably connected to the tracks
and arranged to control the common and differential speed of
the tracks for speed control and steering of the vehicle
respectively, wherein the steering means is a handlebar
20 pivotally mounted to the body in front of the driver seat
and arranged to be turned left or right for left or right
steering respectively, wherein
the driver seat is a straddle-type seat, footrests for
the left and right feet of the driver are provided left and
25 right of the driver seat and situated behind the handlebar,
between the tracks and vertically below the upper run of the
tracks, allowing a standing driving posture of the driver,
the handlebar is pivotable with respect to the vehicle body
about a single pivoting axis, so that it is suitable to be
30 used by the driver to exert forces on the vehicle body, and
speed control means is arranged on the handlebar for manual
speed control of the vehicle by the driver.

2. A tracked ATV according to claim 1, further comprising a brake system comprising brake control means arranged on or in proximity of the handlebar for manual braking.
- 5 3. A tracked ATV according to claim 1 or 2, wherein the suspension means is arranged to allow a vertical excursion of the carrying wheels with respect to the body of at least 10cm.
- 10 4. A tracked ATV according to any one of claims 1 to 3, wherein the carrying wheels are individually suspended from the body by resilient suspension means.
5. A tracked ATV according to any one of claims 1 to 4,
15 wherein the length of the ground engaging lower runs of the tracks do not exceed 2m.
6. A tracked ATV according to any one of claims 1 to 5,
wherein its unfueled weight does not exceed 450kg.
- 20 7. A tracked ATV according to any one of claims 1 to 6, wherein the body comprises a watertight hull, the volume of which is sufficient for the vehicle to float in water.
- 25 8. A tracked ATV according to claim 7, wherein when the vehicle is in a body of water the upper run of the tracks of the vehicle is above a water surface.
9. A tracked ATV according to any one of claims 1 to 8,
30 wherein the body comprises a substantially closed deck and each of the footrests is arranged in a corresponding recess in the deck.
10. A tracked ATV according to any one of claims 1 to 9,
35 wherein the combustion engine is mounted to the body in

such a position that, in the straight direction of travel, the distance of its center of gravity from the middle of a ground engaging lower run of the tracks does not exceed 30% of the length of the latter.

5

11. A tracked ATV according to any one of claims 1 to 10, wherein the driver seat is arranged in such a position that, in the straight direction of travel, the deviation of the intended sitting position of the driver from the middle of a ground engaging lower run of the tracks does not exceed 30% of the length of the latter.

10

12. A tracked ATV according to any one of claims 1 to 11, wherein the handlebar comprises left and right handles for the left and right hands of the driver respectively and the speed control means are associated with one of the handles for manual speed control.

15

13. A tracked ATV according to claim 12, wherein the brake control means is arranged in proximity of at least one of the handles for manual braking.

20

14. A tracked ATV substantially as herein described with reference to and as illustrated in the accompanying drawings.

25

Fig.3

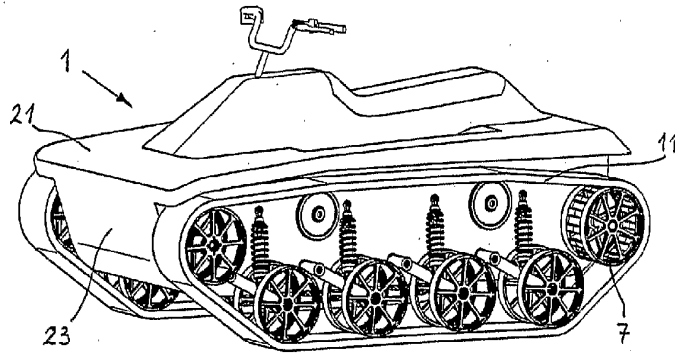


Fig.4

