

Description

Technical field

This invention relates to vehicular propulsion systems and, more particularly, to means for tensioning endless, elastomeric, inextensible frictionally driven belts each entrained about a driver and an idler structure.

Background art

Vehicles utilizing continuous ground-engaging apparatus (e.g. track or belt) require same to be tensioned within a specified range for acceptable vehicle performance. Hydraulic tensioning apparatus such as is illustrated in the following U.S. patents perform the requisite tensioning but, in some circumstances such as extended periods of vehicle shutdown, can lose tensioning pressure past seals, through loose fittings, and otherwise: U.S. Patent 4,227,748, issued October 14, 1980, assigned to the assignee of the present invention and U.S. Patent 3,101,977, issued August 27, 1963. Minimum acceptable tensions for positive drive systems has been found to be lower than the minimum acceptable tension for frictional drive systems such as are respectively illustrated in U.S. Patents 4,227,748 and 3,101,977. Hydraulic tensioning apparatus pressure losses are often unacceptable for frictional drives unless supplemented by other means, due to the time delay experienced from vehicle start up until sufficient tensioning pressure is available to provide vehicular mobility.

Other track tensioning devices include those illustrated in U.S. Patent 1,906,415, patented May 2, 1933, U.S. Patent 1,522,157, patented January 6, 1925, U.S. Patent 3,930,553, patented January 6, 1976, and U.S. Patent 2,998,998, patented September 5, 1961. Experience has shown that endless ground engagement members entrained about circular wheel-like elements must have a system which provides recoil capability or the ability for the axis of rotation of one or more of the entrained wheel elements to move in order to accommodate debris and other matter which is inadvertently ingested between such wheels and the ground engagement members without damaging any of such components. U.S. Patents 3,930,553, 2,998,998, and 1,906,415 appear to lack provisions for such recoil capability other than deflection of the wheels' pneumatic tires and are thus believed to have significant disadvantages when used in heavy-duty, earthworking environments. Moreover, U.S. Patent 2,998,998 provides increased belt tension by pivoting the rotation axis of its idler element relative to its roller frame. Pivoting of that rotation axis causes changes in the orientation of the utilizing vehicle, the spacial relationship among drive components, and the height of the connection point for ground engaging implements. These changes detract from operator comfort, reduce drive component reliability, and introduce wide variations in implement ground penetration.

The vehicle illustrated in U.S. Patent 1,522,157

has a tensioning apparatus which includes recoil provisions but has driver wheel elements and idler wheel elements which are supported from the vehicle's main frame. Such idler wheel elements are rotatably and translatably displaceable relative to the main frame and thus require additional framework and provisions for accommodating relative movement. Such framework and movement accommodation may reduce the reliability, increase the cost, and add weight to the vehicle. The illustrated vehicle also uses dual tensioning/recoil devices for each cooperating set of driver/idler wheels which can cause unfavourable cocking thereof and reduce the effectiveness of the entraining ground-engaging member. Accordingly, the present invention is intended to overcome one or more of the aforementioned problems and/or disadvantages.

In accordance with the present invention, a belt laying work vehicle comprises:

a main frame; a drive structure extending from a lateral side of the main frame and including a rotatable drive wheel having a drive axis of rotation; a roller frame disposed on a lateral side of and in rigid supporting relation to the main frame; an idler structure slidably mounted on the roller frame and including an idler shaft having an idler axis of rotation and a rotatable idler wheel mounted on the shaft; an endless, inextensible elastomeric belt entrained about the wheels; means for constraining relative movement between the idler structure and roller frame to a longitudinal recoil path during rotation of the idler structure; and, means for adjustably biasing the belt into frictional driven engagement with the drive structure with a first force and for exerting a second compensating force on the drive structure which is equal in magnitude but opposite in direction to the first force, characterised by:

the biasing and force compensating means including apparatus for transmitting the first and second forces between the idler and drive structures independently of the main and roller frames.

A method is provided of adjusting the tension of an endless inextensible ground engagement vehicle propulsion belt entrained about a drive structure extending from a vehicle main frame, having a radially outwardly facing surface, and an axis of rotation and about an associated idler structure slidably supported on a roller frame which is rigidly connected to the main frame, the driver and idler structures being respectively connected to a drive strut and an idler strut which are engaged with opposite ends of a spring, the method comprising: lengthening one of the struts until the belt is frictionally coupled with and driven by the radially outwardly facing surface with a first force; transmitting a second, compensating force between the idler and drive structures independently of the main and roller frames; locking the strut in its lengthened configuration; and, constraining relative movement of the idler structure and the roller frame to a longitudinal recoil path during rotation of the idler structure.

The advantages of the present invention will

become apparent from the following description when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevational view of a belted work vehicle in which the invention is exemplified;

Fig. 2 is an enlarged partial sectional view of a portion of the vehicle in Fig. 1 illustrating a first embodiment of its tensioning/recoil apparatus;

Fig. 3 is an enlarged partial sectional view of a portion of the vehicle illustrated in Fig. 1 illustrating a second embodiment of the tensioning/recoil apparatus; and,

Fig. 4 is a sectional view taken along section line IV—IV of Fig. 1.

In the description which follows, like reference numerals indicate like structure. Referring now to the drawings in detail, Fig. 1 illustrates a belt laying work vehicle 10 having a chassis 12 and an undercarriage 14 which is arranged in supporting relation to the chassis 12. The chassis 12 includes a main frame 16 and an engine compartment 18 within which an engine (not shown) is housed. The undercarriage 14 includes a first 20 and a second 22 belt roller frame assembly arranged in supporting relation to the main frame 16 on either lateral side thereof. Only the "near" belt roller frame assembly 20 is illustrated in Fig. 1 since it is understood that the corresponding and identical belt roller assembly 22 is arranged on the opposite side of the main frame 16. Accordingly, due to the substantial identity therebetween, further reference and description of the belt roller frame assemblies and their components will be limited to the roller frame assembly 20.

The belt roller frame assembly 20 includes a roller frame 24, a biasing/recoil apparatus 26 partially housed within the frame 24, and a set of rollers 28 mounted on the frame 24. The roller frame 24 is rigidly connected to the main frame 16 at a front location 30 (the actual connection is hidden by the roller frame 24) and a rear location 32. An endless inextensible, elastomeric belt 34 having guide elements 35 is entrained about an idler structure 36 and a drive structure 38 which are respectively disposed adjacent the front and rear longitudinal ends of the main frame 16.

Fig. 2 is a partial sectional view of the undercarriage 14 illustrated in Fig. 1. The drive structure 38, as shown in Fig. 2, includes a drive shaft 40 which transmits power from the vehicle engine and protrudes laterally from the main frame 16, a hub 42 which is connected to the drive shaft 40 and constitutes a portion of a drive wheel 44 which is rotatable about an axis of rotation 46, a bearing structure 48 disposed about the drive hub 42, and a bearing cage 50 disposed about and in supporting relation to the bearing structure 48. The bearing structure 48 accommodates relative rotation between the bearing cage 50 and the drive hub 42. The drive wheel 44 also includes a radially outwardly facing surface 51 which is frictionally coupled to the belt 34.

The idler structure 36 includes a slider assembly 52 and an idler wheel 54 which are respectively disposed in sliding relation to the

roller frame 24 and rotatably mounted on the slider assembly 52 about an idler shaft 56 having an axis of rotation 58. A constraining element 59 having a constraining axis 60 protrudes laterally from the slider assembly 52 and resides in a longitudinal slot 61 formed in the roller frame 24 so as to constrain relative movement between the slider assembly 52 and roller frame 24 to a longitudinal recoil path. Fig. 4 provides a detailed illustration of the idler structure 36 and its relationship with the belt 34 and roller frame 24.

A biasing/recoil apparatus 62 illustrated in Fig. 2 constitutes a first embodiment of the biasing/recoil apparatus 26 of Fig. 1 and includes an idler strut 63 housed within the roller frame 24 and a connecting pin 64 having a connection axis 65. The idler strut 63 is pivotally connected to the slider assembly 52 in front of the axis of rotation 58 by the connecting pin 64 and is engaged with an idler spring retainer 66. While the constraining element 59 of the embodiments illustrated herein constitutes the connecting pin 64, it is to be understood that one of ordinary skill in the art could, within the teachings of the present invention, suitably modify the idler structure 36 and use the idler shaft 56 as the constraining element 59 in place of the connecting pin 64. As illustrated, the axes 46, 58, and 60 are preferably coplanar for purposes of minimizing the stress induced in the drive structure 38, idler structure 36, and biasing/recoil apparatus 62.

The biasing/recoil apparatus 62 also includes a drive strut 68 which extends from the bearing cage 50 through a spherical bearing 70 to a drive spring retainer 72. A compression spring 74 constitutes a portion of the apparatus 62 and has opposite ends which are engaged with the respective spring retainers 66, 72. The drive strut 68 includes a first member 76 and a second member 78 within which the first member 76 is disposed. The first drive strut member 76 has external threads 80 and the second drive strut member 78 has internal threads (not shown) and a gripping portion 82.

Fig. 3 illustrates a second embodiment 84 of the biasing/recoil apparatus 26 with the primary differences between the embodiments 62 and 84 residing in the cooperation of the first and second members of the respective drive struts. It is to be understood that the remaining elements of the undercarriage 14 illustrated in Fig. 2 also exist in Fig. 3 and, for the sake of clarity, are not duplicated in Fig. 3. The biasing/recoil apparatus 84 of Fig. 3 includes the same elements as does the biasing/recoil apparatus 62 of Fig. 2 except that the apparatus 84 includes a drive strut 86 having a first and a second member 88, 90, respectively, instead of the drive strut 68 of Fig. 2. The first member 88 has a circular body portion 92, external threads 94 adjacent a proximal end 96 of the body portion 92, and a circular seal 98 partially recessed in and disposed about a distal end 100 of the body portion 92. The second member 90 of the drive strut 86 has a cylindrical shape with an open, proximal end 102 through which the distal

and 100 of the first member 88 is received and a closed, distal end 104 which engages the spring retainer 72. The first member 88, the second member 90, and the seal 98 cooperatively define a pressurizable chamber 106 which volume varies with the relative longitudinal position of the first and second members 88, 90. An opening 108 through the second member 90 permits transmission of pressurized fluid into the chamber 106, along a path 110, the details of which are not relevant to the present invention. A locking assembly 112 includes a nut 114 and a thrust washer 116 which are respectively threadably engaged with the first member 88 and abutably engaged with the nut 114 and the second member 90.

Industrial applicability

The biasing/recoil apparatus 26 must be appropriately adjusted to provide the tension required for successful frictional coupling of the belt 34 to the drive surface 51 and to permit recoil of the idler structure 36 upon ingestion of debris between the belt 34 and other undercarriage components.

For both embodiments 62, 84 of the biasing/recoil apparatus, the tensioning force of the spring 74 is applied to the idler structure 36 in front of the axis 58 in a "pulling" rather than a "pushing" mode for purposes of correcting instead of aggravating a slider assembly 52/roller frame 24 configuration which has been "cocked" by other forces. To tension the belt 34 by using the apparatus 62, a wrench or similar device is mated with the gripping portion 82 of the drive strut's second member 78 and rotated to provide relative rotational motion and longitudinal displacement of the threadably engaged first and second members 76, 78, respectively, of the drive strut 68. The relative longitudinal displacement of the drive strut members 76, 78 results in relative rotational motion between the second member 78 and the spring retainer 72 which motion is accommodated by the spherical bearing 70. Longitudinal displacement of the strut member 76 away from the idler structure 36 causes the spring retainer 72 to advance toward the idler structure 36. As a result of the aforementioned motion, the length of the coil spring 74 decreases and subsequently provides a greater biasing force between the drive and idler structures 36, 38, respectively, through the drive strut 68, 86, idler strut 63, bearing cage 50, and bearing 48 so as to increase the tension in the belt 34 and cause greater frictional engagement thereof with the drive surface 51. Of course, it is to be understood that rotation of the second member 78 in a direction opposite that previously described causes the first member 76 to longitudinally approach the idler structure 36 and thus decrease the biasing force in the spring 74 and in the belt 34.

Substantial torques are required to relatively rotate and extend the first and second members 76, 78 to provide the requisite belt tension for

frictionally coupling the belt 34 to the drive surface 51 of the drive structure 38. Accordingly, the embodiment of Fig. 3 is somewhat preferred over that of Fig. 2 in that the locking assembly 112 in Fig. 3 is only used for preventing the first member 88 from being further inserted into the second member 90 instead of also inducing the relative longitudinal displacement of the members 88, 90.

In using the biasing/recoil apparatus 84 of Fig. 3 to increase the tension in the belt 34, pressurized fluid such as grease is transmitted under pressure through the port 108 into the pressurizable chamber 106. The fluid pressure in the chamber 106 is increased to induce opposite relative longitudinal displacement of the drive strut's first and second members 88, 90, respectively, until the desired belt tension is achieved. Thereafter, the locking nut 114 is rotated in the appropriate direction to longitudinally advance it and the adjacent thrust washer 116 until the thrust washer 116 abutably engages the second member 90. The hereinbefore described longitudinal displacement of the first and second members 88, 90, respectively, tends to move the spring retainer 72 toward the idler structure 36. However, due to the substantially inextensible nature of the elastomeric belt 34, the opposing spring retainer 66 moves very little. Accordingly, the spring 74 assumes a shortened configuration and provides greater biasing force on and thus tension in the elastomeric belt 34. The locking nut 114, when rotated, drives the thrust washer 116 into longitudinally abutting engagement with the second member 90 of the drive strut 86. The fluid pressure in pressurizable chamber 106 may then be relieved to reduce the pressure load on the seal member 98. The biasing/recoil apparatus 84 of Fig. 3 is also preferred to the biasing/recoil apparatus 62 of Fig. 2 because there is no relative rotation under load between the spring retainer 72 and the second member 90 of the drive strut 86.

During movement of the work vehicle 10, the elastomeric belt 34 rotates about the driver structure 38 to which it is frictionally coupled, about the idler structure 36, and under the rollers 28 which uniformize the ground engagement pressure exerted by the belt 34. The idler wheel 54, during vehicular movement, rotates about the axis 58 and reciprocates during recoil/recovery thereof. Upon ingestion of debris between the belt 34 and the undercarriage components (drive wheel 44, idler wheel 50, and the rollers 28), the slider assembly 52 recoils by moving longitudinally towards the drive structure 38. During such recoil, the spring retainer 66 is induced by the idler strut 63 and idler structure 36 to move toward the opposing spring retainer 72 and controllably increase the spring force and belt tension. Such increased belt tension manifests itself in a first force on the drive structure 38 in a direction toward the idler structure 36. The driver bearing cage 50, drive strut 68, 86 (depending on the chosen biasing/recoil apparatus), and spring

retainer 72 under inducement of the spring 74's biasing force exert a second, compensating force on the drive structure 38 which is equal in magnitude but opposite in direction to the first force. Upon expulsion of the debris, the slider assembly 52 recovers its steady state position by moving longitudinally away from the drive structure 38 until the belt tension counteracts the spring force.

It should now be apparent that a tensioning/recoil apparatus 26 has been provided for adjusting the tension in an inextensible, elastomeric belt 34 which is frictionally coupled to the driving surface 51 of the driver structure 38. Such improved biasing/recoil apparatus 26 accommodates debris ingestion between the undercarriage components and the belt 34 without subjecting such components to undue stress while isolating the recoil action of the idler structure 36 to the roller frame 20 constraining the recoil action to the longitudinal direction and self correcting any cocked configuration of the idler structure 36/roller frame 24.

Claims

1. A belt laying work vehicle (10) comprising:
 - a main frame (16);
 - a drive structure (38) extending from a lateral side of the main frame (16) and including a rotatable drive wheel (44) having a drive axis of rotation (46);
 - a roller frame (24) disposed on a lateral side of and in rigid supporting relation to the main frame (16);
 - an idler structure (36) slidably mounted on the roller frame (24) and including an idler shaft (56) having an idler axis of rotation (58) and a rotatable idler wheel (54) mounted on the shaft;
 - an endless, inextensible, elastomeric belt (34) entrained about the wheels;
 - means (59, 61) for constraining relative movement between the idler structure (36) and roller frame (24) to a longitudinal recoil path during rotation of the idler structure (36); and,
 - means (26, 62, 84) for adjustably biasing the belt (34) into frictional driven engagement with the drive structure (38) with a first force and for exerting a second compensating force on the drive structure (38) which is equal in magnitude but opposite in direction to the first force, characterised by:
 - the biasing and force compensating means including apparatus for transmitting the first and second forces between the idler and drive structures independently of the main and roller frames.
2. A vehicle (10) according to claim 1, wherein the biasing and force compensating means (26, 62, 84) comprises:
 - a spring (74);
 - a first means (68, 88, 72) for connecting one end of the spring (74) to the drive structure (38);
 - second means (63, 66) for connecting the other end of the spring (74) to the idler structure (36), wherein one of the connecting means (68, 88, 72,

63, 66) includes a spring retainer (66, 72) engaged with an end of the spring (74); and,

means (76, 78, 82, 88, 90, 114) for adjusting the distance between the spring retainer (66, 72) and the structure (36, 38) connected by the one connecting means.

3. A vehicle (10) according to claim 2, wherein the adjusting means (76, 78, 82, 88, 90, 112) comprises:

a first member (76, 88) connected to one of the structures (36, 38);

a second member (78, 90) engaged with the spring retainer (66, 72) and disposed about the first member (76, 88); and,

means (80, 94, 112) for locking the first (76, 88) and second (78, 90) members together.

4. A vehicle according to claim 3, wherein the locking means (80, 94, 112) comprises:

means (94, 112) for threadably engaging the first member (88) and for abutably engaging the second member (90).

5. A vehicle (10) according to claim 4, further comprising:

means (98, 108) for fluidly separating the spring retainer (72) and the first member (76, 88).

6. A vehicle (10) according to claim 5, wherein the second member (90) has an open (102) and a closed (104) end;

the first member (88) is reciprocatably receivable in the open end (102) of the second member (90); and is characterised by

means (98) for fluidly sealing between the first (88) and second (90) members and, together with the first (88) and second (90) members, defining a variable volume chamber (106); and,

means (108) for transmitting pressurized fluid into the chamber (106).

7. A vehicle (10) according to claim 3, wherein the locking means (80, 94, 112) comprises:

means (80) for threadably engaging the first (76) and second (78) members.

8. A vehicle (10) according to claim 3, wherein the second member (78, 90) and the spring retainer (72) are engaged at a spherical bearing (70).

9. A vehicle (10) according to claim 2, wherein the first connecting means (68, 88, 72) comprises:

a bearing (48) disposed about the drive structure (38);

a bearing cage (50) supportably disposed about the bearing (48); and,

a drive strut (68, 86) extending between the spring (74) and the bearing cage (50).

10. A vehicle (10) according to claim 1, wherein the constraining means (59, 61) comprises:

a longitudinal slot (61) in the idler structure (36) or the roller frame (24); and,

an elongate constraining element (59) which resides in the slot (61) and protrudes from the roller frame (24) or the idler structure (36) respectively.

11. A vehicle (10) according to claim 10, wherein the second connecting means (63, 66) comprises:

an idler strut (63) biased by the spring (74); and,

connecting pin (64) which joins the idler strut (63) to the idler structure (36).

12. A vehicle (10) according to claim 11, wherein the constraining element (59) constitutes one of the idler shaft (56) and the connecting pin (64).

13. A vehicle (10) according to claim 11, wherein the connecting pin (64) and the drive axis (46) are disposed on opposite sides of the idler axis (58).

14. A vehicle (10) according to claim 10, wherein the longitudinal axis (60) of the constraining pin (59), the idler axis (58), and the drive axis (46) are coplanar.

15. A vehicle (10) according to claim 13 or claim 14, wherein the idler axis (55) and connection pin (64) lie in a common plane.

16. A method of adjusting the tension of an endless inextensible ground engagement vehicle propulsion belt (34) entrained about a drive structure (38) extending from a vehicle main frame (16), having a radially outwardly facing surface (51), and an axis of rotation (46) and about an associated idler structure (36) slidably supported on a roller frame (24) which is rigidly connected to the main frame (16), said driver (38) and idler (36) structures being respectively connected to a drive strut (68, 86) and an idler strut (63) which are engaged with opposite ends of a spring (74), the method comprising:

lengthening one of the struts (68, 86, 63) until the belt (34) is frictionally coupled with and driven by the radially outwardly facing surface (51) with a first force;

transmitting a second, compensating force between the idler and drive structures independent of the main and roller frames;

locking the strut (68, 86, 63) in its lengthened configuration; and,

constraining relative movement of the idler structure (36) and the roller frame (24) to a longitudinal recoil path during rotation of the idler structure.

Patentansprüche

1. Ein bandablegendes Arbeitsfahrzeug (10) weist folgendes auf:

einen Hauptrahmen (16);

eine Antriebsstruktur (38), welche sich von einer lateralen Seite des Hauptrahmen (16) aus erstreckt und ein drehbares Antriebsrad (44) mit einer Antriebsdrehachse (46) umfasst;

einen Rollenrahmen (24) angeordnet an einer lateralen Seite des Hauptrahmens (16) und zwar in einer steifen stützenden Verbindung mit diesem;

eine Laufstruktur (36) gleitend an dem Rollenrahmen (24) befestigt, die eine Laufwelle (56) mit einer Laufdrehachse (58) und ein an der Welle befestigtes drehbares Laufrad (54) umfasst;

ein endloses nicht ausdehnbares Elastomerband (34), welches um die Räder herumgelegt ist;

Mittel (59, 61) zum Einschränken der Relativbewegung zwischen der Laufstruktur (36) und dem

Rollenrahmen (24) auf einen longitudinalen Rücklaufweg während der Drehung der Laufstruktur (36); und,

Mittel (26, 62, 84) zum einstellbaren Vorspannen des Bandes (34) in einen reibungsmäßig angetriebenen Eingriff mit der Antriebsstruktur (38) mit einer ersten Kraft und zum ausüben einer zweiten Kompensationskraft auf die Antriebsstruktur (38) welche die gleiche Größe aber eine entgegengesetzt gerichtete Richtung zu der ersten Kraft besitzt, dadurch gekennzeichnet, daß die Vorspann- und Kraftkompensierungsmittel, eine Vorrichtung zum Übertragen der ersten und zweiten Kräfte zwischen der Lauf- und Antriebsstrukturen umfassen und zwar unabhängig von den Haupt- und Rollenrahmen.

2. Ein Fahrzeug (10) nach Anspruch (1) wobei die Vorspann- und Kraftkompensierungsmittel (26, 62, 84) folgendes aufweisen:

eine Feder (74);

erste Mittel (68, 88, 72) zum Verbinden des einen Endes der Feder (74) mit der Antriebsstruktur (38);

zweite Mittel (63, 66) zum Verbinden des anderen Endes der Feder (74) mit der Laufstruktur (36) wobei eines der Verbindungsmittel (68, 88, 72, 63, 66) einen Federaufnehmer (66, 72) der mit einem Ende der Feder (74) in Eingriff steht, umfasst; und Mittel (76, 78, 82, 88, 90, 114) zum Einstellen der Entfernung zwischen dem Federaufnehmer (66, 72) und der Struktur (36, 38) welche durch das eine Verbindungsmittel verbunden sind.

3. Fahrzeug (10) nach Anspruch 2, wobei die Einstellmittel (76, 78, 82, 88, 90, 112) folgendes aufweisen:

eine erstes Glied (76, 88) verbunden mit einer der Strukturen (36, 38);

ein zweites Glied (78, 90) welches mit dem Federaufnehmer (76, 72) in Eingriff steht und an dem ersten Glied (76, 88) angeordnet ist; und

Mittel (80, 94, 112) zum Verriegeln der ersten (76, 88) und der zweiten (78, 90) Glieder.

4. Fahrzeug nach Anspruch 3, wobei die Verriegelungsmittel (80, 94, 112) Mittel (94, 112) zum gewindemäßigen in Eingriff kommen des ersten Gliedes (88) und zum anlagemäßig in Eingriff kommen des zweiten Gliedes (90) aufweisen.

5. Fahrzeug (10) nach Anspruch 4 wobei weiterhin folgendes vorgesehen ist: Mittel (98, 108) zum fluidmäßigen Trennen des Federaufnehmers (72) und des ersten Gliedes (76, 88).

6. Fahrzeug (10) nach Anspruch 5 wobei das zweite Glied (90) ein offenes (102) und ein geschlossenes (104) Ende besitzt; das erste Glied (88) hin- und herbewegbar in dem offenen Ende (102) des zweiten Gliedes (90) aufnehmbar; und gekennzeichnet ist durch

Mittel (98) zum fluidmäßigen Abdichten zwischen den ersten (88) und zweiten (90) Gliedern und zum definieren einer veränderbaren Volumenkommer (106) mit den ersten (88) und zweiten (90) Gliedern; und,

Mittel (108) zum Übertragen eines unter Druck stehenden Fluids in die Kammer (106).

7. Fahrzeug (10) nach Anspruch 3, wobei die



Verriegelungsmittel (90, 94, 112) Mittels (80) zum Gewindemäßigen in Eingriff kommen der ersten (76) und zweiten (78) Glieder aufweist.

8. Fahrzeug (10) nach Anspruch 3, wobei das zweite Glied (78, 90) und der Federaufnehmer (72) an einem kugelförmigen Lager (70) in Eingriff stehen.

9. Fahrzeug (10) nach Anspruch 2, wobei die ersten Verbindungsmittel (68, 88, 72) folgendes aufweisen:

ein Lager (48) angeordnet an der Antriebstruktur (38);

eine Lagerschale (50), die Stützmäßig um das Lager (48) herum angeordnet ist; und,

eine Antriebsverstrebung (68, 86) die sich zwischen der Feder (74) und der Lagerschale (50) erstreckt.

10. Fahrzeug (10) nach Anspruch 1, wobei die Einschränkungsmittel (59, 61) folgendes aufweisen:

einen Längsschlitz (61) in der Laufstruktur (36) oder dem Rollenrahmen (24); und

ein verlängertes Einschränkungselement (59) welches sich in dem Schlitz (61) befindet und von dem Rollenrahmen (24) bzw. der Laufstruktur (36) hervorspringt.

11. Fahrzeug (10) nach Anspruch 10, wobei die zweiten Verbindungsmittel (63, 66) folgendes aufweisen:

eine Laufverstrebung (63), welche durch die Feder (74) vorgespannt ist; und

einen Verbindungsstift (64) welcher die Laufverstrebung (63) mit der Laufstruktur (36) verbindet.

12. Fahrzeug (10) nach Anspruch 11, wobei das Einschränkungselement (59) entweder die Antriebswelle (56) oder den Verbindungsstift (64) bildet.

13. Fahrzeug (10) nach Anspruch 11, wobei der Verbindungsstift (64) und die Antriebsachse (46) auf entgegengesetzten Seiten der Laufachse (58) angeordnet sind.

14. Fahrzeug (10) nach Anspruch 10 wobei die Längsachse (60) des Einschränkungstiftes (59), die Laufachse (58), und die Antriebsachse (46) coplanar sind.

15. Fahrzeug (10) nach Anspruch 13 oder 14, wobei die Laufachse (58) und der Verbindungsstift (64) in einer gemeinsam Ebene liegen.

16. Verfahren zum Einstellen der Spannung eines endlosen, nicht ausdehnbaren, mit der Erde in Eingriff stehenden Fahrzeugsantriebsbandes (34) welches herumgelegt ist um eine Antriebsstruktur (38) die sich von einem Fahrzeughauptrahmen (16) erstreckt und eine radial nach außen gerichtete Oberfläche (51) und eine Rotationsachse (46) besitzt und um eine dazugehörige Laufstruktur (36) die gleitmäßig an einem Rollenrahmen (24) getragen wird, der fest mit dem Hauptrahmen (16) verbunden ist, wobei die Antriebs- (38) und Lauf- (36) strukturen mit einer Antriebsverstrebung (68, 86) bzw. einer Laufverstrebung (63) die mit gegenüberliegenden Enden einer Feder (74) in Eingriff stehen verbunden sind, wobei das Verfahren folgendes aufweist:

Verlängerung einer der Verstreubungen (68, 86, 63) bis das Band (34) reibungsmäßig mit der

radial nach außen gerichteten Oberfläche (51) gekuppelt und durch sie mit einer ersten Kraft angetrieben ist;

Übertragen einer zweiten Kompensationskraft zwischen der Lauf und der Antriebsstrukturen und zwar unabhängig von den Haupt- und Rollenrahmen;

Verriegeln der Verstrebung (68, 86, 63) in ihrer verlängerten Konfiguration; und,

Einschränken der Relativbewegung der Laufstruktur (36) und des Rollenrahmens (24) auf einen länglichen Rücklaufweg während der Drehung der Laufstruktur.

Revendications

1. Véhicule de travail (10) monté sur courroies, comprenant:

un bâti principal (16);

une structure d'entraînement (38) s'étendant depuis un côté latéral du bâti principal (16) et comprenant une roue motrice rotative (44) présentant un axe de rotation d'entraînement (46);

un bâti à rouleaux (24) disposé sur un côté latéral du bâti principal (16) et disposé dans un rapport de maintien rigide avec celui-ci;

une structure libre (36) montée de façon coulissante sur le bâti à rouleaux (24) et comprenant un arbre libre (56) ayant un axe de rotation libre (58) et une libre rotative (54) montée sur l'arbre; une courroie (34) en élastomère, inextensible et sans fin entraînée autour des roues;

des moyens (59, 61) pour limiter le mouvement relatif entre la structure libre (36) et le bâti à rouleaux (24) à un parcours de recul longitudinal pendant la rotation de la structure libre (36); et

des moyens (26, 62, 84) pour solliciter de façon réglable la courroie (34) en vue d'une mise en prise d'entraînement par friction avec la structure d'entraînement (38) à l'aide d'une première force et pour exercer une seconde force compensatrice sur la structure d'entraînement (38) qui est égale, en valeur, à la première force mais de sens opposé, caractérisé en ce que:

les moyens de sollicitation et de compensation de force comprennent un appareil pour transmettre les première et seconde forces entre les structures libre et d'entraînement indépendamment des bâtis principal et à rouleaux.

2. Véhicule (10) selon la revendication 1, dans lequel les moyens de sollicitation et de compensation de force (26, 62, 84) comprennent:

un ressort (74);

un premier moyen (68, 88, 72) pour relier une extrémité du ressort (74) à la structure d'entraînement (38);

un second moyen (63, 66) pour relier l'autre extrémité du ressort (74) à la structure libre (36), l'un des moyens de liaison (68, 88, 72, 63, 66) comportant un élément de retenue de ressort (66, 72) en prise avec une extrémité du ressort (74); et

des moyens (76, 78, 82, 88, 90, 114) pour régler la distance entre l'élément (66, 72) de retenue du ressort et la structure (36, 38) reliée par le moyen de liaison.

3. Véhicule (10) selon la revendication 2, dans lequel les moyens de réglage (76, 78, 82, 88, 90, 112) comprennent:

un premier élément (76, 88) relié à l'une des structures (36, 38);

un second élément (78, 90) en prise avec l'élément de retenue (66, 72) du ressort et disposé autour du premier élément (76, 88); et

des moyens (80, 94, 112) pour verrouiller les premier (76, 88) et second (78, 90) éléments ensemble.

4. Véhicule selon la revendication 3, dans lequel les moyens de verrouillage (80, 94, 112) comprennent:

des moyens (94, 112) pour engager par vissage le premier élément (88) et pour engager par aboutement le second élément (90).

5. Véhicule (10) selon la revendication 4, comprenant en outre:

des moyens (98, 108) pour séparer par fluide l'élément (72) de retenue du ressort et le premier élément (76, 88).

6. Véhicule (10) selon la revendication 5, dans lequel le second élément (90) comporte une extrémité ouverte (102) et une extrémité fermée (104);

le premier élément (88) est apte à être reçu à va-et-vient dans l'extrémité ouverte (102) du second élément (90); et est caractérisé par:

des moyens (98) pour assurer un scellement fluide entre les premier (88) et second (90) éléments et, en association avec les premier (88) et second (90) éléments, définir une chambre à volume variable (106); et

des moyens (108) pour transmettre un fluide sous pression dans la chambre (106).

7. Véhicule (10) selon la revendication 3, dans lequel les moyens de verrouillage (80, 94, 112) comprennent:

des moyens (80) pour engager par vissage les premier (76) et second (78) éléments.

8. Véhicule (10) selon la revendication 3, dans lequel le second élément (78, 90) et l'élément (72) de retenue du ressort sont engagés au niveau d'un palier sphérique (70).

9. Véhicule (10) selon la revendication 2, dans lequel le premier moyen de liaison (68, 88, 72) comprend:

un élément d'appui (48) disposé autour de la structure d'entraînement (38);

une cage d'élément d'appui (50) disposée autour de l'élément d'appui (48) de manière à le supporter; et

une barre d'entraînement (68, 86) s'étendant entre le ressort (74) et la cage d'élément d'appui (50).

10. Véhicule (10) selon la revendication 1, dans lequel les moyens de limitation (59, 61) comprennent:

une fente longitudinale (61) dans la structure libre (36) ou le bâti à rouleaux (24); et

un élément de limitation allongé (59) qui réside dans la fente (61) et fait saillie hors du bâti à rouleaux (24) ou de la structure libre (36) respectivement.

11. Véhicule (10) selon la revendication 10, dans lequel le second moyen de liaison (63, 66) comprend:

une barre libre (63) sollicitée par le ressort (74); et

une tige de liaison (64) qui relie la barre libre (63) à la structure libre (36).

12. Véhicule (10) selon la revendication 11, dans lequel l'élément de limitation (59) constitue soit l'axe libre (56), soit la tige de liaison (64).

13. Véhicule (10) selon la revendication 11, dans lequel la tige de liaison (64) et l'axe d'entraînement (46) sont disposés de part et d'autre de l'axe libre (58).

14. Véhicule (10) selon la revendication 10, dans lequel l'axe longitudinal (60) de la tige de limitation (59), l'axe libre (58) et l'axe d'entraînement (46) sont copolaires.

15. Véhicule (10) selon la revendication 13 ou la revendication 14, dans lequel l'axe libre (55) et la tige de liaison (64) sont situées dans un plan commun.

16. Procédé de réglage de la tension d'une courroie (34) de propulsion de véhicule, à engagement avec le sol, inextensible et sans fin, entraînée autour d'une structure d'entraînement (38) s'étendant depuis un bâti principal (16) de véhicule, comportant une surface (51) tournée radialement vers l'extérieur, et une axe de rotation (46), et autour d'une structure libre associée (36) supportée de façon coulissante sur un bâti à rouleaux (24) qui est relié rigidement au bâti principal (16), lesdites structures d'entraînement (38) et libre (36) étant respectivement reliées à une barre d'entraînement (68, 86) et à une barre libre (63) qui sont en prise avec les extrémités opposées d'un ressort (74), le procédé consistant à:

allonger l'une des barres (68, 86, 63) jusqu'à ce que la courroie (34) soit accouplée par friction avec la surface tournée radialement vers l'extérieur (51) et entraînée par cette dernière selon une première force;

transmettre une seconde force de compensation entre les structures libre et d'entraînement indépendamment des bâtis principal et à rouleaux;

verrouiller la barre (68, 86, 63) dans sa configuration allongée; et

limiter le mouvement relatif de la structure libre (36) et du bâti à rouleaux (24) à un trajet de recul longitudinal pendant la rotation de la structure libre.

