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CA 2612356 C 2014/10/21

(11)(21) **2 612 356**

(12) **BREVET CANADIEN**
CANADIAN PATENT

(13) **C**

(22) **Date de dépôt/Filing Date:** 2007/11/27

(41) **Mise à la disp. pub./Open to Public Insp.:** 2009/05/27

(45) **Date de délivrance/Issue Date:** 2014/10/21

(51) **Cl.Int./Int.Cl.** ***B62D 55/04*** (2006.01),
B62D 55/10 (2006.01)

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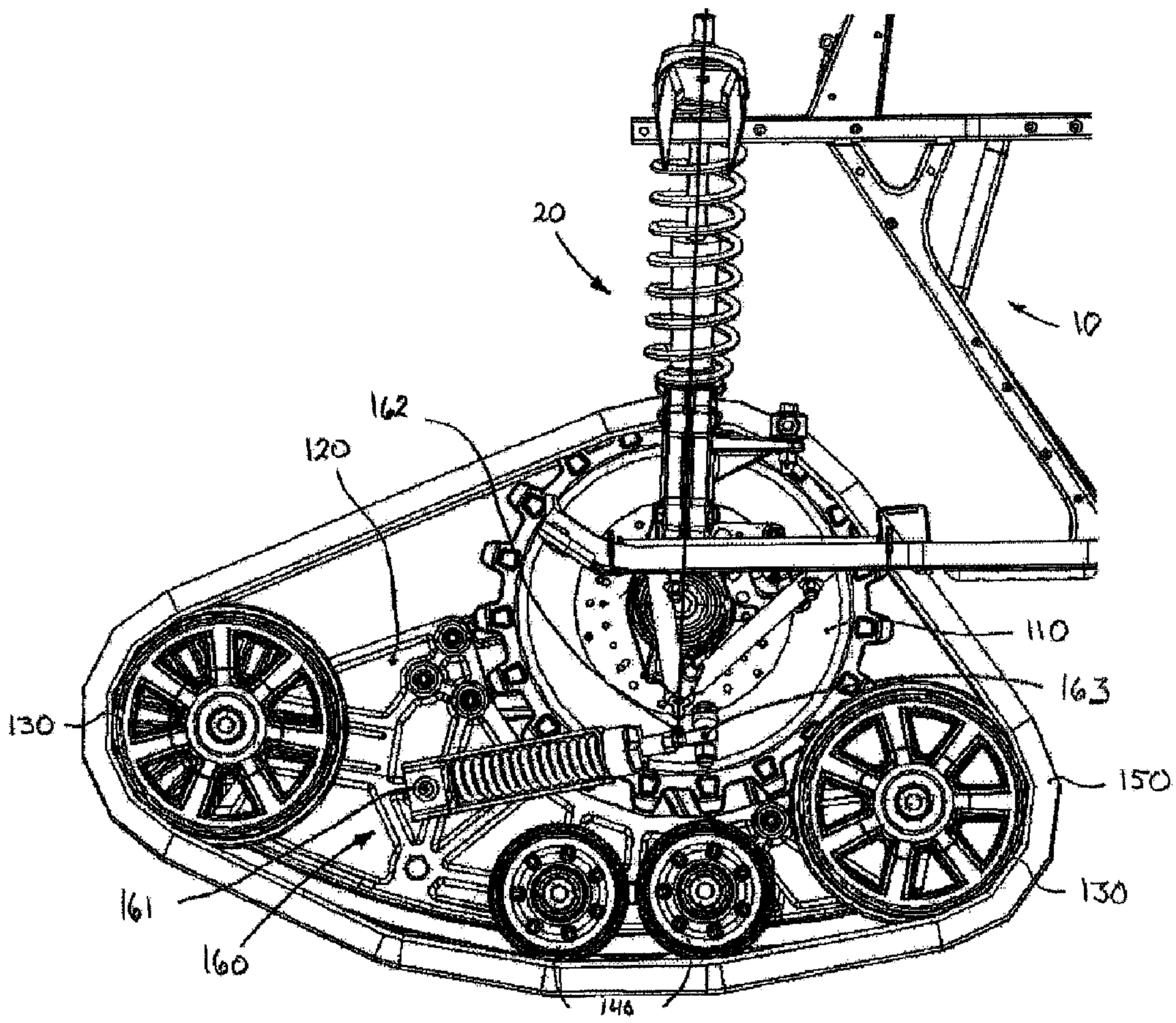
(54) **Titre : ENSEMBLE DE TRACTION AVEC SYSTEME DE COMPENSATION DU RELIEF DE LA PISTE**
(54) **Title: TRACTION ASSEMBLY WITH TRAIL COMPENSATING SYSTEM**



(57) **Abrégé/Abstract:**
A wheel replacing traction assembly which uses, for propulsion, an endless track disposed around a sprocket wheel and idler and/or road wheels generally mounted to a frame, is provided. The traction assembly of the present invention is preferably used to

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(57) **Abrégé(suite)/Abstract(continued):**
replace wheels that steer a vehicle, generally the front wheels. Accordingly, the traction assembly of the present invention comprises an elongated member or mechanism pivotally mounted to the traction assembly and to the vehicle. The point at which the member is mounted to the vehicle is preferably longitudinally and also preferably laterally displaced with respect to the steering axis of the vehicle in order for the member or mechanism to compensate for the variation in the trail of the traction assemblies when the latter are pivoted.

File number: 11038-090
Revision: As Filed
Date: 2007/11/27

TRACTION ASSEMBLY WITH TRAIL COMPENSATING SYSTEM

Abstract

A wheel replacing traction assembly which uses, for propulsion, an endless track disposed around a sprocket wheel and idler and/or road wheels generally mounted to a frame, is provided. The traction assembly of the present invention is preferably used to replace wheels that steer a vehicle, generally the front wheels. Accordingly, the traction assembly of the present invention comprises an elongated member or mechanism pivotally mounted to the traction assembly and to the vehicle. The point at which the member is mounted to the vehicle is preferably longitudinally and also preferably laterally displaced with respect to the steering axis of the vehicle in order for the member or mechanism to compensate for the variation in the trail of the traction assemblies when the latter are pivoted.

File number: 11038-090
Revision: As Filed
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Title of the Invention

[0001] Traction Assembly with Trail Compensating System.

Cross-Reference to Related Applications

[0002] There are no cross-related applications.

Field of the Invention

[0003] The present invention generally relates to traction assemblies used as wheel replacement for wheeled vehicles. More particularly, the present invention relates to traction assemblies used as wheel replacement for the wheels that steer vehicles.

Background of the Invention

[0004] Nowadays, there are an ever-increasing number of people who enjoy riding all-terrain vehicles and other similar off-road vehicles, either in trails or even on totally uncharted terrain.

[0005] In order to further adapt the vehicles to the increasing variety of terrains onto which they are ridden, companies have started to offer traction assemblies which can be used to replace wheels on wheeled vehicles.

[0006] Traction assemblies generally comprise a frame, a sprocket wheel, idler and/or road wheels and an endless track disposed therearound. By using an endless track instead of a tire, a traction assembly generally provides increased floatation and better traction to the vehicle. However, since the ground contacting area (hereinafter "contact patch") of the endless track of the traction assembly is generally significantly larger than the contact patch of a regular tire, and since the steering and suspension systems of the vehicle were initially designed and configured to accommodate wheels and not traction assemblies,

steering and other driving characteristics of the traction assembly-equipped vehicle are generally affected, sometimes even negatively.

[0007] Indeed, it has been discovered that when the steerable wheels of certain all-terrain vehicles are replaced by traction assemblies, the steering of these vehicles was negatively affected by the fact that the trail of each traction assembly varied in opposite direction during steering manoeuvres. As it is known in the art, the trail of a traction assembly (or a wheel) generally affects the stability of the vehicle. Hence, during steering of these vehicles, as the trail of one traction assembly diminishes, the trail of the other traction assembly increases, thereby rendering the vehicle particularly unstable in curves.

[0008] Hence, there is a need for a novel traction assembly which improves riding condition when traction assemblies are used to replace existing steerable wheels on vehicles.

Objects of the Invention

[0009] Accordingly, a main aspect of the present invention is to provide a traction assembly having a trail compensating system adapted to compensate for variations in the trail of the traction assembly when the latter is pivoted during steering manoeuvres.

[0010] Other and further objects and advantages of the present invention will be obvious upon an understanding of the illustrative embodiments about to be described or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

Summary of the Invention

[0011] The aforesaid and other objectives of the present invention are realized by generally providing an improved traction assembly particularly adapted to replace the front or steerable wheels of a wheeled vehicle.

[0012] The object of the present invention involves a traction assembly that can preferably replace a wheel on wheeled vehicle. The traction assembly thus involves a vehicle with a frame and at least one traction axle. Preferably, the traction assembly can replace steerable wheels on either side of the front portion of the vehicle.

[0013] More particularly, the traction assembly comprises a sprocket wheel and a longitudinally extending traction band cooperating therewith. The sprocket wheel is preferably fixedly attached by means known in the art to the traction axle (or the wheel hub) of the vehicle. The traction assembly also comprises a support structure or frame, preferably, but not exclusively in the form of a slider bar on which idler wheels are preferably mounted. These idlers wheels are preferably mounted at the extremities of the support structure. A plurality of road wheels can also be mounted on either side and along the support structure to increase the stability of the traction band.

[0014] In accordance with the invention, the traction assembly further comprises a trail compensating system which generally prevents the trail of the traction assemblies to either increase or diminish when the traction assemblies are steered.

[0015] As used hereinabove and hereinafter, the term "trail" generally refers to the horizontal distance, measured along the ground, between the geometrical center of the contact patch of the traction assembly (or of the wheel) and the intersection point between the projection of the steering rotation axis and the ground when viewed from the side. The concept of "trail", which is generally known in the mechanical art, is also known to have material effect on the steering and handling of a vehicle.

[0016] Hence, the trail compensating system is generally comprised of an elongated member or mechanism which is pivotally mounted, at its first end, generally, but not exclusively, to the front portion of the traction assembly, and at its second end, to the vehicle at a point which is, contrary to the prior art, preferably located longitudinally behind the steering axis.

[0017] The features of the present invention which are believed to be novel are set forth with particularity in the appended claims.

Brief Description of the Drawings

[0018] The above and other objects, features and advantages of the invention will become more readily apparent from the following description, reference being made to the accompanying drawings in which:

[0019] Figure 1 is an internal side view of a traction assembly.

[0020] Figure 2 is an internal side view of a traction assembly, without the trail compensating system, during a right turn.

[0021] Figure 3 is an internal side view of a traction assembly, without the trail compensating system, during a left turn.

[0022] Figure 4 is a side view of a traction assembly, with the trail compensating system according to the invention, as installed on the front right wheel hub of a vehicle.

[0023] Figure 5 is an internal side view of a traction assembly, schematically with the trail compensating system, during a right turn.

[0024] Figure 6 is an internal side view of a traction assembly, schematically with the trail compensating system, during a left turn.

Detailed Description of the Preferred Embodiment

[0025] A novel traction assembly with a trail compensating system will be described hereinafter. Although the invention is described in terms of specific illustrative embodiments, it is to be understood that the embodiments described herein are by way of example only and that the scope of the invention is not intended to be limited thereby.

[0026] Referring first to Fig. 1, a traction assembly 100, in accordance with the present invention, generally comprises a sprocket wheel 110 fixedly mounted to the wheel hub or axle which is operationally connected to the suspension and steering system 20 of the vehicle. The traction assembly 100 also comprises a frame structure 120 to which idler

wheels 130 and road wheels 140 are pivotally mounted. Finally, disposed around the sprocket wheel 110, the idler wheels 130 and the road wheels 140 is a longitudinally extending endless track 150 preferably made of elastomeric material.

[0027] Generally, traction assemblies 100 can be used to replace wheels on wheeled vehicles in order to provide improved floatation and traction. However, since the vehicles onto which traction assemblies 100 are generally installed were initially designed to use wheels for propulsion and for steering, the suspension and steering systems 20 of these vehicles were designed accordingly. Hence, to provide certain driving and steering characteristics to the vehicle 10, the steering axes 21 of wheeled vehicles are generally at an angle. The angle is generally determined to generate a certain trail for the wheels. Also, due to the overall symmetry of the circular wheels, the rotation of the wheels around the angled steering axes generally does not affect the trail of the wheels.

[0028] However, when the front and/or steerable wheels of a wheeled vehicle are replaced by traction assemblies 100, the suspension and steering systems 20 of the vehicle are generally not modified to particularly accommodate the traction assemblies 100. Hence, when a formerly wheeled vehicle 10 equipped with traction assemblies 100 is steered, the traction assemblies 100 pivot around the steering axis 21 of the suspension and steering system 20 of the vehicle 10. However, contrary to a wheel which is essentially symmetric, a traction assembly is not symmetric. This difference generally affects the steering behaviour of the vehicle.

[0029] Referring now to Fig. 2, when, for example, a prior art front right traction assembly 100 is steered to the right, thus away from the vehicle, the traction assembly 100 pivots around the steering axis 21, as would a regular wheel. However, since the steering axis 21 is angled and since the traction assembly 100 is not symmetric, the front portion of the traction assembly 100 rises, displacing at the same time the contact patch 170' toward the rear of the traction assembly 100 and thereby altering the trail of the traction assembly 100.

[0030] On the contrary, referring now to Fig. 3, when, for example, a prior art front right traction assembly 100 is steered to the left, thus toward the vehicle, the traction assembly pivots around the steering axis 21. However, in this case, instead of rising, the front portion of the traction assembly 100 descends, displacing at the same time the contact patch 170'' toward the front of the traction assembly 100 and thereby altering the trail of the traction assembly 100.

[0031] As the skilled addressee would understand, when a vehicle is steered, for example, to the right, the front right traction assembly 100 will behave as the traction assembly 100 shown in Fig. 2 since the traction assembly will be pivoted away from the vehicle. However, the front left traction assembly 100 will behave as the traction assembly 100 shown in Fig. 3, since the traction assembly 100 will be pivoted toward the vehicle. Consequently, as the front portion of the right traction assembly 100 will rise, the front portion of the left traction assembly 100 will descend.

[0032] By varying the trail of each traction assembly 100 is opposite direction, steering behaviour of the vehicle will be negatively affected. Moreover, when the phenomenon described above is combined with the weight transfer due to centrifugal forces that naturally occurs when a vehicle engages a curve, the resulting steering behaviour of the vehicle can be fatally affected.

[0033] Referring now to Fig. 4, in order to generally compensate for the variations in the trail of the traction assemblies 100 during steering manoeuvres, the traction assembly 100 is shown equipped with the trail compensating system 160. In the present preferred embodiment, the trail compensating system also serves as an anti-rotation system. Accordingly, as shown in Fig. 4, the trail compensating system 160 can be an elongated mechanism which can be resiliently compressed or extended in order to absorb rotational movements of the traction assembly 100 around the axis of rotation of the traction axle of the vehicle 10. Still, the trail compensating system 160 could alternatively be an elongated member. The present invention is not so limited.

[0034] As shown in Fig. 4, the trail compensating system 160 is generally an elongated structure (e.g. a member or a mechanism) which is pivotally connected, at its first end, generally to a point 161 on the front portion of the traction assembly 100, and at its second end, to a pivot point 163, located on the suspension and steering system 20, which is longitudinally displaced with respect to the point 162 which is aligned with the steering axis 21.

[0035] By so connecting the front portion of the traction assembly 100 to a pivot point 163 longitudinally displaced generally behind the point 162, a trail compensating effect occurs and the position of the contact patch 170 of both the front right and front left traction assemblies 100 remain essentially unchanged when the vehicle 10 is steered, thereby maintaining the trail of the front right and front left traction assemblies 100.

[0036] For example, as shown in Fig. 5, when the front right traction assembly 100 equipped with a trail compensating system 160 (not shown for clarity) is steered to the right, the front portion of the traction assembly 100 does not rise and therefore the position of the contact patch 170 and the trail of the traction assembly 100 remains essentially unchanged.

[0037] Similarly, as shown in Fig. 6, when the front right traction assembly 100 equipped with a trail compensating system 160 (not shown for clarity) is steered to the left, the front portion of the traction assembly 100 does not descend and therefore the position of the contact patch 170 and the trail of the traction assembly 100 remains also essentially unchanged.

[0038] Hence, by generally preventing displacements of the contact patch 170 of each traction assembly 100 during steering manoeuvres, the trail of each traction assembly 100 remains essentially unchanged and the driving and steering behaviour of the vehicle are not negatively affected.

[0039] Understandably, the skilled addressee shall understand that the trail compensating system 160 is efficient essentially only flat surfaces. Indeed, the trail compensating system 160 generally does not prevent displacements of the contact patch 170 of a traction assembly 100 when the latter is on uneven surfaces or when the whole traction assembly 100 pivots around the rotation axis of the axle.

[0040] Furthermore, it is to be understood that the position of the point 161 on the front portion of the traction assembly 100 and the position of the pivot point 163 on the suspension and steering system 20 shown in the figures are given for example purpose only. As the skilled addressee would understand, the exact position of the point 161 on the traction assembly 100 and the exact position of the pivot point 163 on the suspension and steering system 20 can vary according to the particular configuration or geometry of the traction assembly 100 and to the particular configuration or geometry (e.g. steering axis inclination) of the suspension and steering system 20. For example, in a different embodiment, the point 161 could be located on the rear portion of the traction assembly 100 whereas the point 163 would correspondingly be located in front of the steering axis 21. The present invention is not so limited.

[0041] While illustrative and presently preferred embodiments of the invention have been described in detail hereinabove, it is to be understood that the inventive concepts may be otherwise variously embodied and employed and that the appended claims are intended to be construed to include such variations except insofar as limited by the prior art.

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Claims

1) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle having a steering system defining a steering axis, said traction assembly comprising a sprocket wheel, a longitudinally extending endless track and a support structure having a front portion and a rear portion, said endless track being disposed around and cooperating with said sprocket wheel and said support structure, said traction assembly further comprising a compensating system having a first end pivotally connected to said front portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system, wherein said pivot point is located longitudinally behind said steering axis.

2) A traction assembly as claimed in claim 1, wherein said compensating system is an elongated member.

3) A traction assembly as claimed in claim 1, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

4) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle having a steering system defining a steering axis, said traction assembly comprising a sprocket wheel, a longitudinally extending endless track and a support structure having a front portion and a rear portion, said endless track being disposed around and cooperating with said sprocket wheel and said support structure, said traction assembly further comprising a compensating system having a first end pivotally connected to said rear portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system, wherein said pivot point is longitudinally displaced with respect to said steering axis.

5) A traction assembly as claimed in claim 4, wherein said pivot point is located in front of said steering axis.

6) A traction assembly as claimed in claim 4, wherein said compensating system is an elongated member.

7) A traction assembly as claimed in claim 4, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

8) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle having a steering system defining a steering axis, said traction assembly comprising a sprocket wheel, a longitudinally extending endless track and a support structure having a front portion and a rear portion, said endless track being disposed around and cooperating with said sprocket wheel and said support structure, said traction assembly further comprising a compensating system having a first end pivotally connected to said rear portion of said support structure and a second end pivotally connectable to a pivot point located on said steering system, wherein said pivot point is located longitudinally in front of said steering axis.

9) A traction assembly as claimed in claim 8, wherein said compensating system is an elongated member.

10) A traction assembly as claimed in claim 8, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

11) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle comprising a steering system defining a steering axis, said traction assembly comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels; and

f) a compensating system comprising a first end pivotally connected to said front portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system longitudinally behind said steering axis.

12) A traction assembly as claimed in claim 11, wherein said compensating system is an elongated member.

13) A traction assembly as claimed in claim 11, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

14) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle comprising a steering system defining a steering axis, said traction assembly comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels; and

f) a compensating system comprising a first end pivotally connected to said rear portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system longitudinally in front of said steering axis.

15) A traction assembly as claimed in claim 14, wherein said compensating system is an elongated member.

16) A traction assembly as claimed in claim 14, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

17) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle comprising a steering system defining a steering axis, said traction assembly comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels, said endless track defining a contact patch with a ground surface, said contact patch and said steering axis defining a trail; and

f) a compensating system comprising a first end pivotally connected to said front portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system longitudinally behind said steering axis, said compensating system being configured to substantially maintain said trail when said traction assembly is steered.

18) A traction assembly as claimed in claim 17, wherein said compensating system is an elongated member.

19) A traction assembly as claimed in claim 17, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

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20) A traction assembly for replacing a steerable wheel on a vehicle, said vehicle comprising a steering system defining a steering axis, said traction assembly comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels, said endless track defining a contact patch with a ground surface, said contact patch and said steering axis defining a trail; and

f) a compensating system comprising a first end pivotally connected to said rear portion of said support structure, and a second end pivotally connectable to a pivot point located on said steering system longitudinally in front of said steering axis, said compensating system being configured to substantially maintain said trail when said traction assembly is steered.

21) A traction assembly as claimed in claim 20, wherein said compensating system is an elongated member.

22) A traction assembly as claimed in claim 20, wherein said compensating system is a resilient extensible and compressible elongated mechanism.

23) A vehicle having mounted thereto a pair of traction assemblies, a first one of said traction assemblies being mounted to a first steering system defining a first steering axis, and a second one of said traction assemblies being mounted to a second steering system defining a second steering axis, each of said traction assemblies comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels, said endless track defining a contact patch with a ground surface; and

f) a compensating system comprising a first end pivotally connected to said front portion of said support structure, and a second end;

wherein said contact patch of said endless track of said first one of said traction assemblies and said first steering axis define a first trail;

wherein said contact patch of said endless track of said second one of said traction assemblies and said second steering axis define a second trail;

wherein said second end of said compensating system of said first one of said traction assemblies is pivotally connected to a first pivot point located on said first steering system longitudinally behind said first steering axis;

wherein said second end of said compensating system of said second one of said traction assemblies is pivotally connected to a second pivot point located on said second steering system longitudinally behind said second steering axis;

wherein said compensating systems are configured to substantial maintain said first and second trails when said traction assemblies are steered.

24) A vehicle as claimed in claim 23, wherein said first steering system is a front left steering system, and wherein said second steering system is a front right steering system.

25) A vehicle as claimed in claims 23 or 24, wherein each of said compensating systems is an elongated member.

26) A vehicle as claimed in claims 23 or 24, wherein each of said compensating system is a resilient extensible and compressible elongated mechanism.

27) A vehicle as claimed in any of claims 23 to 26, wherein said vehicle is an all-terrain vehicle (ATV).

28) A vehicle having mounted thereto a pair of traction assemblies, a first one of said traction assemblies being mounted to a first steering system defining a first steering axis, and a second one of said traction assemblies being mounted to a second steering system defining a second steering axis, each of said traction assemblies comprising:

a) a sprocket wheel;

b) a support structure comprising a front portion and a rear portion;

c) idler wheels pivotally mounted to said front portion and to said rear portion of said support structure;

d) road wheels pivotally mounted to said support structure;

e) an endless track disposed around and cooperating with said sprocket wheel, said idler wheels and said road wheels, said endless track defining a contact patch with a ground surface; and

f) a compensating system comprising a first end pivotally connected to said rear portion of said support structure, and a second end;

wherein said contact patch of said endless track of said first one of said traction assemblies and said first steering axis define a first trail;

wherein said contact patch of said endless track of said second one of said traction assemblies and said second steering axis define a second trail;

wherein said second end of said compensating system of said first one of said traction assemblies is pivotally connected to a first pivot point located on said first steering system longitudinally in front of said first steering axis;

wherein said second end of said compensating system of said second one of said traction assemblies is pivotally connected to a second pivot point located on said second steering system longitudinally in front of said second steering axis;

wherein said compensating systems are configured to substantial maintain said first and second trails when said traction assemblies are steered.

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29) A vehicle as claimed in claim 28, wherein each of said compensating systems is an elongated member.

30) A vehicle as claimed in claim 28, wherein each of said compensating system is a resilient extensible and compressible elongated mechanism.

31) A vehicle as claimed in any of claims 28 to 30, wherein said vehicle is an all-terrain vehicle (ATV).

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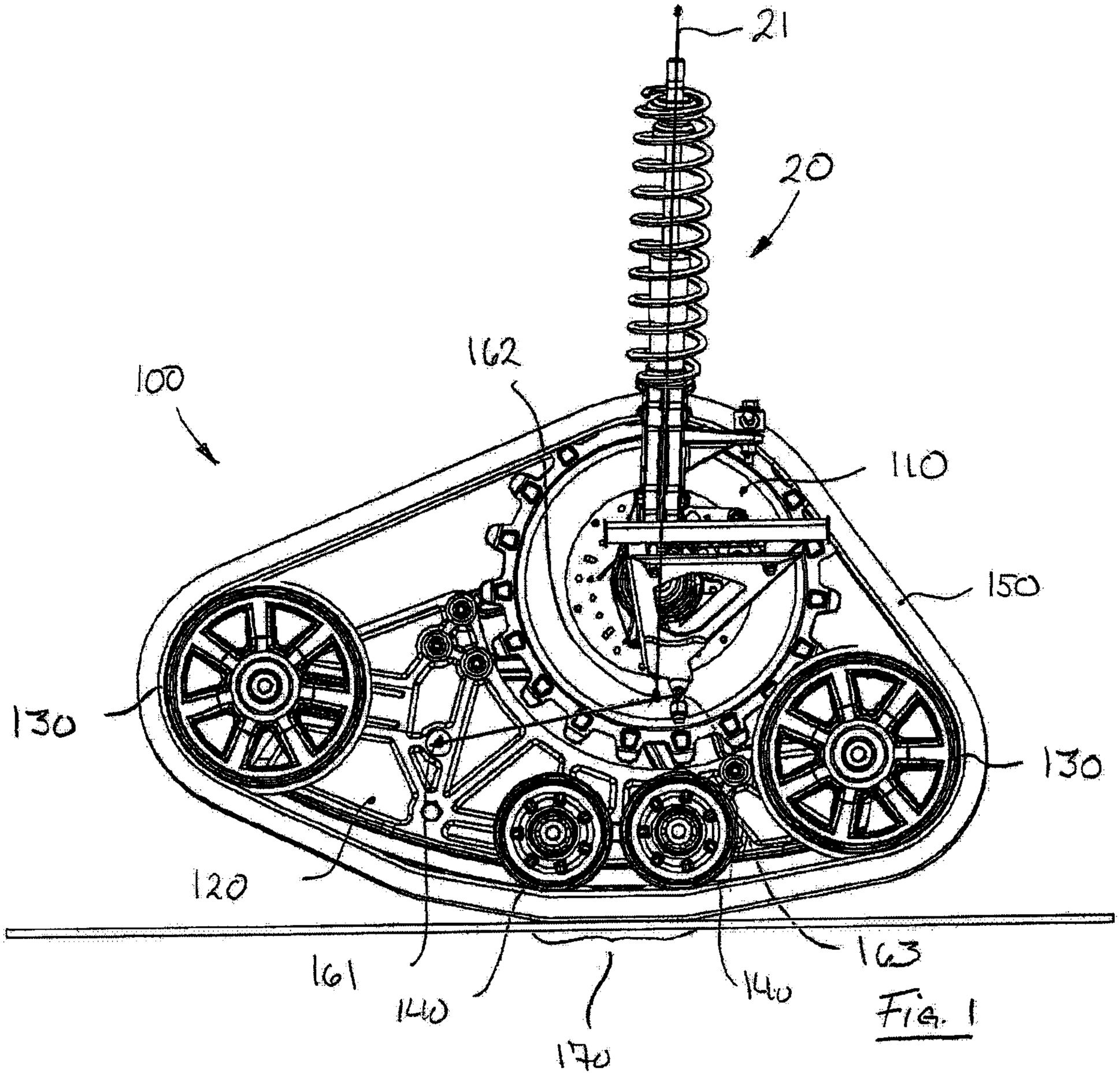


FIG. 1

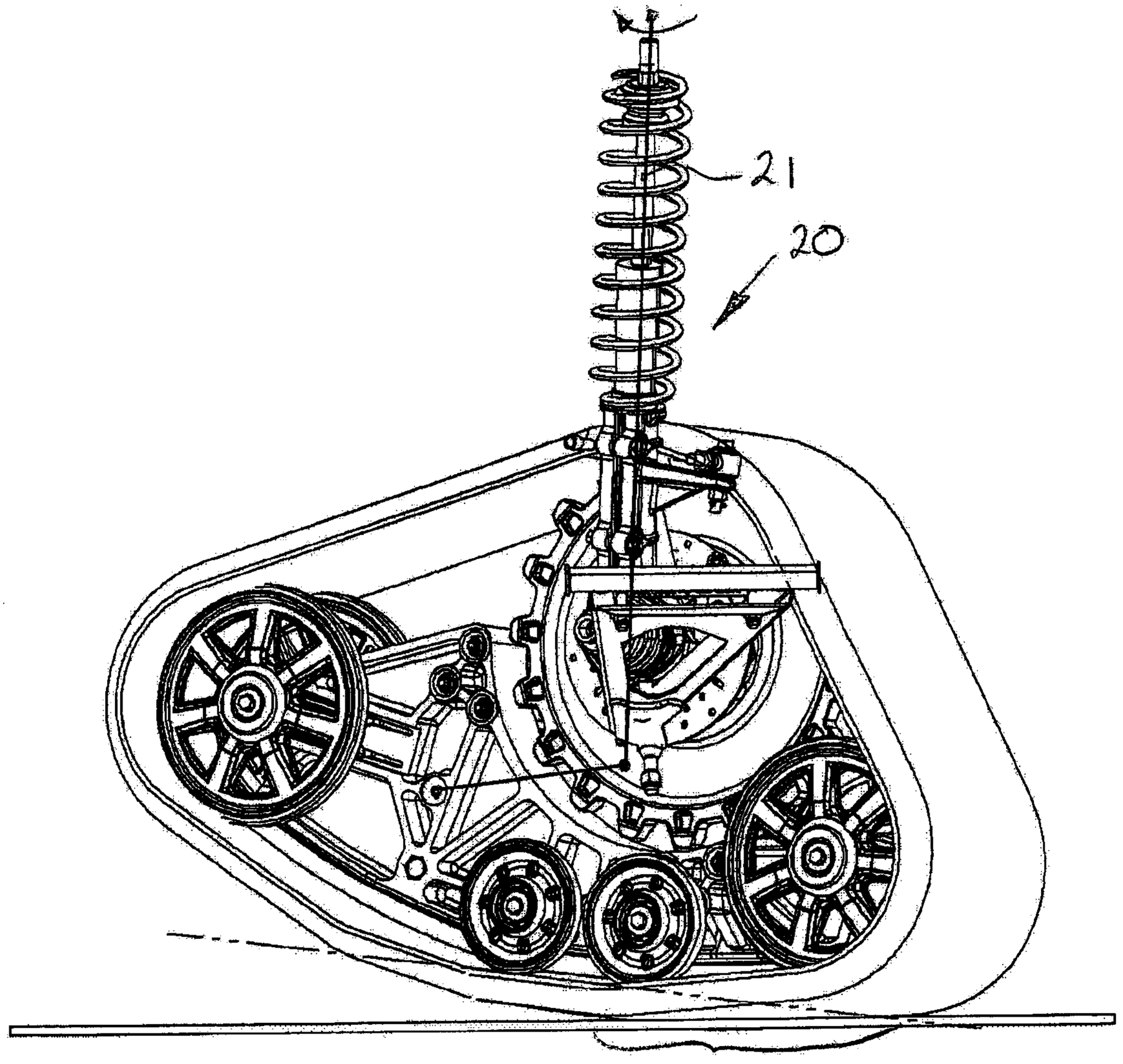


FIG. 2
PRIOR ART

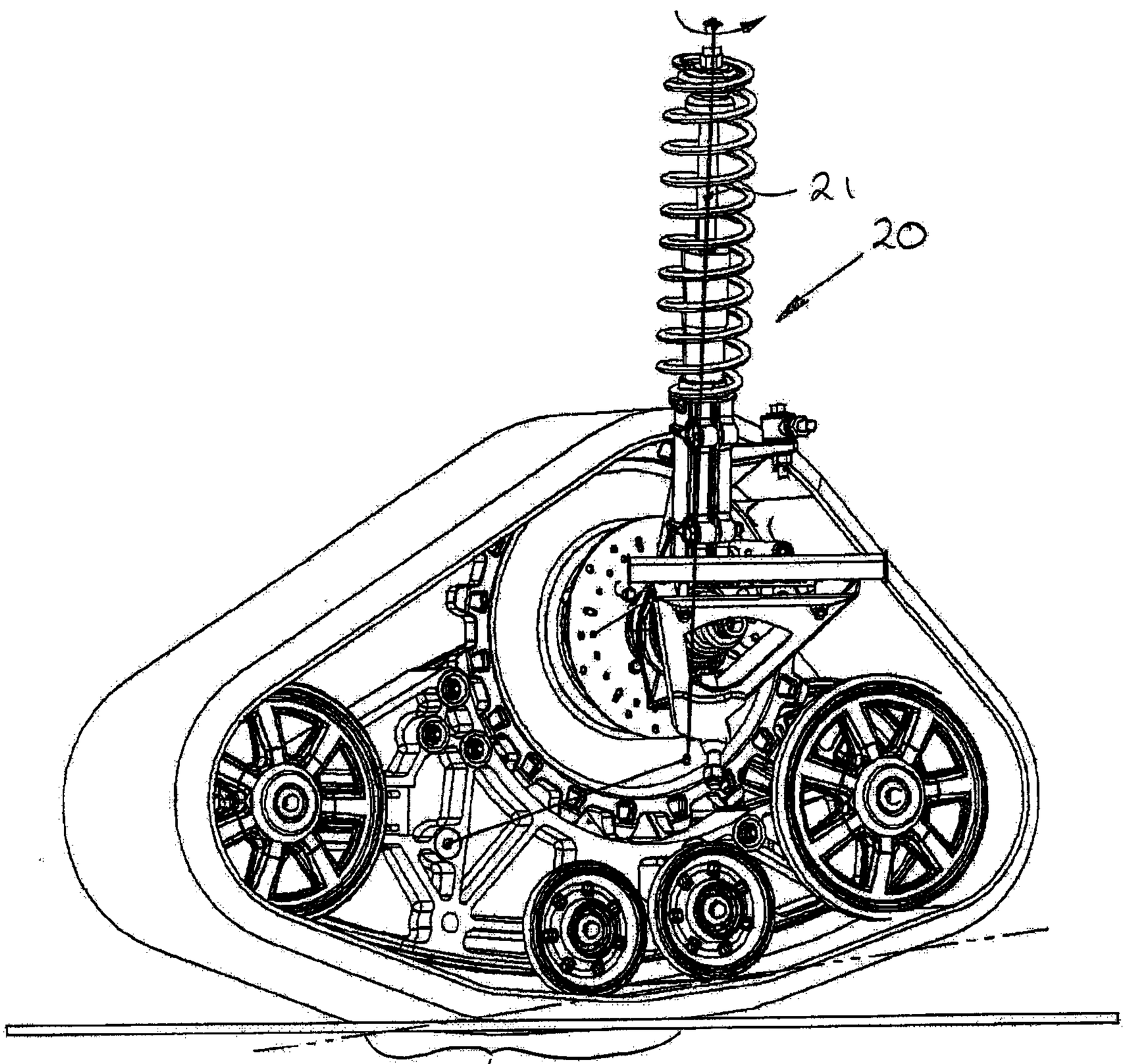


FIG. 3
PRIOR ART

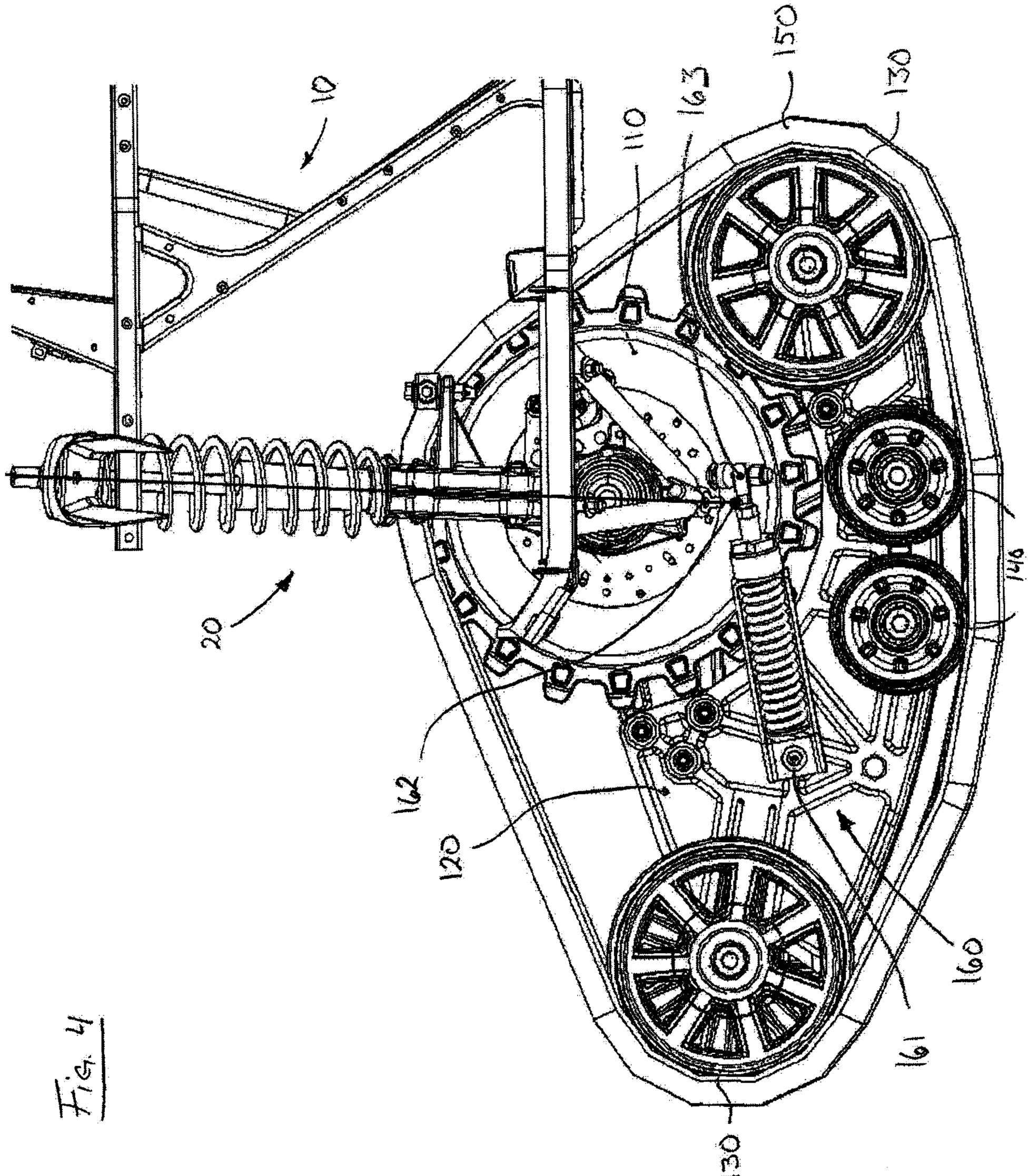


Fig. 4

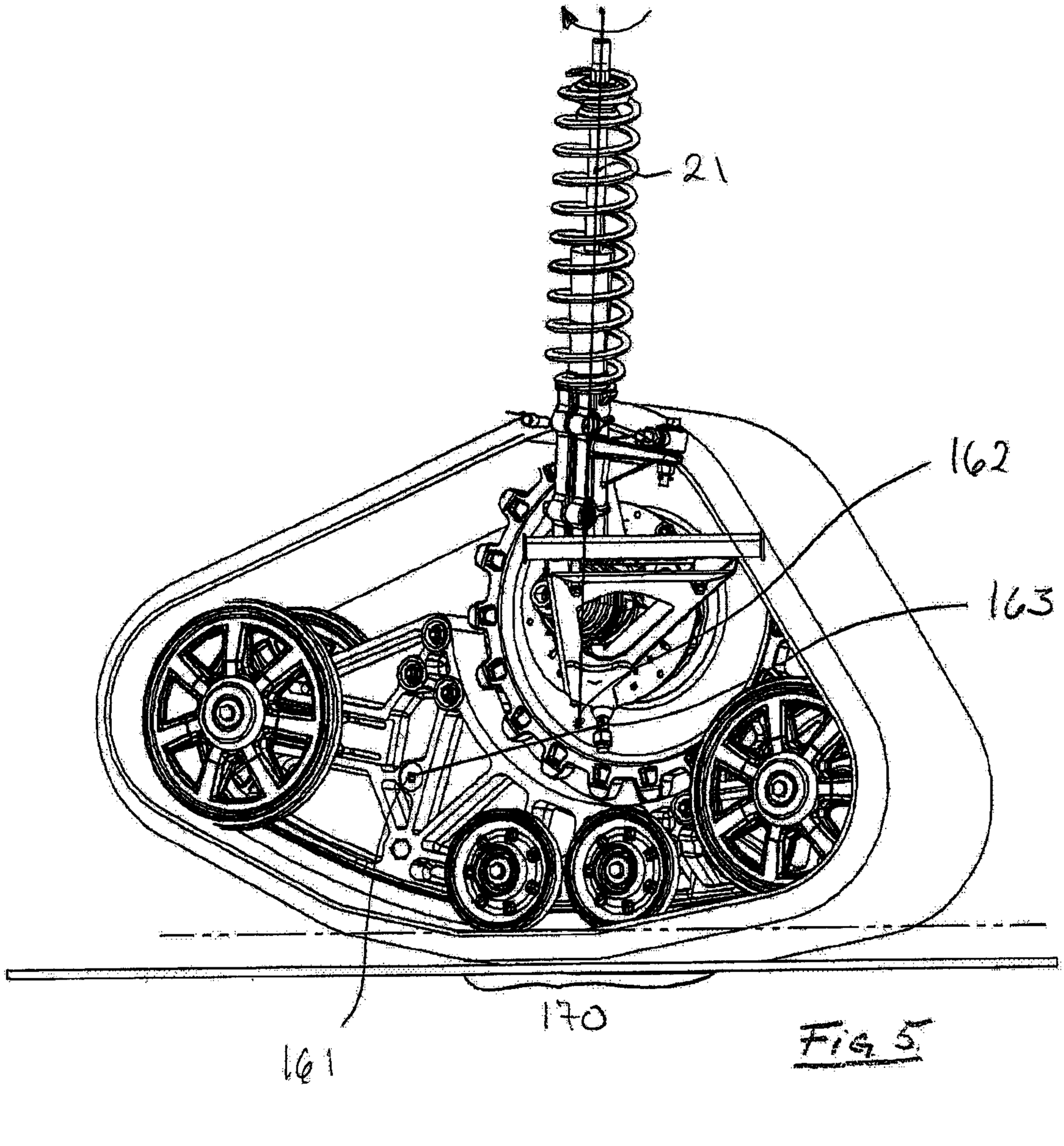


Fig 5

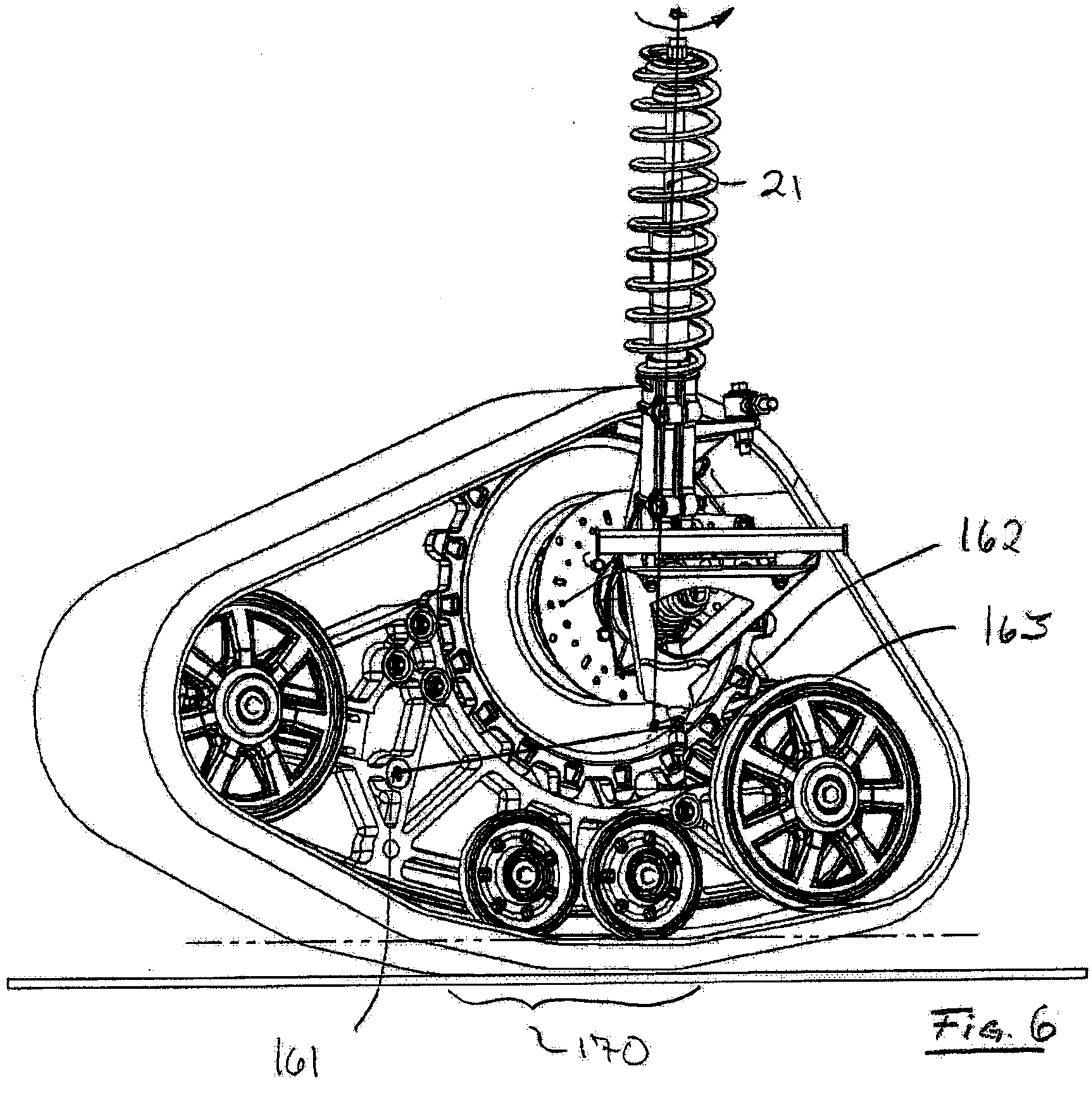
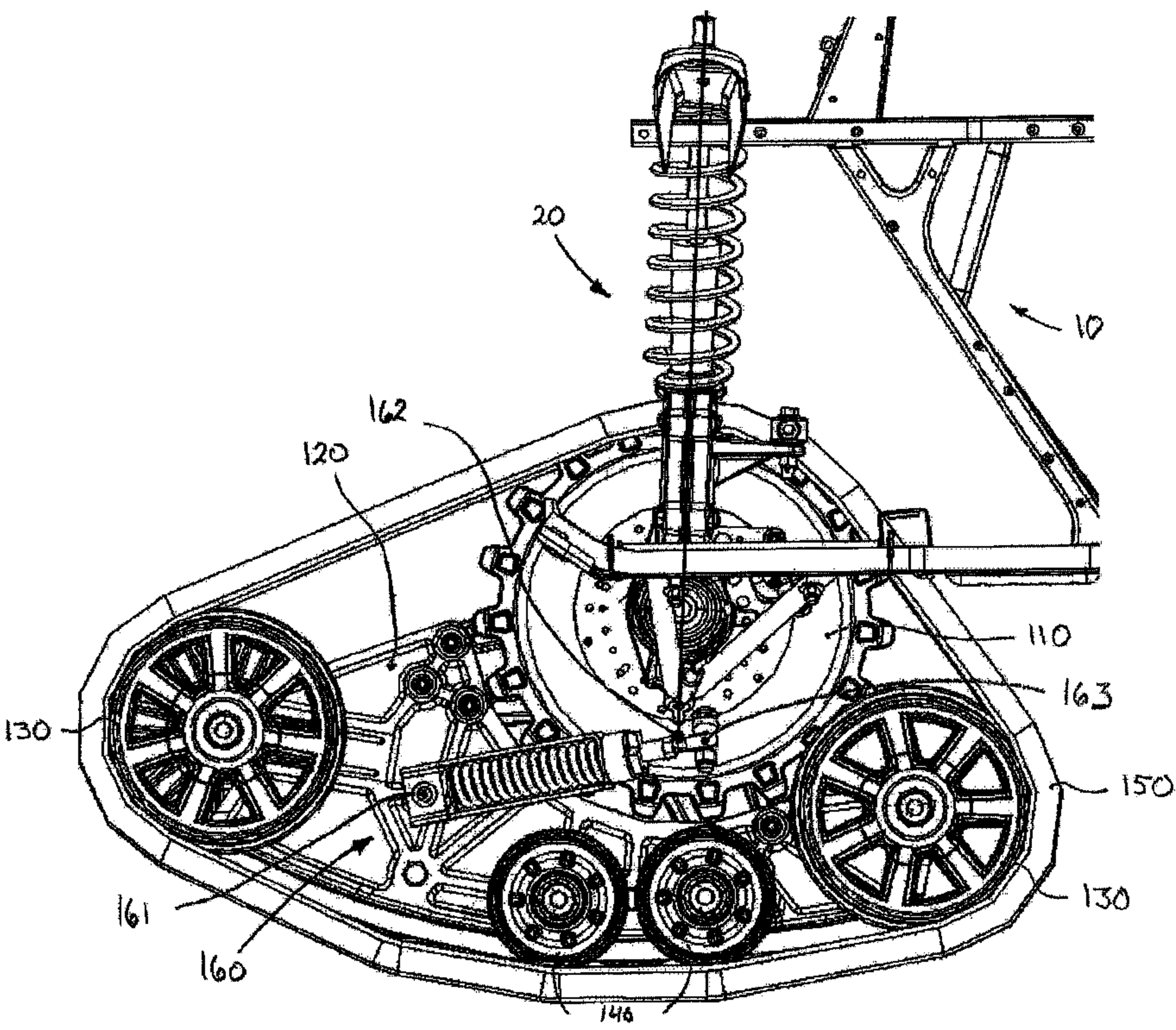


Fig. 6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