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(71) Applicant: **Caterpillar SARL**
1208 Geneva (CH)

(72) Inventor: **Gallignani, Luigi**
40027 Mordano BO (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Thierschstrasse 11
80538 München (DE)

(54) **UNDERCARRIAGE WITH AUGMENTED LATERAL STABILITY**

(57) An undercarriage with augmented lateral stability is disclosed. The undercarriage may comprise a chassis having a central axis; and a stabiliser laterally coupled to the chassis, the stabiliser may be movable between a stowed position and an operative position wherein the stabiliser may be configured to augment a contact surface area of the undercarriage at the operative position.

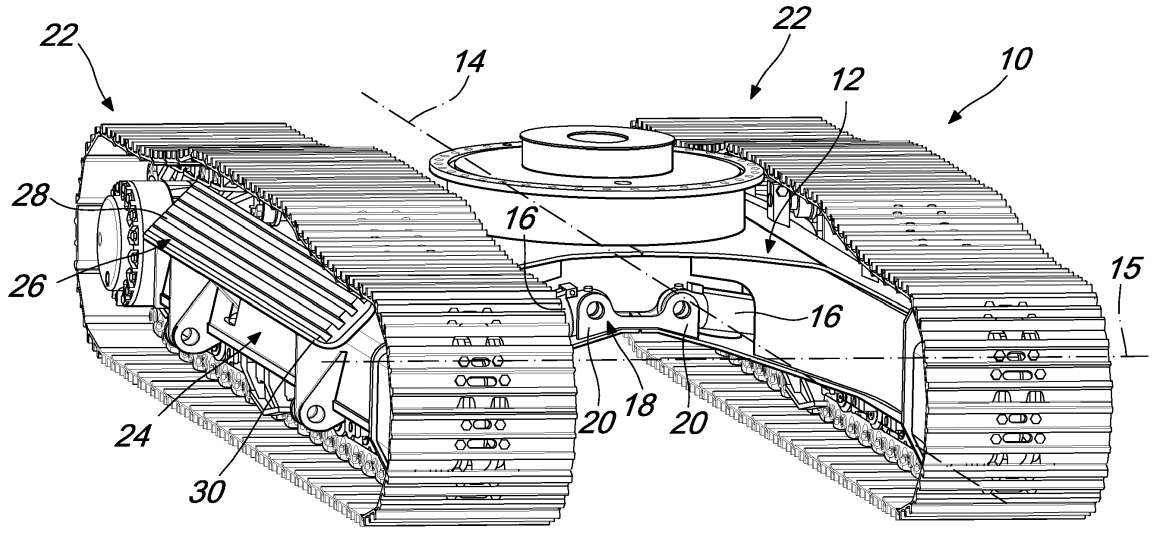

Fig. 1

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Description

Technical Field

[0001] This disclosure relates to the field of undercarriages of vehicles, particularly to the field of stabilising undercarriages during work operations.

Background

[0002] Undercarriages for vehicles and/ or industrial machines are generally known. The undercarriage may be adapted to support operating machinery. The undercarriage may be provided with wheels or tracks. Undercarriages may be formed with a central frame and lateral sub-frames that may support the wheels or tracks. Movement of the wheels or the tracks may be attained through translational motors carried in the sub-frame. Various engineering vehicles, such as cranes, excavators or earth movers, may incorporate an undercarriage.

[0003] Undercarriages may have a greater stability along a longitudinal axis relative to a stability along a transverse axis. During operation the undercarriage of the engineering vehicle may require greater lateral stability to perform certain functions, such as excavating or transporting earth or other functions in which the general performance of the machine is contingent on ground stability.

[0004] In order to increase lateral stability certain undercarriages may be of the variable gauge types wherein the width of the undercarriage may be increased during operation in order to have a larger dimension for ground stability. The change in the width of the undercarriage may be achieved through lateral movement of the sub-frames relative to the central. However, variable gauge undercarriages significantly increase cost and associated weight in order to provide increased lateral stability.

Brief Summary of the Invention

[0005] In a first aspect, the present disclosure describes an undercarriage with augmented lateral stability. The undercarriage may comprise a chassis having a central axis; and a stabiliser laterally coupled to the chassis, the stabiliser may be movable between a stowed position and an operative position wherein the stabiliser may be configured to augment a contact surface area of the undercarriage at the operative position.

[0006] In a second aspect, the present disclosure describes a method for augmenting lateral stability of an undercarriage wherein the undercarriage has a contact surface area for engaging a ground surface, the method comprising augmenting the contact surface area of the undercarriage.

Brief Description of the Drawings

[0007] The foregoing and other features and advantages of the present disclosure will be more fully understood from the following description of various embodiments, when read together with the accompanying drawings, in which:

Fig. 1 is an isometric view of an undercarriage with a first embodiment of the stabiliser in a stowed position according to the present disclosure;

Fig. 2 is an isometric view of an undercarriage with a first embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 3 is a further isometric view of an undercarriage with a first embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 4 is a side view of an undercarriage with a first embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 5 is a top view of an undercarriage with a first embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 6 is a front view of an undercarriage with a first embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 7 is a sectional view of a track roller frame showing the stabiliser in a stowed position according to the present disclosure;

Fig. 8 is a sectional view of a track roller frame showing the stabiliser in an operative position according to the present disclosure;

Fig. 9 is a side view of the stabiliser disposed on a wheeled undercarriage according to the present disclosure

Fig. 10 is a perspective view of an undercarriage with a second embodiment of the stabiliser in an operative position according to the present disclosure;

Fig. 11 is a perspective view of a third embodiment of the stabiliser according to the present disclosure; and

Fig. 12 is a perspective view of a fourth embodiment of the stabiliser according to the present disclosure.

Detailed Description

[0008] This disclosure generally relates to an undercarriage that may provide augmented stability when required during work operations. The undercarriage may provide augmented stability along the lateral sides thereof.

[0009] Fig. 1 illustrates an undercarriage **10.** The undercarriage **10** may have a chassis **12.** The chassis **12** may have a central axis **14.** Chassis **12** may be symmetrical about the central axis **14.** Central axis **14** may be oriented along the direction of travel of the undercarriage **10.** The direction of travel is linear. Central axis **14** may be parallel to the direction of travel. The linear direction of travel of the undercarriage may be determined by travel members **22** provided on the undercarriage **10.** The undercarriage **10** may be propelled along the linear direc-

tion of travel with all the travel members **22** operating at the same operational values.

[0010] Chassis **12** may be formed as a hollow frame. Chassis **12** may have motors (not shown) and cables (not shown) located within the chassis **12.** The motors and integrated cables may allow for control of mechanical and/ or hydraulic operations and for movement of the undercarriage **10.**

[0011] Undercarriage **10** may comprise an actuator **16.** The chassis **12** may accommodate the actuator **16.** The direction of actuation of the actuator **16** may be substantially orthogonal to the central axis **14.** The direction of actuation of the actuator **16** may be substantially parallel to a transverse axis **15.**

[0012] Undercarriage **10** may comprise a plurality of actuators **16.** With reference to Fig. 2, the undercarriage **10** may comprise two actuators **16 (16a, 16b).** The actuators **16a, 16b** may be disposed at the same side of the chassis **12.** With reference to Fig, 3, in an alternative embodiment, the undercarriage **10** may comprise two additional actuators **16 (16c, 16d).** In a further embodiment (not shown), the undercarriage **10** may comprise only two actuators **16.** Each actuator **16** may be positioned on opposite sides of the chassis **12.**

[0013] With reference to Figs. 1 and 2, the actuator **16** may be a hydraulic cylinder. The line of extraction and retraction of the hydraulic cylinder **16** may be substantially orthogonal to the central axis **14.** The line of extraction and retraction of the hydraulic cylinder **16** may be substantially parallel to the transverse axis **15.** Extraction of the hydraulic cylinder **16** may be in a direction substantially away from the central axis **14.** Retraction of the hydraulic cylinder **16** may be in a direction substantially towards the central axis **14.**

[0014] Undercarriage **10** may comprise a plurality of hydraulic cylinders **16.** In an embodiment, the undercarriage **10** may comprise two hydraulic cylinders **16.** The hydraulic cylinders **16** may be disposed at opposite sides of the chassis **12.** The hydraulic cylinders **16** may be mutually aligned. Hydraulic cylinders **16** may be aligned along the transverse axis **15** of the chassis **12.** Hydraulic cylinders **16** may be aligned along a plane parallel to the transverse axis **15** of the chassis **12.** Hydraulic cylinders **16** may be positioned end to end. Extraction of the respective hydraulic cylinders **16** may be orientated in opposite directions. Retraction of the respective hydraulic cylinders **16** may be orientated in opposite directions.

[0015] In an alternative embodiment, the hydraulic cylinders **16** may be paired at the same side of the chassis **12.** The paired hydraulic cylinders **16** may be mutually parallel. The lines of extraction and retraction of the paired hydraulic cylinders **16** may be both substantially orthogonal to the central axis **14.** The lines of extraction and retraction of the paired hydraulic cylinders **16** may be both substantially parallel to the transverse axis **15.**

[0016] In yet a further embodiment, the undercarriage **10** may comprise four hydraulic cylinders **16.** Two hydraulic cylinders **16** may be paired at the same side of the chassis **12.** The paired hydraulic cylinders **16** may be mutually parallel. The lines of extraction and retraction of the paired hydraulic cylinders **16** may be both substantially orthogonal to the central axis **14.**

[0017] Two further hydraulic cylinders **16** may be paired at the opposite side of the chassis **12.** The second paired hydraulic cylinders **16** may be mutually parallel. The lines of extraction and retraction of the second paired hydraulic cylinders **16** may be both substantially orthogonal to the central axis **14.**

[0018] Each hydraulic cylinder **16** of the first pair may be mutually aligned with the respective hydraulic cylinder **16** of the second pair. Respective hydraulic cylinders **16** of the first and second pairs may be aligned along the transverse axis of the chassis **12.** The mutually aligned hydraulic cylinders **16** may be positioned end to end. Extraction of the respective aligned hydraulic cylinders **16** may be orientated in opposite directions. Retraction of the respective aligned hydraulic cylinders **16** may be orientated in opposite directions.

[0019] Undercarriage **10** may comprise a brace **18.** The brace **18** may be disposed in the chassis **12.** Actuator **16** may be coupled to the brace **18.** Brace **18** may be centrally positioned in the chassis **12** relative to the central axis **14.** In an embodiment, an end of the hydraulic cylinder **16** may be coupled to the brace **18.**

[0020] The brace **18** may have a flange **20** for connection to the actuator **16.** In an embodiment, the brace **18** may have two flanges **20** for connection to opposed actuators **16a, 16b.** Brace **18** may be aligned such that the two flanges **20** are disposed on opposed sides of the central axis **14.** In a further embodiment, undercarriage **10** may comprise a plurality of braces **18.** The undercarriage **10** may comprise two braces **18** mutually aligned along the central axis **14.** The plurality of actuators **16** may be connected to the braces **18.**

[0021] With reference to Figs 1 and 2, the undercarriage **10** may comprise a stabiliser **24.** Stabiliser **24** may be coupled to the chassis **12.** Stabiliser **24** may be laterally coupled to the chassis **12.** Stabiliser **24** may be coupled to a side of the chassis **12** that is laterally adjacent to the central axis **14.** Stabiliser **24** may be coupled to a side of the chassis **12** that is substantially parallel to the central axis **14.**

[0022] In an embodiment, a second stabiliser **24** may be laterally mounted to the chassis **12.** The second stabiliser **24** may be located at the side opposite to the first stabiliser **24.** The second stabiliser **24** may be independently movable relative to the first stabiliser **24.**

[0023] Stabiliser **24** may be movably coupled to the chassis **12.** Stabiliser **24** may be movable between a stowed position and an operative position when coupled to the chassis **12.** With reference to Fig. 1 the stabiliser **24** may be at the stowed position. With reference to Fig. 2 the stabiliser **24** may be at the operative position.

[0024] The stabiliser **24** may be configured to augment a contact surface area of the undercarriage **10** at the operative position. The contact surface area may be the

total area of the undercarriage **10** that is in contact with the ground. The contact surface area includes the surface area of the travel members **22** contacting the ground.

[0025] Stabiliser **24** may have a contact surface **26.** The contact surface **26** is the portion of the stabiliser **24** that contacts the ground so as to provide stability for the undercarriage **10.** Contact surface **26** may be substantially spread out so as to distribute pressures generated during work operations over an extended area. The contact surface **26** may be substantially planar. In an embodiment, the contact surface **26** may be substantially flat. In an alternative embodiment, the contact surface **26** may be provided with grooves **28.** Grooves **28** may extend into the stabiliser **24.** Grooves **28** may enable the stabiliser **24** to accommodate soft ground conditions or uneven surfaces.

[0026] Stabiliser **24** may be movable along plane. The plane may be defined by the direction of movement of the stabiliser between the limits of the stowed position and the operative position. Stabiliser **24** may be movable along a plane that is substantially transverse to the central axis **14.** Stabiliser **24** may be movable along a plane that is substantially orthogonal to the central axis **14.** Stabiliser **24** may be movable along a plane that is substantially parallel to the transverse axis **15.**

[0027] The stabiliser **24** may be pivotally movable between the stowed position and the operative position. Stabiliser **24** may move along an arcuate path between the stowed position and the operative position. The arcuate path may be on the plane that is substantially transverse to the central axis **14.** Stabiliser **24** may be pivotably coupled to the chassis **12.**

[0028] With reference to Figs. 1 and 2, at the stowed position the contact surface **26** may be turned away from the orientation thereof at the operative position. At the stowed position the contact surface **26** may be turned away from the ground. At the stowed position the contact surface **26** may have an upwards tilt relative to the orientation at the operative position of the chassis **12.** At the operative position the contact surface **26** may be turned towards the ground. At the operative position the contact surface **26** may face downwards relative to the operational position of the chassis **12.** Stabiliser **24** may be disposed nearer to the chassis **12** at the stowed position when compared to the operative position.

[0029] In an embodiment, stabiliser **24** may be linearly movable between the stowed position and the operative position. Stabiliser **24** may move along a linear path between the stowed position and the operative position. The linear path may be on the plane that is substantially transverse to the central axis **14.**

[0030] The linear path may be a vertical movement of the stabiliser **24** relative to the ground. The stabiliser **24** may move downwards to the operative position and upwards to a transitional position. The stabiliser **24** may move horizontally from the transitional position to the stowed position.

[0031] In a further embodiment, the linear path may be a diagonal movement of the stabiliser **24** relative to the ground. The stabiliser **24** may move diagonally downwards from the stowed position to the operative position. The stabiliser **24** may move diagonally upwards from the operative position to the stowed position.

[0032] Stabiliser **24** may be coupled to the actuator **16.** Actuator **16** may move the stabiliser **24** between the stowed position and the operative position. Actuator **16** may be connected between the stabiliser **24** and the brace **18.** Actuator **16** may move the stabiliser **24** relative to the chassis **12.** In an embodiment, stabiliser **24** may be coupled to a pair of actuators **16.**

[0033] The hydraulic cylinder **16** may control the position of the stabiliser **24.** The position of the stabiliser **24** may be fixed by the hydraulic cylinder **16** through hydraulic lock valves positioned in the hydraulic system.

[0034] In an embodiment, the hydraulic system may be configured to monitor the pressure of the hydraulic cylinder and provide a pressure feedback to the control system. The feedback may enable the stabilisers **24** to contact the ground without lifting the undercarriage **10** off the ground.

[0035] With reference to Fig. 3, the stabiliser **24** may comprise a platform **30.** The contact surface **26** may be provided on the platform **30.** Opposite the contact surface **26,** the platform **30** may have a mounting surface **34.** The platform **30** may be coupled to the chassis **12** and the actuator **16** at the mounting surface **34.** With reference to Fig. 1, grooves **28** may extend lengthwise along the contact surface **26.** Grooves **28** may be parallel to the longitudinal axis of the platform **30.** Platform **30** may have a longitudinal axis that is parallel to the central axis **14.**

[0036] With reference to Fig. 3, platform **30** may have a pair of wings **32.** Wings **32** may be disposed at opposite terminal ends of the platform **30.** Wings **32** may be portions of the platforms inclined away from the contact surface **26.** Wings **32** may be inclined towards the mounting surface **34.** Contact surface **26** and the mounting surface **34** may be positioned between the wings **32.**

[0037] Stabiliser **24** may have a strut **36** provided on the mounting surface **34.** Stabiliser **24** may be connected to the actuator **16** through the strut **36.** Strut **36** may be a thickened portion of the stabiliser **24** capable of withstanding forces generated during work operations. Strut **36** may be centrally located on the mounting surface **34.** In an embodiment, strut **36** may be provided adjacent the terminal end of the platform **30.** The strut **36** may be provided adjacent a wing **32.** In a further embodiment, a pair of struts **36** may be provided adjacent the respective terminal ends of the platform **30.** The pair of struts **36** may be provided adjacent the respective wings **32.**

[0038] Platform **30** may be movable by actuation of the actuator **16.** A pair of lugs **38** may be provided on the strut **36** for connection to the actuator **16.** Platform **30** may be rotatably coupled to the actuator **16** through the lugs **38.** In an embodiment, platform **30** may be movable by actuation of a pair of actuators **16.** Two pairs of lugs **38** may be provided on the strut **36** for connection to the

pair of actuators **16.**

[0039] In an embodiment, stabiliser **24** may be movable by actuation of an actuator **16** provided as a hydraulic cylinder. Platform **30** may be coupled to the hydraulic cylinder **16.** Lugs **38** provided on the strut **36** may enable connection to the piston rod **46** of the hydraulic cylinder. The eye of the piston rod **46** may be connected to respective holes **48** provided on the lugs **38.** In an embodiment, platform **30** may be movable by actuation of two hydraulic cylinders **16.** Two pairs of lugs **38** may be provided on the strut **36** for connection to a pair of piston rods **46.**

[0040] Stabiliser **24** may be movable between the operative position and the stowed position through the extraction and retraction of the hydraulic cylinder **16.** Stabiliser **24** may be at the operative position with the hydraulic cylinder **16** being extracted. Stabiliser **24** may be at the stowed position with the hydraulic cylinder **16** being retracted. Stabiliser **24** may move along an arcuate path between the operative position and the stowed position through the extraction and retraction of the hydraulic cylinder **16.** Stabiliser **24** may be rotatably coupled to the piston rod **46.** Platform **30** may be rotatably coupled to the piston rod **46** through the pair of lugs **38.**

[0041] Chassis **12** may be provided with a window **50** through which the piston rod **46** may extend for connection to the lugs **38.** The piston rod **46** may extend and retract through the window **50.** In an embodiment, chassis **12** may be provided with a window **50** for the piston rod **46.** With reference to Fig. 4, the cylinder barrels **53** of the respective hydraulic cylinders may be provided in alignment with the windows **50.**

[0042] With reference to Fig. 3, stabiliser **24** may be pivotably coupled to the chassis **12** through a pivotal connection **40.** The pivotal connection **40** may comprise a shaft **42** provided on the platform **30** and brackets **44** provided on the chassis **12.** Shaft **42** may be disposed on the mounting surface **34.** Shaft **42** may be disposed adjacent the lugs **38.** Shaft **42** may be laterally joined to the strut **36.** Brackets **44** may be positioned on the chassis **12** adjacent a window **50.**

[0043] Shaft **42** may be rotatably coupled to the brackets **44** at a coupling point **52.** Stabiliser **24** may rotate about the coupling point **52.** Stabiliser **24** may rotate about the coupling point **52** when moved between the stowed position and the operative position. Stabiliser **24** may rotate about the coupling point **52** when actuated through the extraction and retraction of the hydraulic cylinder **16.**

[0044] In an embodiment, the pivotal connection **40** may be centrally provided between the chassis **12** and the stabiliser **24.** The shaft **42** may be centrally provided on the mounting surface **34.** Strut **36** may be positioned between the shaft **42** and the terminal end of the platform **30.** In an alternate embodiment, struts **36** may be positioned between the shaft **42** and the respective terminal ends of the platform **30.**

[0045] In a further embodiment, stabiliser **24** may be connected to the chassis **12** through a pair of pivotal connections **40.** The connection between stabiliser **24** and the actuator **16** may be disposed between a pair of pivotal connections **40.** The shafts **42** may be disposed on opposite ends of the strut **32.** The lugs **38** may be located between the shafts **42.** In an alternate embodiment, connections between stabiliser **24** and the pair of actuators **16** may be disposed between a pair of pivotal connections **40.**

[0046] In yet a further embodiment, the pivotal connections **40** may be centrally provided between the chassis **12** and the stabiliser **24.** The shafts **42** may be centrally provided on the mounting surface **34.** Strut **36** may be positioned between the shafts **32** and the terminal end of the platform **30.** In an alternate embodiment, struts **36** may be positioned between the shafts **42** and the respective terminal ends of the platform **30.**

[0047] With reference to Fig. 4, stabiliser **24** may be centrally positioned relative to the chassis **12.** Stabiliser **24** may be centrally positioned relative to the chassis **12.** The stabiliser **24** is at the operative position and platform **30** may be positioned adjacent the travel member **22.** The contact surface **26** may be aligned with the travel member **22.** The chassis **12** may have a chassis contact surface **54** that is defined by the contact surface of the travel member **22.** Contact surface **26** may be aligned with the chassis contact surface **54.**

[0048] With reference to Fig. 5, stabiliser **24** is positioned alongside the travel member **22.** Stabiliser **24** is centrally aligned to the central frame **57** of chassis **12.** Platform **30** may be positioned parallel to the travel member **22.** Platform **30** may be parallel to the central axis **14.** Platform **30** may be spaced from the travel member **22** such that a gap **56** is provided. The dimension of the gap **56** may be configured to optimise stability provided by the stabiliser **24** in accordance to the shape and configuration of the platform **30.**

[0049] With reference to Fig. 6, stabiliser **24** is transversely aligned with the travel member **22.** Hydraulic cylinder **16** may be connected between the brace **18** and the lugs **38** extending from the platform **30.** Hydraulic cylinder **16** may be at the extracted position.

[0050] In an embodiment, the travel members **22** may be track roller frames. Track roller frames **22** may form a part of the chassis **12.** With reference to Fig. 4, track roller frames **22** may support track chains **58.** The track chain **58** may comprise track shoes **60.Track** shoes **60** may contact the ground and may define the chassis contact surface **54.**

[0051] The stabiliser **24** may be mounted to the track roller frame **22.** Stabiliser **24** may be pivotably coupled to the track roller frame **22.** The actuator **16** may extend through the track roller frame **22** to couple to the stabiliser **24.** In an embodiment, the piston rod **46** of the hydraulic cylinder **16** may extend through window **50** on the track roller frame **22** to couple with the stabiliser **24.**

[0052] With reference to Fig. 7, the stabiliser **24** is in the stowed position. Stabiliser **24** may be disposed sub-

stantially within the transverse width of the track chain **58.** Stabiliser **24** may be disposed substantially within the track chain **58** transversely extending from the track roller frame **22.** The hydraulic cylinder **16** may be retracted. Stabiliser **24** may be rotated such that the contact surface **26** faces away from the chassis contact surface **54** of the track chain **58.** Stabiliser **24** may be positioned adjacent the track roller frame **22.** The coupling point **52** of the pivotal connection **40** may be positioned between the contact surface **26** and the chassis contact surface **54.** The coupling between the piston rod **46** and the hole **48 of** the lug **38** may be positioned between the coupling point **52** and the track roller frame **22.**

[0053] With reference to Fig. 8, the stabiliser **24** is in the operative position. Stabiliser **24** may be disposed away from the track chain **58.** Stabiliser **24** may be spaced away from transverse edge of the track chain **58.** The hydraulic cylinder **16** may be extended. Stabiliser **24** may be rotated such that the contact surface **26** is aligned with the chassis contact surface **54** of the track chain **58.** Stabiliser **24** may be spaced from the track roller frame **22.** The coupling point **52** of the pivotal connection **40** may be positioned opposite both the contact surface **26** and the chassis contact surface **54.** The coupling point **52** may be positioned between the track roller frame **22** and the coupling between the piston rod **46** and the hole **48** of the lug **38.**

[0054] With reference to Fig. 9, in an embodiment, the travel members **22** may be wheels. The chassis **12** may comprise axels and the wheels **22** may be mounted on the axles (not shown). The stabiliser **24** may be disposed between the wheels **22** adjacent the chassis **12** at the operative position. The stabiliser **24** may be disposed between the wheels **22** at a side of the chassis **12** at the stowed position.

[0055] With reference to Fig. 10, in a second embodiment, stabiliser **24** may comprise a plurality of platforms **30.** Each platform **30** may be independently movable from the stowed position to the operative position relative to the chassis **12.** Each platform **30** may be independently coupled to the chassis **12.** The plurality of platforms **30** may enable the stabiliser **24** to adapt to the operational conditions. Stabiliser **24** may be adapted to the ground conditions.

[0056] The stabiliser **24** may comprise two platforms **30** wherein each platform **30** is independently movable between the stowed position and the operative position. Each platform **30** may be pivotably coupled to the chassis **12.** Each platform **30** may be pivotably coupled to the chassis **12** through respective pivotal connections **40.** Each platform **30** may be movable by respective actuators **16.** Each platform **30** may be rotatably coupled to the actuators **16.**

[0057] With reference to Fig. 11, in a third embodiment, stabiliser **124** may have a platform **130.** Contact surface **126** may have grooves **128** with enlarged transverse widths. Stabiliser **124** may have a strut **136** that is tubular in form. Strut **136** may be coupled to the platform **130** through a plurality of uprights **144.** Uprights **144** may be mounted to the mounting surface **134.** Shaft **142** may be connected to the strut **136.**

[0058] With reference to Fig. 12, in a fourth embodiment, stabiliser **224** may have a platform **230.** Contact surface **236** may be flat. Platform **230** may have inclined transverse edges **231.** Transverse edges **231** may be inclined away from the contact surface **226.** Stabiliser **224** may have a strut **236** that is tubular in form. Strut **236** may be coupled to the platform **230** through a plurality of uprights **244.** Uprights **244** may be mounted to the mounting surface **234.** Shaft **242** may be connected to the strut **236.**

[0059] A method for augmenting lateral stability of the undercarriage **10** having a contact surface area for engaging a ground surface. The method may comprise augmenting the contact surface area of the undercarriage **10.** The method may comprise the step of moving the stabiliser **24** from a stowed position to an operative position relative to the chassis **12.** The stabiliser **24** may be pivotally movable from the stowed position to the operative position along a plane substantially transverse to the central axis **14** of the chassis **12.**

[0060] The skilled person would appreciate that foregoing embodiments may be modified or combined to obtain the undercarriage **10** of the present disclosure.

Industrial Applicability

[0061] This disclosure describes an undercarriage **10** with actuatable stabilisers **24.** The undercarriage **10** may provide for a stable base on ground by actuating the stabilisers **24.** The stabilisers **24** may move from the stowed position to the operation position at the lateral sides of the undercarriage **10** when lateral stability is required.

[0062] Each stabiliser **24** may be actuated at a lateral side of the undercarriage **10** so as to provide lateral stability. Each stabiliser **24** may be actuated independently. The stabilisers **24** may be actuated to the operative position at both lateral sides of the undercarriage **10** when all around (360 degrees) stability is required. The stabiliser **24** may prevent undercarriage **10** from toppling substantially along the transverse axis **15.** The stabiliser **24** may prevent the undercarriage **10** from tilting over a limit after which the undercarriage **10** may topple substantially along the transverse axis **15.** Stabiliser **24** may prevent the centre of gravity of the undercarriage **10** from moving over a limit substantially along the transverse axis **15.** At the operative position the stabilisers **24** may be just above the ground or may be in contact with the ground. At the operative position of the stabilisers **24** the undercarriage **10** may not be raised. The undercarriage **10** may remain in contact with the ground while the stabiliser **24** contacts the ground to provide lateral stability. At the operative position the stabiliser **24** may augment the contact surface area of the undercarriage **10.** Contact surface **26** of the stabiliser **24** may contact the ground to prevent the undercarriage **10** from toppling. The contact surface area

of the undercarriage **10** may be increased with the contact surface **26** in contact with the ground. Contact surface area of the undercarriage **10** may be increased along the transverse axis **15** with the contact surface **26** in contact with the ground.

[0063] The stabilisers **24** may be hydraulically operated from the cab of the vehicle. The stabilisers **24** may move between a stowed position and an operative position. At the stowed position the stabilisers **24** may be disposed within the profile of the undercarriage **10.** The profile of the undercarriage **10** may remain unchanged with the stabilisers **24** in the stowed position. At the operative position each stabiliser **24** may independently increase the overall surface area of the undercarriage **10.** The shape and dimension of the stabilisers **24** may provide for a stability base on the ground.

[0064] The undercarriage **10** may enable pressure from the work operations to be spread out over a greater area. Operation time may be reduced to provide lateral stability by moving the stabilisers **24** to the operational position.

[0065] The undercarriage **10** may be used as a lower for industrial machines. The industrial machines may be excavators, long reach excavators, demolition machines, pipelayers, aerial platforms, cranes, handling machines and foundation machines. The overall dimension of the industrial machines may not increase with an increase in height with the undercarriage **10.**

[0066] Accordingly, this disclosure includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the disclosure unless otherwise indicated herein.

[0067] Where technical features mentioned in any claim are followed by reference signs, the reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, neither the reference signs nor their absence have any limiting effect on the technical features as described above or on the scope of any claim elements.

[0068] One skilled in the art will realise the disclosure may be embodied in other specific forms without departing from the disclosure or essential characteristics thereof. The foregoing embodiments are therefore to be considered in all respects illustrative rather than limiting of the disclosure described herein. Scope of the invention is thus indicated by the appended claims, rather than the foregoing description, and all changes that come within the meaning and range of equivalence of the claims are therefore intended to be embraced therein.

Claims

1. An undercarriage (10) configured to provide augmented lateral stability, the undercarriage (10) comprising:

a chassis (12) having a central axis (14); and
a stabiliser (24) laterally coupled to the chassis (12), the stabiliser (24) being movable between a stowed position and an operative position wherein the stabiliser (24) is configured to augment a contact surface area of the undercarriage (10) at the operative position.

2. The undercarriage (10) of claim 1 wherein the stabiliser (24) comprises a contact surface (26), the contact surface (26) being substantially planar.

3. The undercarriage (10) of claim 1 or 2 wherein the stabiliser (24) is movable along a plane substantially transverse to the central axis (14).

4. The undercarriage (10) of claims 1, 2 or 3 wherein the stabiliser (24) is pivotally movable between the stowed position and the operative position.

5. The undercarriage (10) of claims 1, 2, 3 or 4 wherein the stabiliser (24) comprises a platform (30), the platform (30) being movable by actuation of an actuator (16).

6. The undercarriage (10) of claim 5 wherein the platform (30) is rotatably coupled to the actuator (16).

7. The undercarriage (10) of claims 1, 2, 3 or 4 wherein the stabiliser (24) comprises at least two platforms (30) wherein each platform (30) is independently movable between the stowed position and the operative position.

8. The undercarriage (10) of claim 7 wherein each platform (30) is pivotably coupled to the chassis (12).

9. The undercarriage (10) of claim 7 or 8 wherein each platform (30) is movable by respective actuators (16), each platform (30) being rotatably coupled to the actuators (16).

10. The undercarriage (10) of any one of preceding claims wherein the chassis (12) comprises track roller frames (22) supporting track chains (58), the stabiliser (24) being mounted on at least one track roller frame (22) wherein the stabiliser (24) is disposed substantially within the transverse width of a track chain (58) at the stowed position.

11. The undercarriage (10) of any one of preceding claims 1 to 9 wherein the chassis (12) comprises wheels mounted on axles and the stabiliser (24) is disposed between the wheels at a side of the chassis (12) at the stowed position.

12. The undercarriage (10) of any one of preceding claims further comprising a second stabiliser (24) laterally mounted to the chassis (12) at the side opposite to the first stabiliser (24), the second stabiliser (24) being independently movable relative to the first stabiliser (24).

13. A method for augmenting lateral stability of an undercarriage (10) according to any one of the preceding claims wherein the undercarriage (10) has a contact surface area for engaging a ground surface, the method comprising augmenting the contact surface area of the undercarriage (10).

14. The method of claim 13 wherein augmenting the contact surface area of the undercarriage (10) comprises moving a stabiliser (24) from a stowed position to an operative position relative to a chassis (12).

15. The method of claim 14 wherein the stabiliser (24) is pivotally movable from the stowed position to the operative position along a plane substantially transverse to a central axis (14) of the chassis (12).

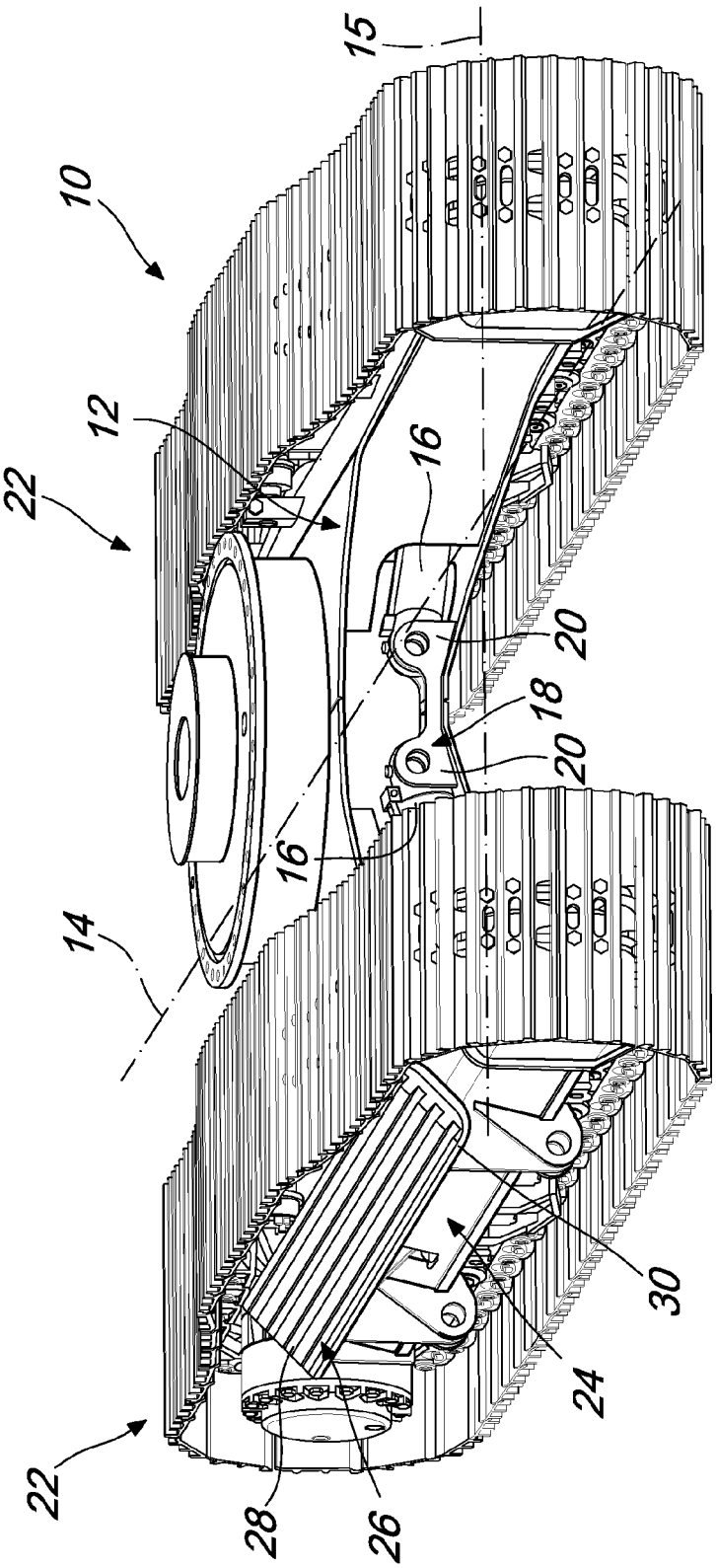


Fig. 1

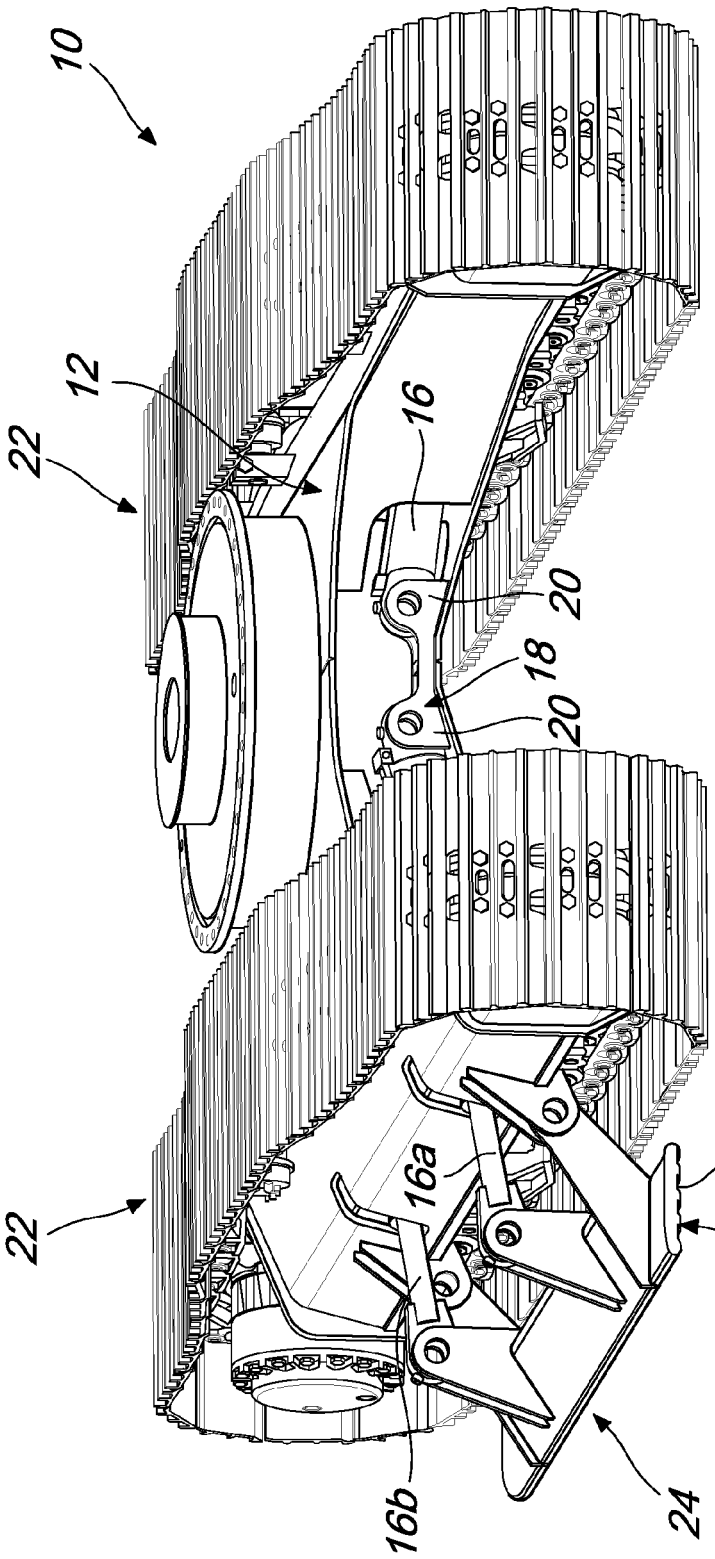
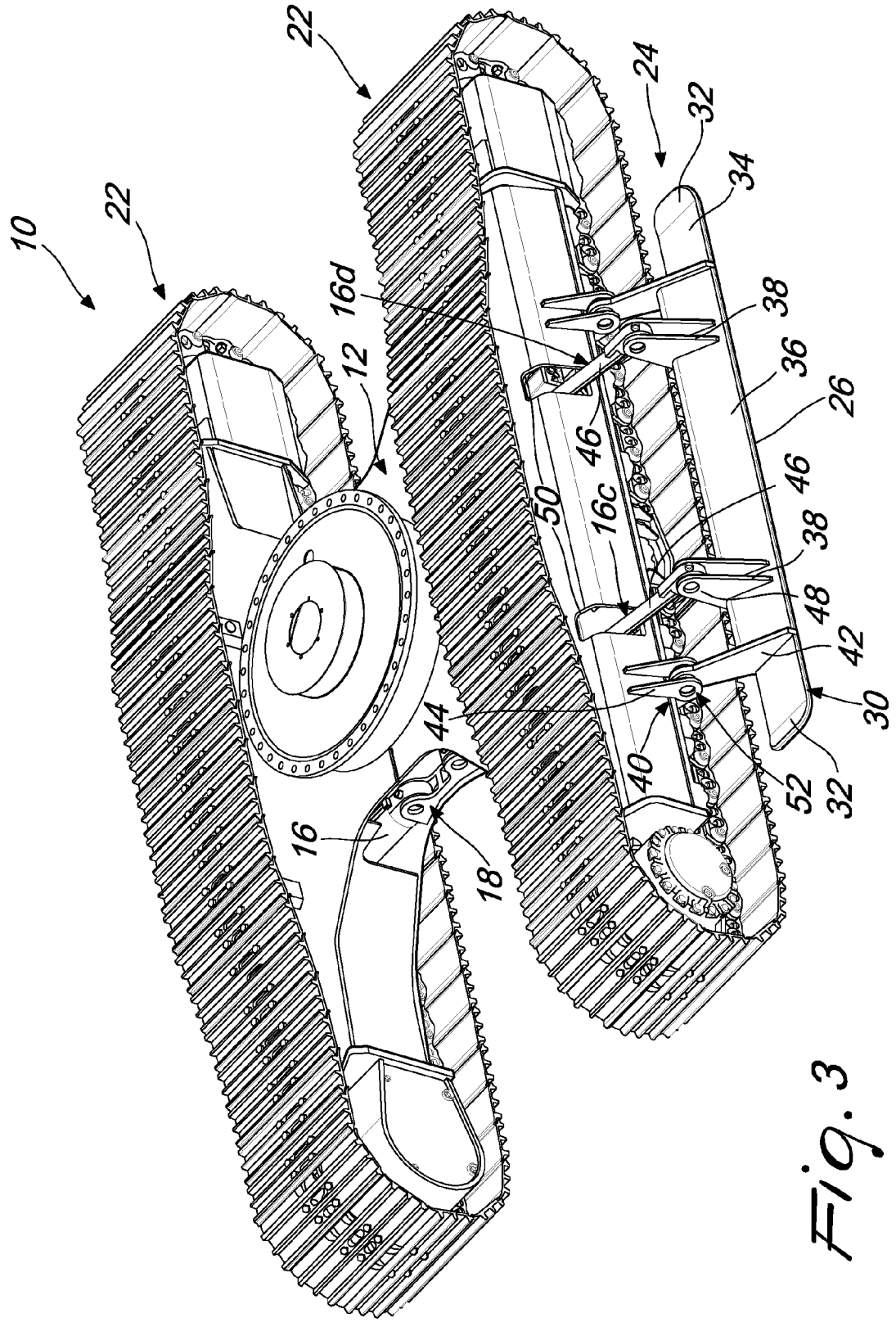


Fig. 2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16d
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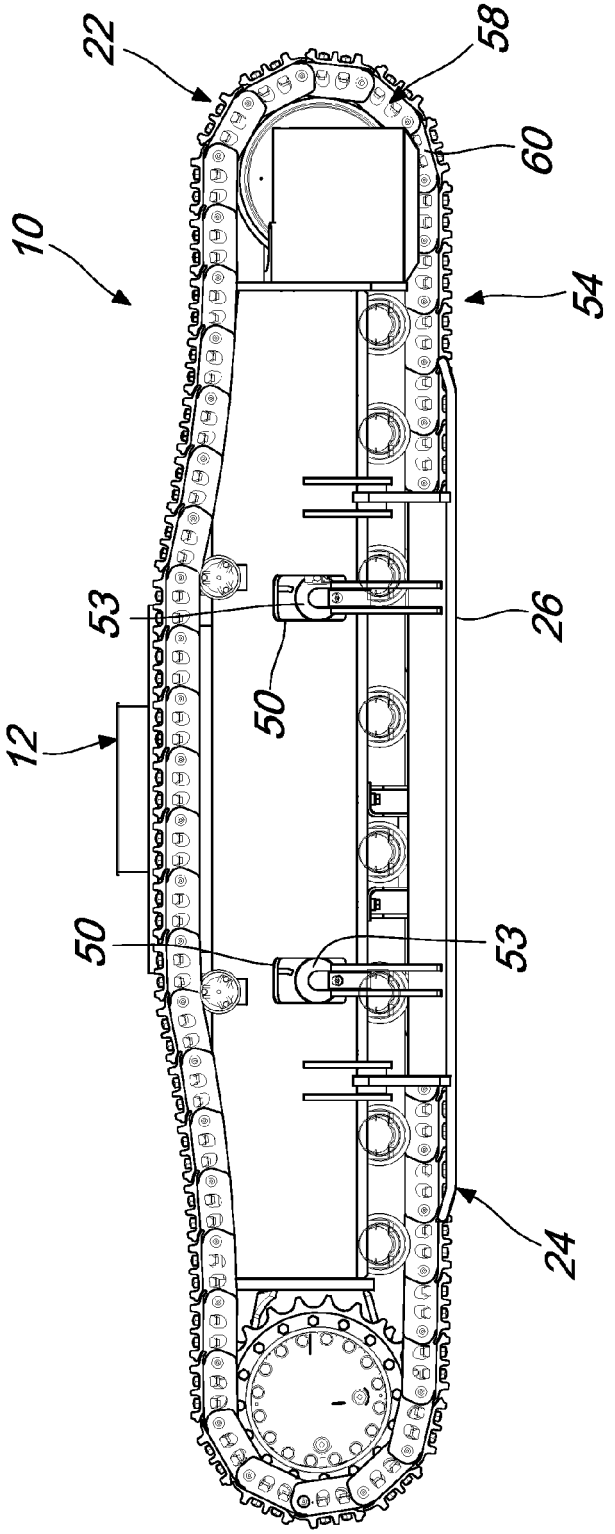
Fig. 3



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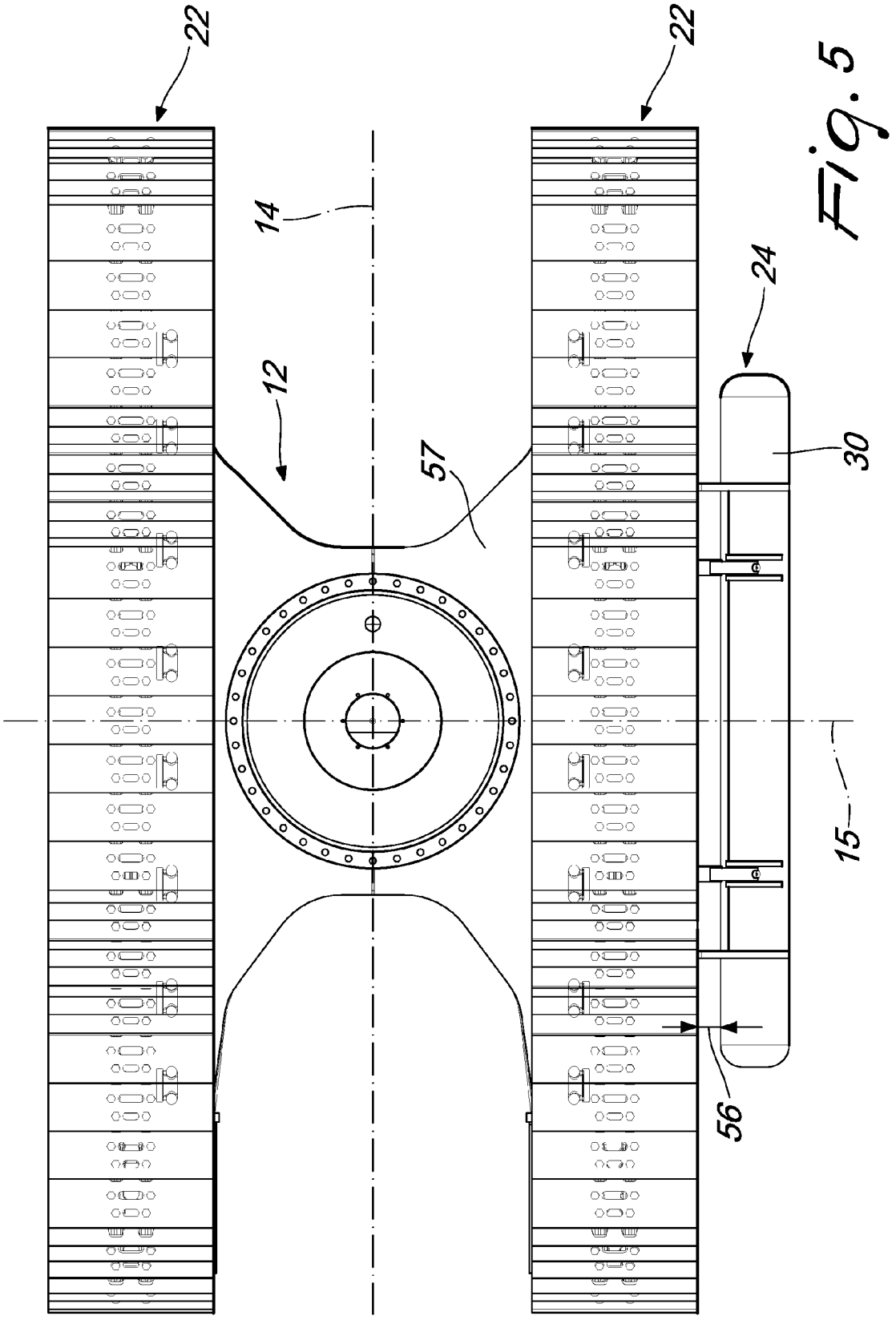
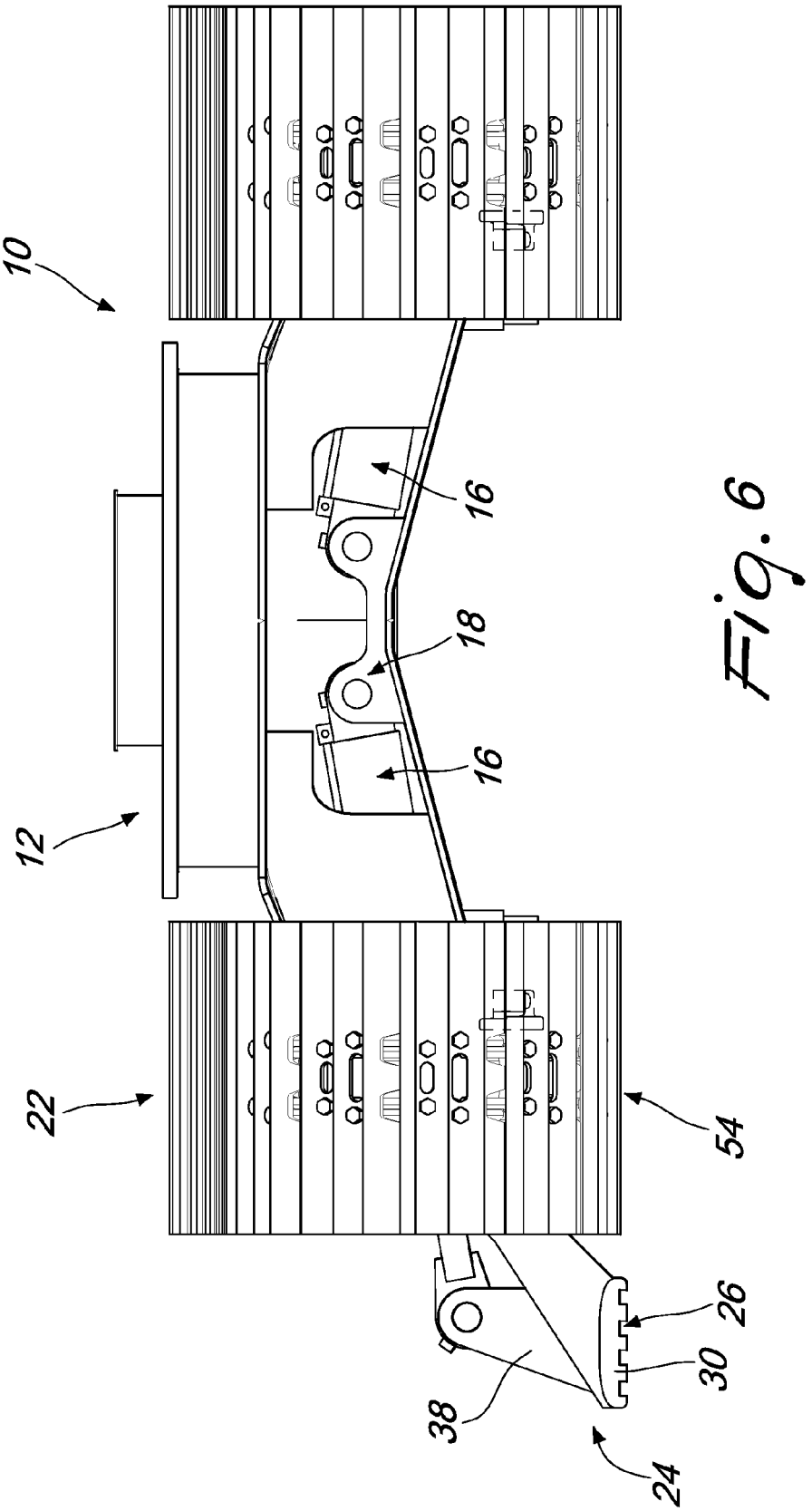


Fig. 5



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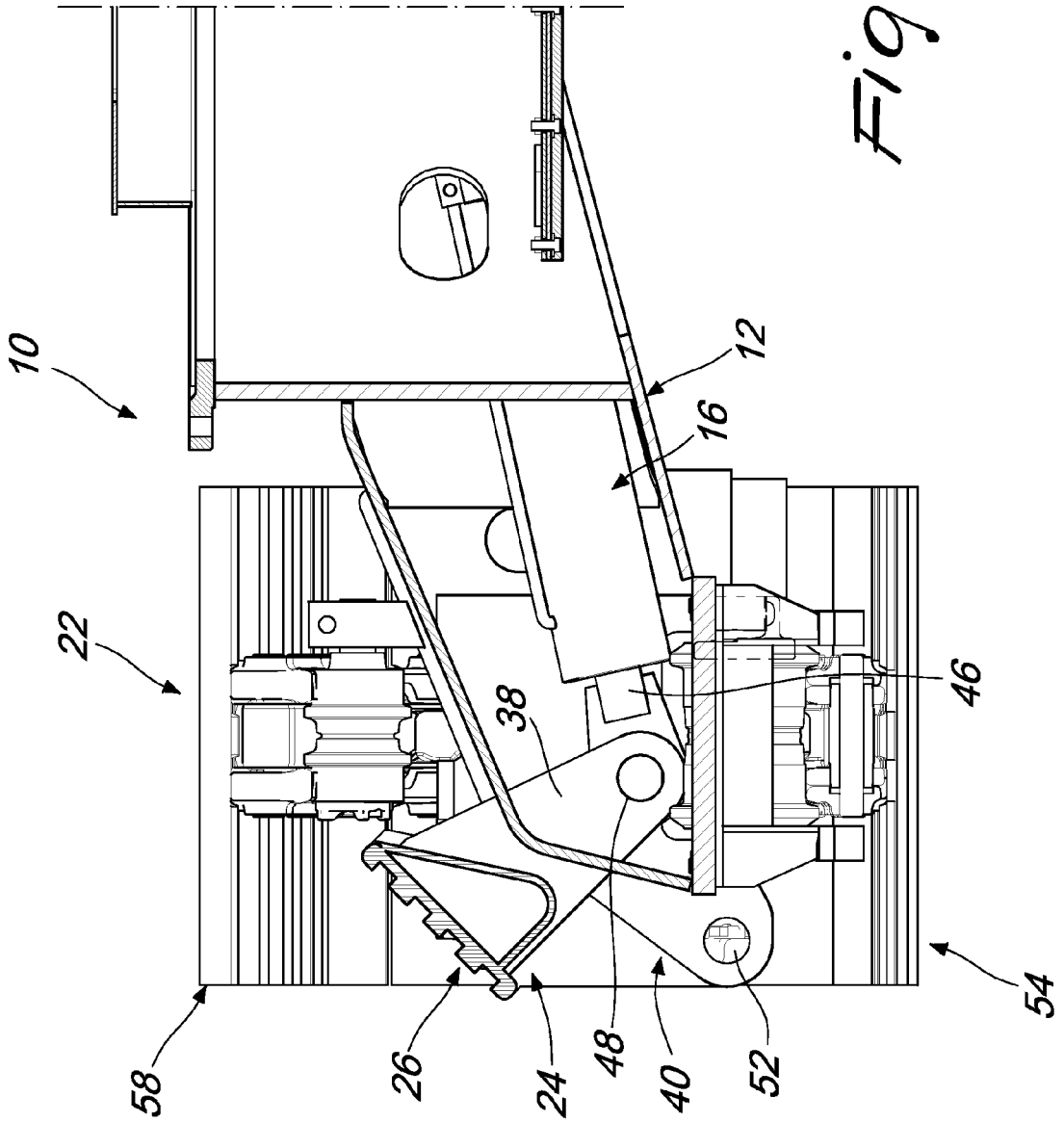

Fig. 7

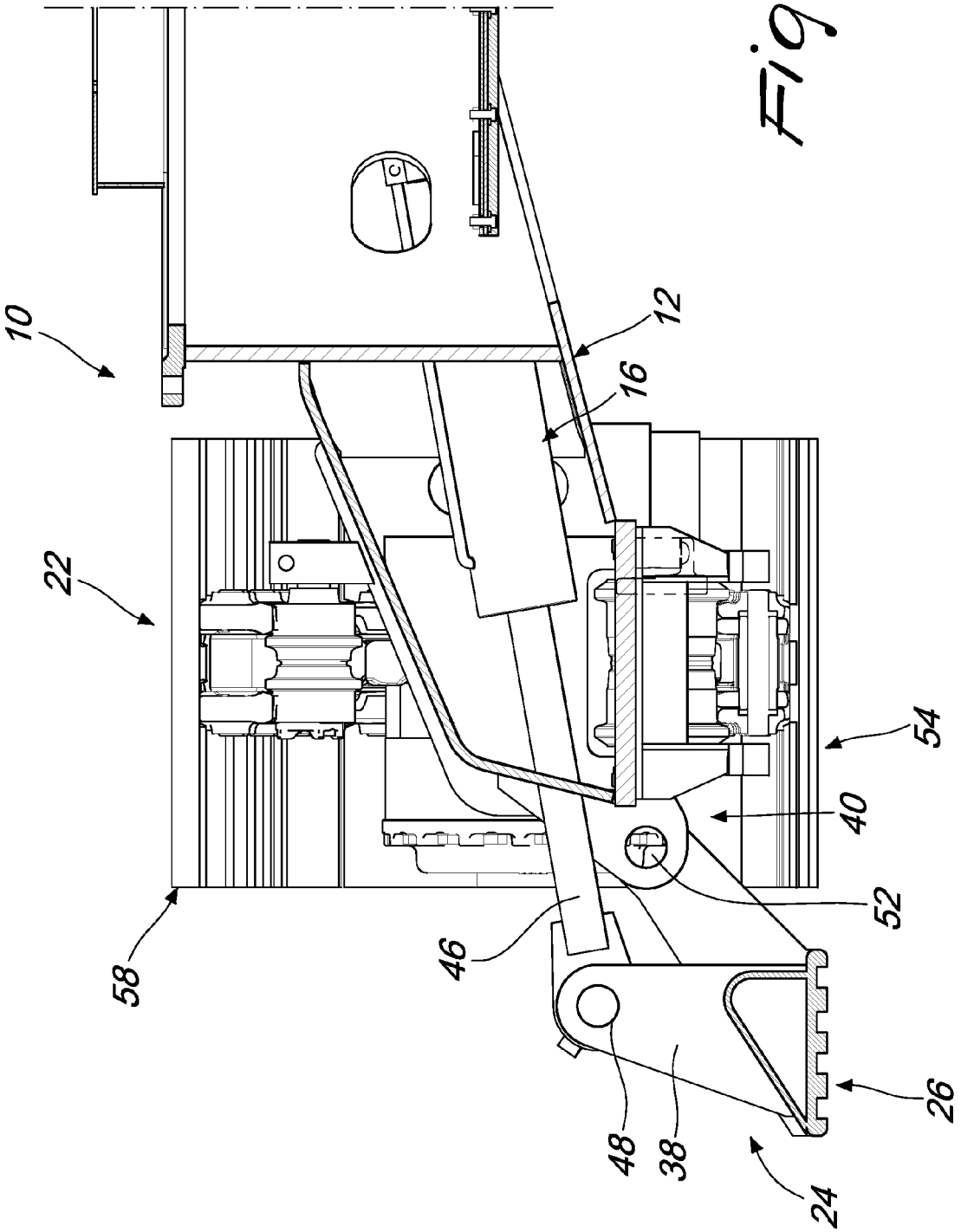

Fig. 8

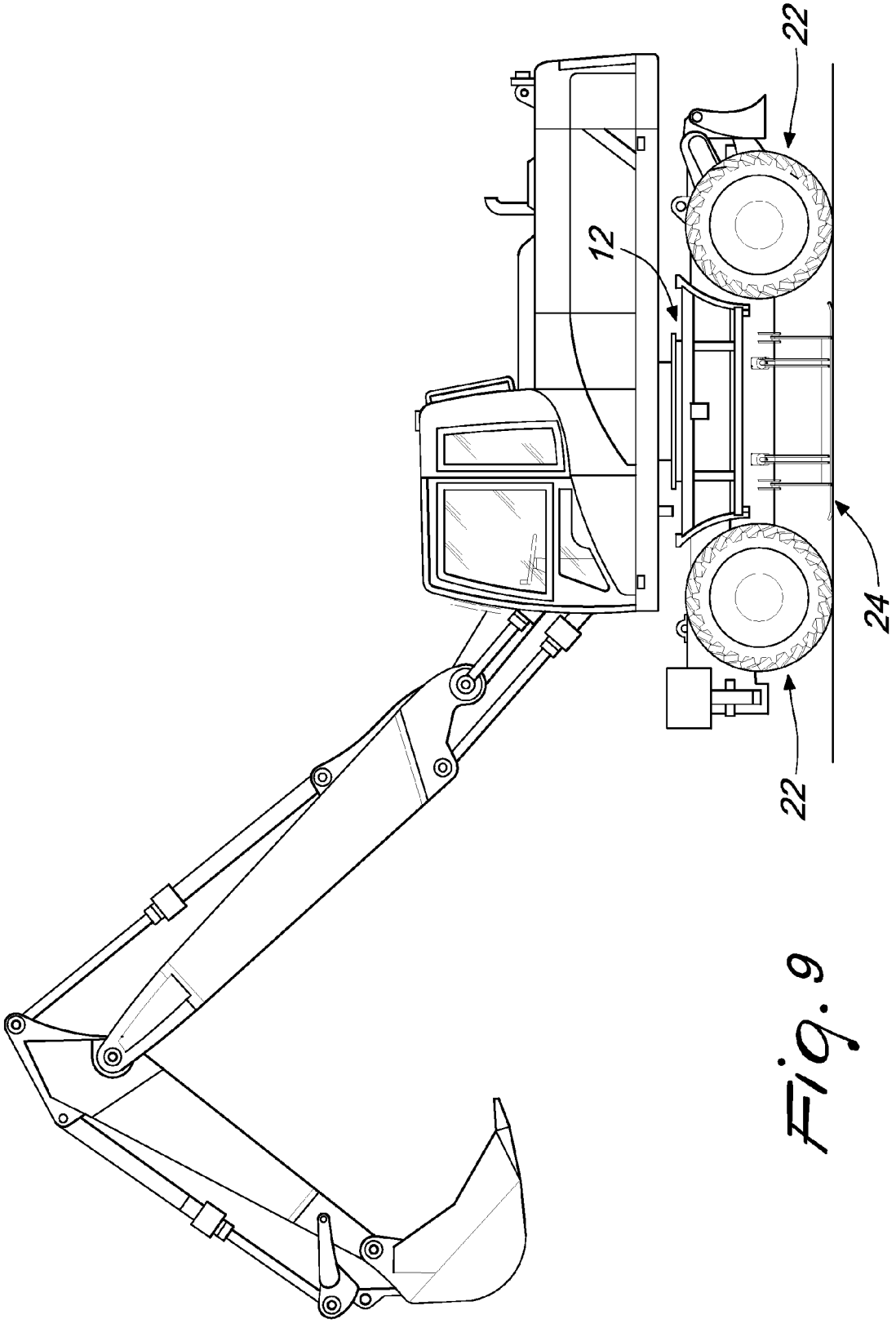

Fig. 9

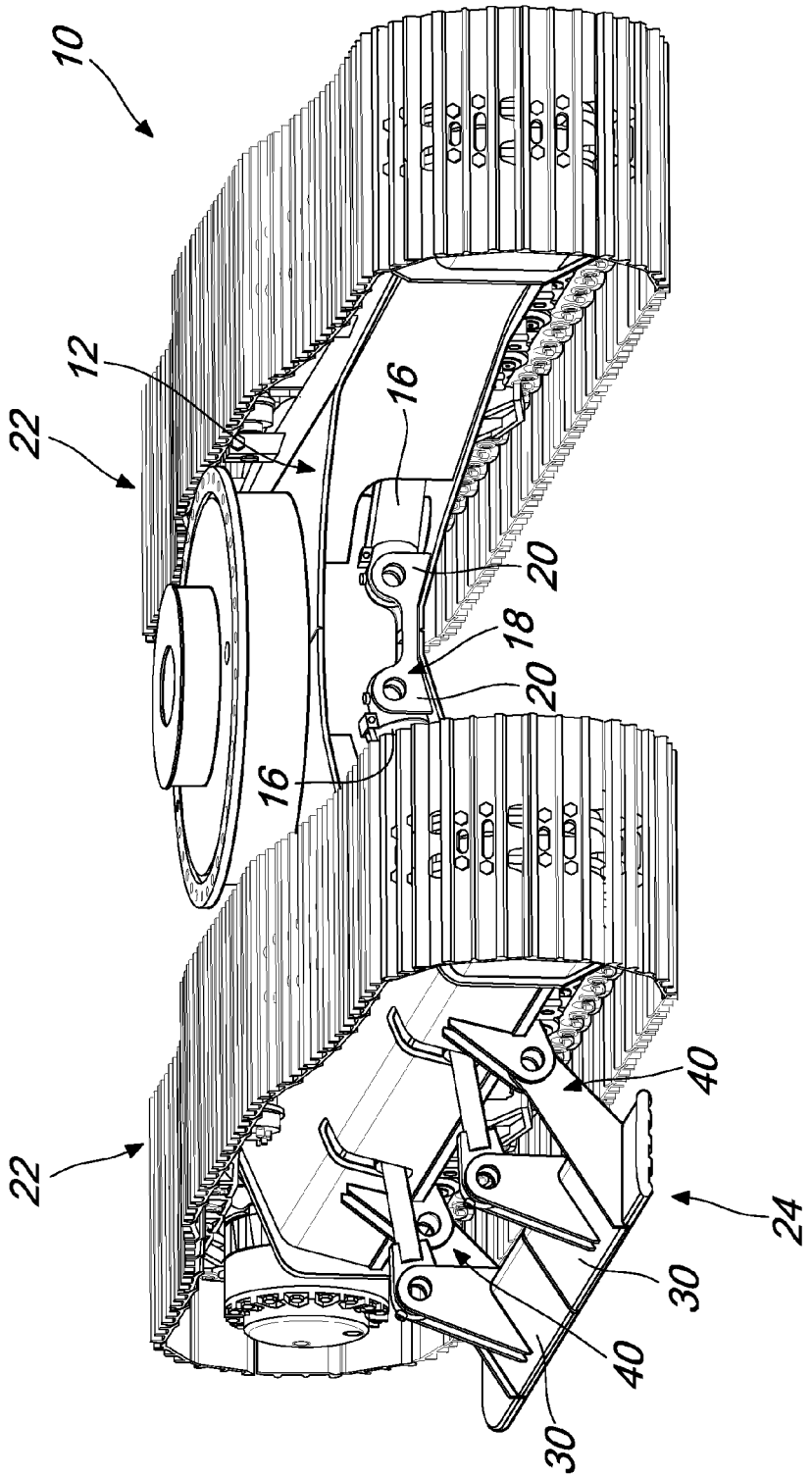

Fig. 10

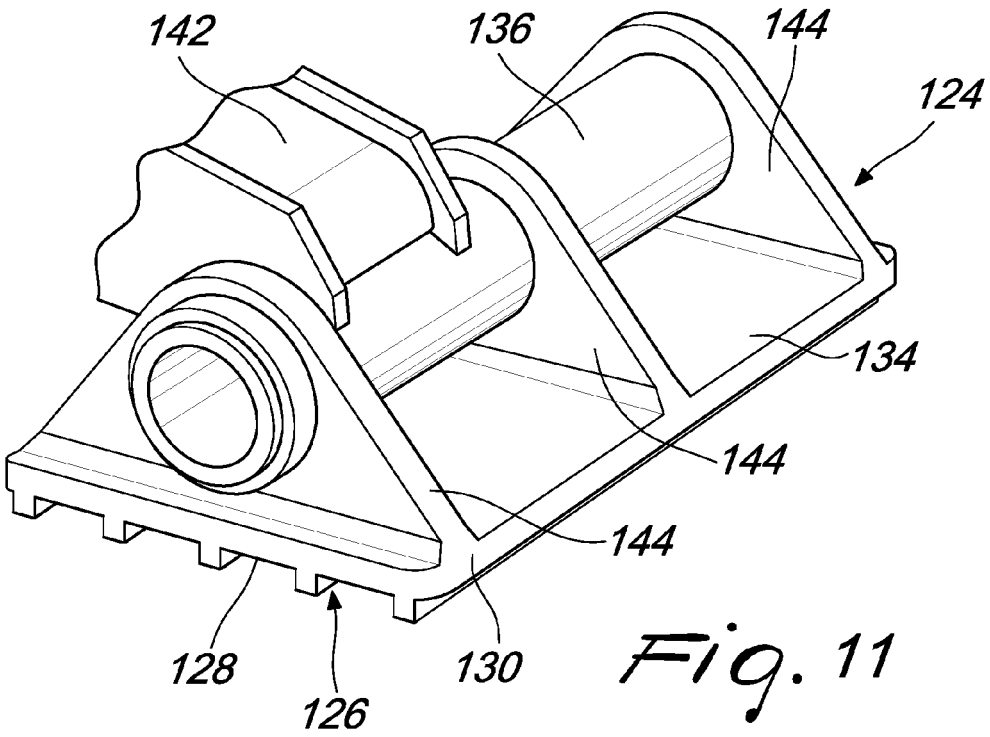
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Fig. 11

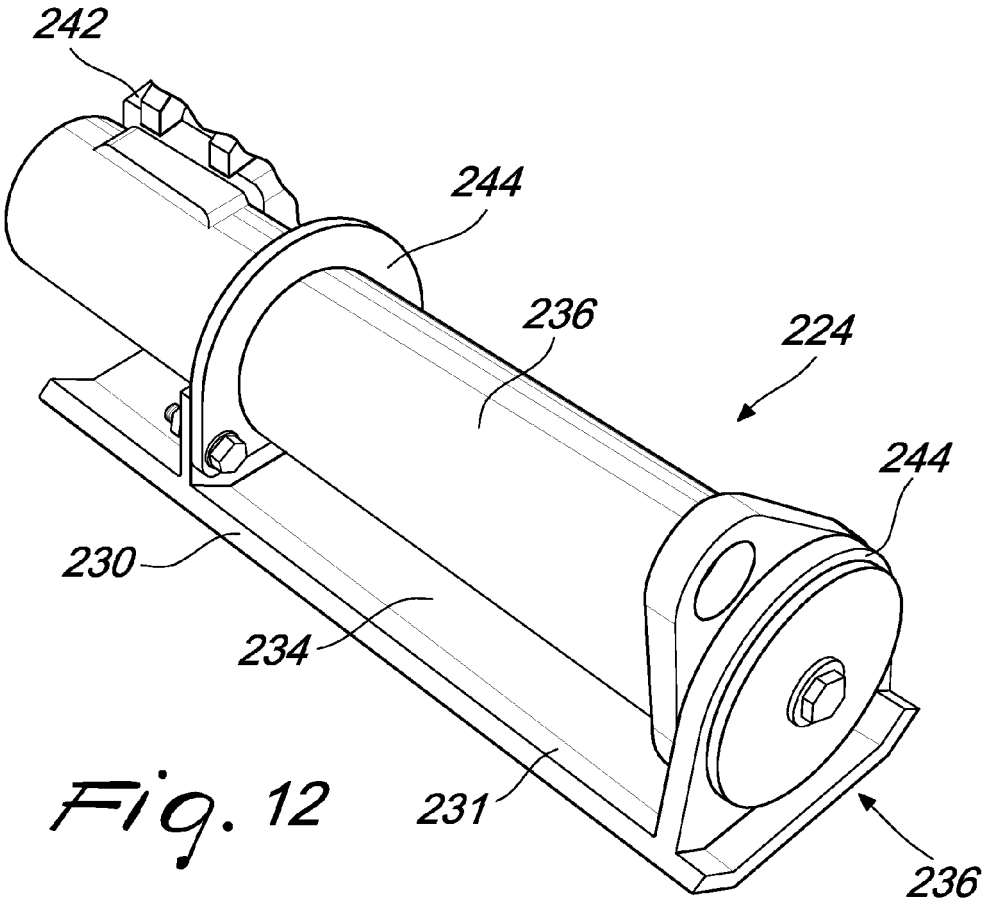
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Fig. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 2389

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	FR 2 850 987 A1 (MECANOKIT [FR]) 13 August 2004 (2004-08-13) * page 9, paragraph 1; figures 1-3 *	1-4, 10-15	
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A	WO 2012/069786 A1 (MACDONALD ANDREW [GB]; MACDONALD GARY [GB]) 31 May 2012 (2012-05-31) * abstract; figures 1-4b *	1,13	

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E02F
B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 September 2015	Ferrien, Yann

CATEGORY OF CITED DOCUMENTS

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