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(54) **MAIN FRAME FOR A TRACKED SKID STEER LOADER MACHINE**

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B62D 21/00 (2006.01)

(52) **U.S. Cl.** **180/311**; 280/781

(58) **Field of Classification Search** 280/781, 280/785; 180/311, 312; 296/35.1, 204, 296/205

See application file for complete search history.

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(57) **ABSTRACT**

A frame for a tracked skid steer loader machine or multi-terrain loader machine is provided having a structural design that enables the loader machine to be modularly assembled using a variety of pre-assembled components, namely a lower frame assembly, an upper frame assembly and an undercarriage. The lower frame assembly includes a pair of recessed channels formed on a base portion of the lower frame assembly and extending the width of the lower frame assembly. The undercarriage includes right and left track assemblies connected by a pair of crossmembers. Each recessed channel is engagingly associated with a respective crossmember of the undercarriage, thereby allowing for the modular assembly of a loader machine when the recessed channels of the lower frame assembly are mounted over the crossmembers of the undercarriage. An upper frame assembly may be mounted on the lower frame assembly before or after the lower frame assembly is mounted onto the undercarriage.

11 Claims, 7 Drawing Sheets

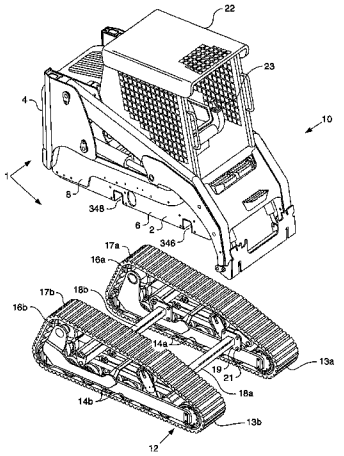
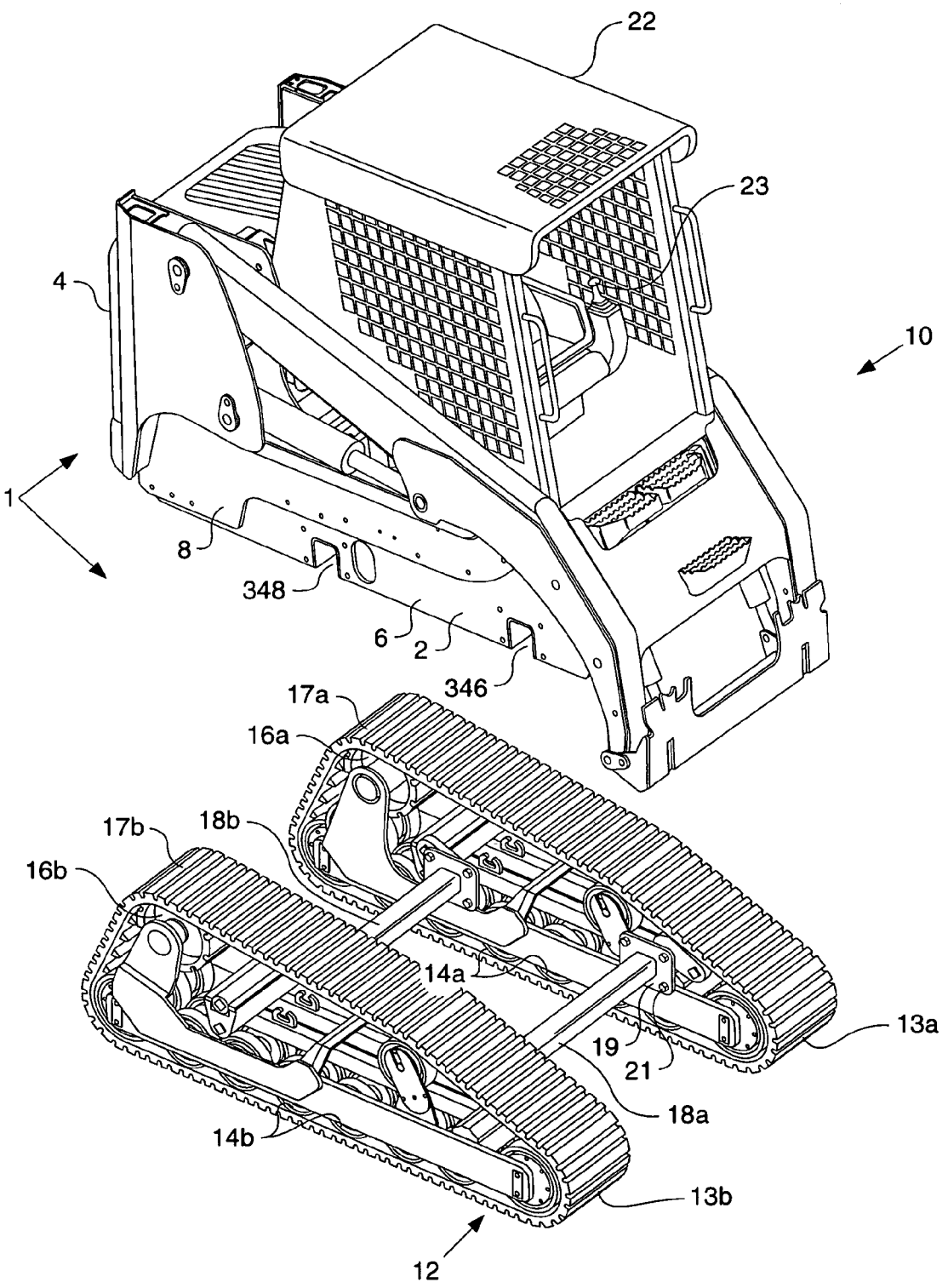


Fig. 1


22
23
4
10
1
8
348
6
2
346
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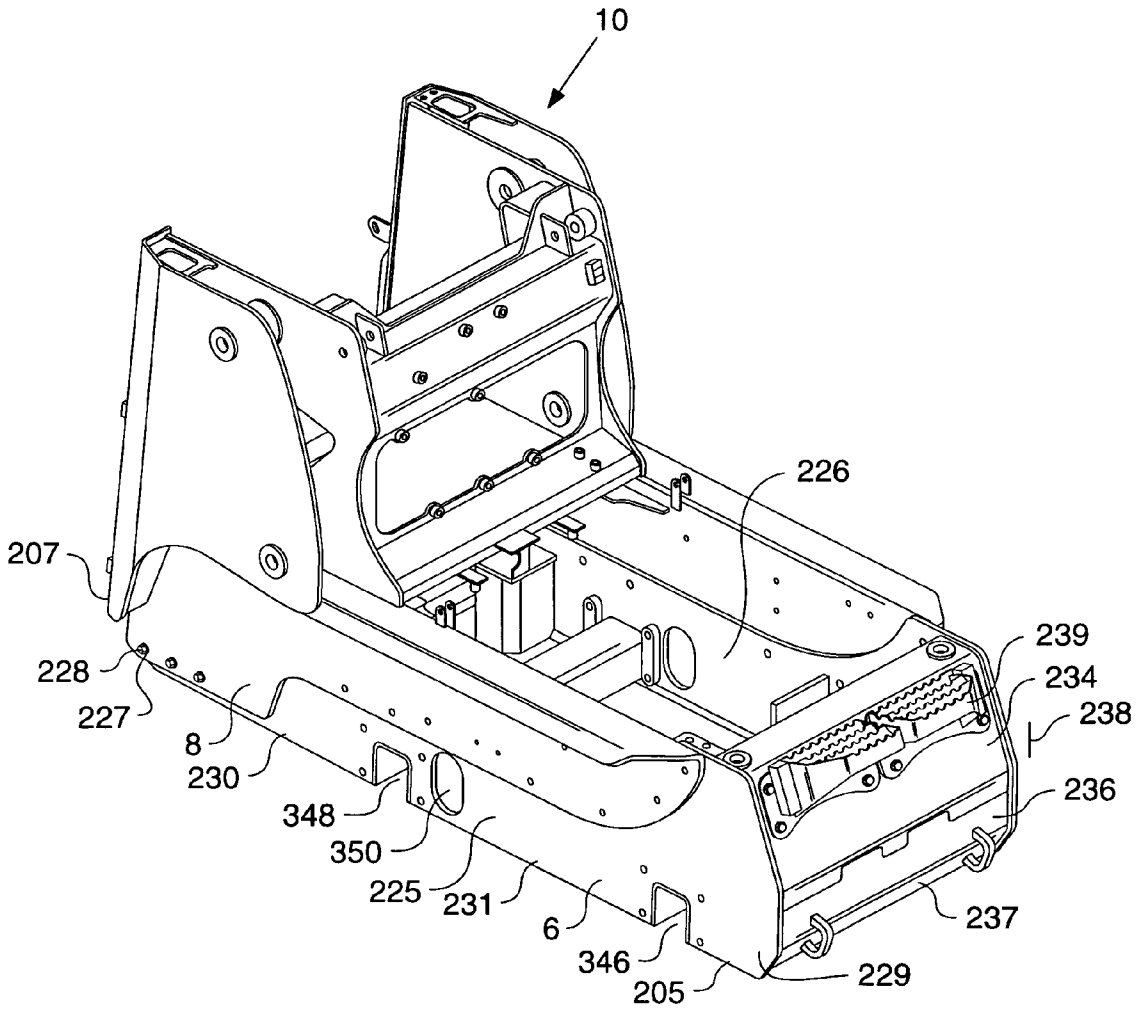
16a
17b
18b
16b
14a
13a
19
21
18a
14b
13b
12

Fig. 2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226
207
239
234
238
228
227
8
230
236
348
350
225
231
6
237
346
205
229

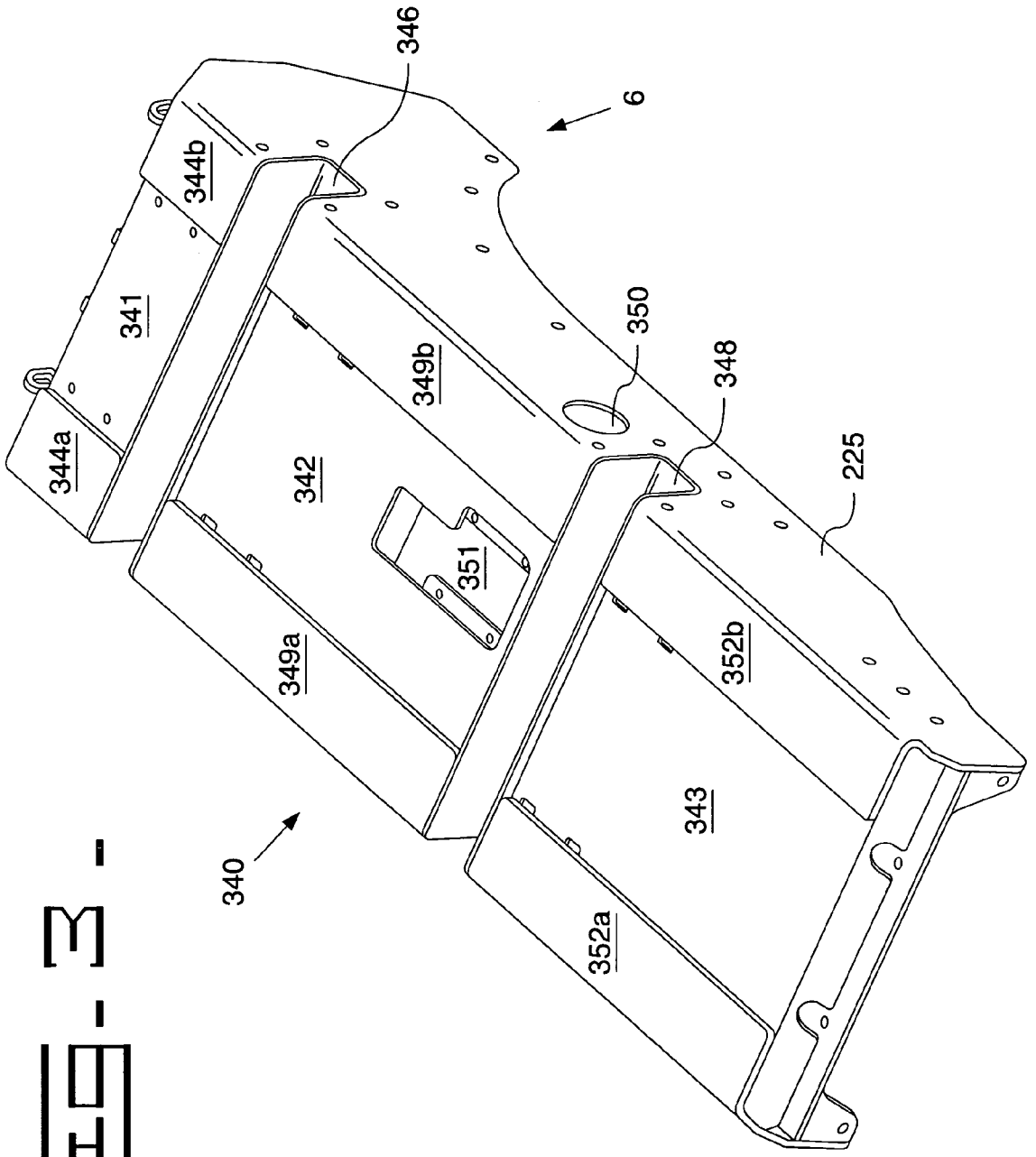

346
6
344b
341
350
348
349b
344a
342
225
351
352b
349a
343
340
352a

FIG. 3

Fig. 4

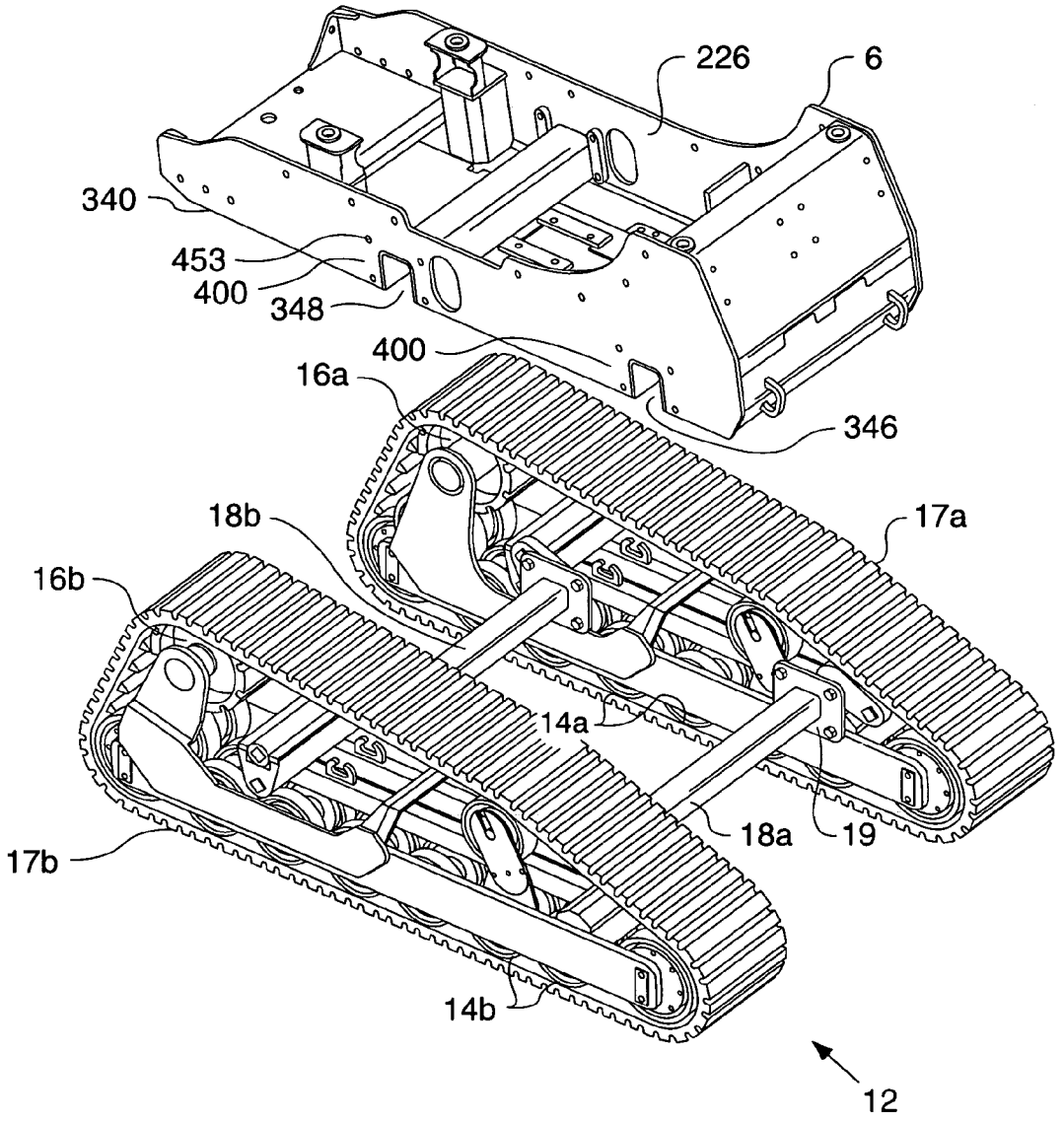

226
6
340
453
400
348
400
16a
346
18b
17a
16b
14a
18a
19
17b
14b
12

Fig. 5

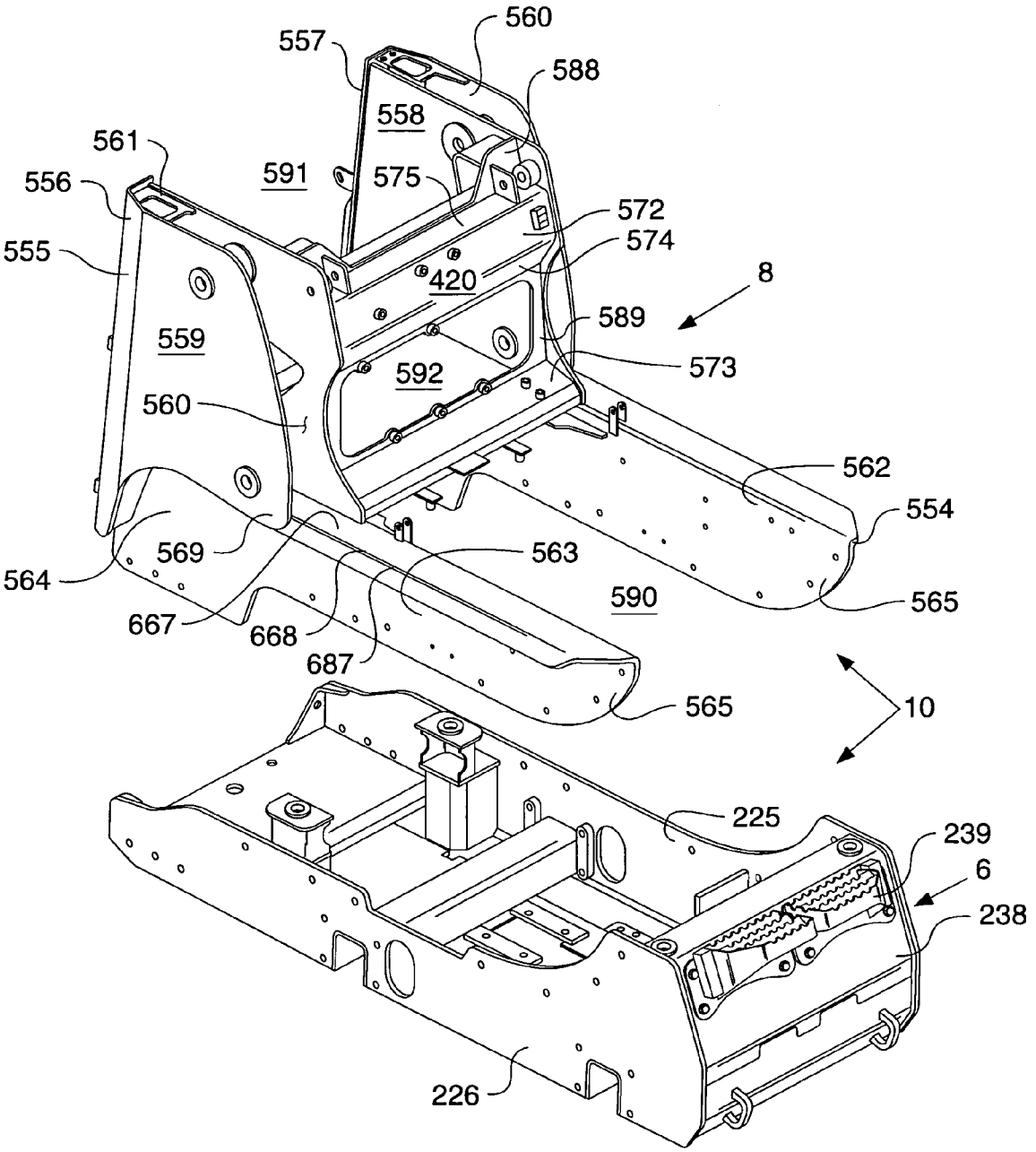

557
560
588
558
561
591
575
556
572
574
555
420
8
589
559
573
592
560
562
554
569
563
564
590
565
667
668
687
565
10
225
239
6
238
226

FIG. 6

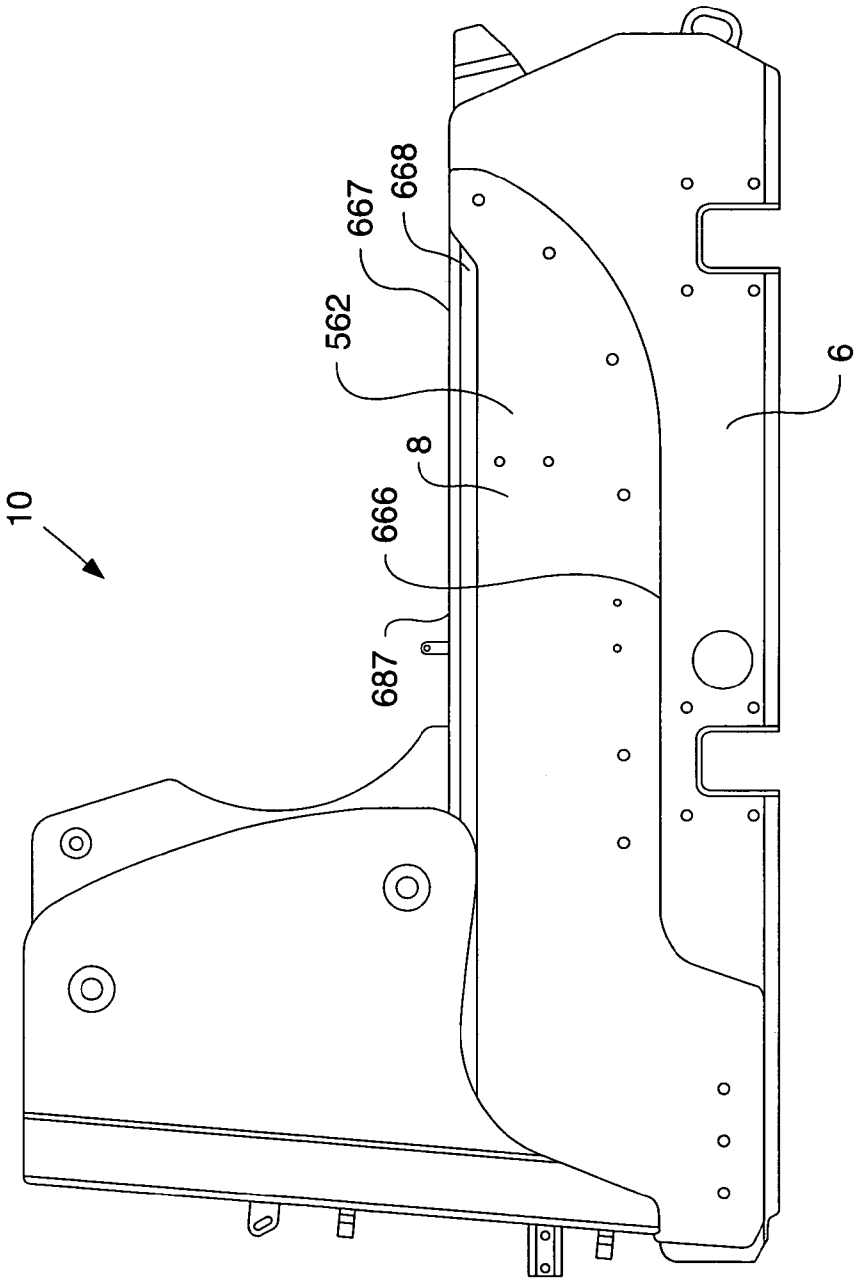
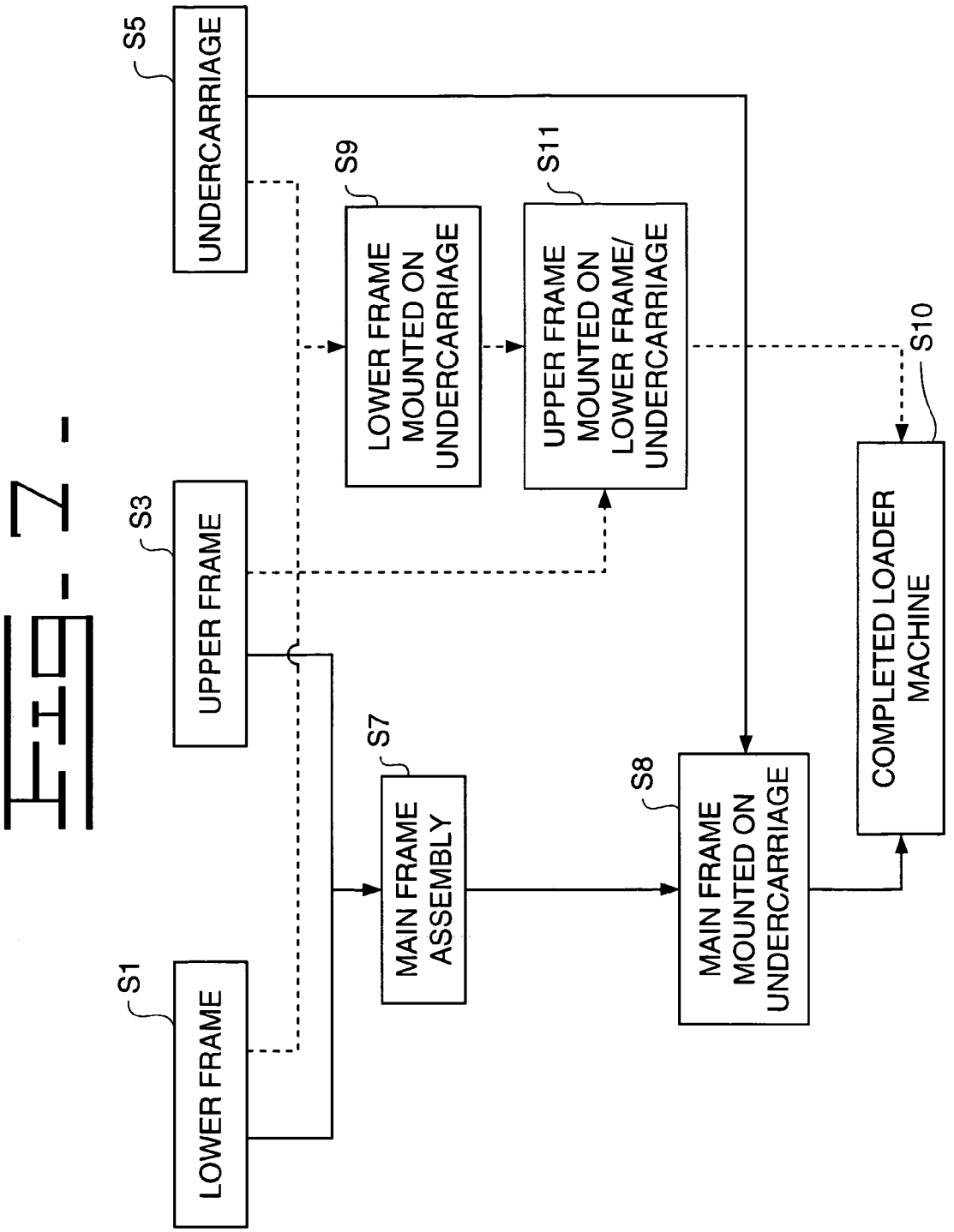


FIG. 7


S5
UNDERCARRIAGE
S9
LOWER FRAME MOUNTED ON UNDERCARRIAGE
S11
UPPER FRAME MOUNTED ON LOWER FRAME/ UNDERCARRIAGE
S10
COMPLETED LOADER MACHINE
S3
UPPER FRAME
S7
MAIN FRAME ASSEMBLY
S8
MAIN FRAME MOUNTED ON UNDERCARRIAGE
S1
LOWER FRAME

MAIN FRAME FOR A TRACKED SKID STEER LOADER MACHINE

TECHNICAL FIELD

This invention relates generally to a main frame assembly for a tracked skid steer loader machine or multi-terrain loader machine and more particularly to such a machine having a main frame assembly, including a lower frame assembly capable of modular assembly with an undercarriage.

BACKGROUND

Skid steer loader machines are manufactured to provide a compact work machine that is maneuverable and durable in various applications. Skid steer loader machines are propelled by independently driven wheels on opposite sides of the vehicle that can be driven at different speeds and in different directions. Some skid steer loader machines use a loader body or lower frame assembly, in conjunction with a subframe or upper frame assembly, to define a main frame assembly for the loader machine. The lower frame assembly typically includes axle openings within which axles are disposed. The main frame may be assembled in a variety of ways to provide effective serviceability and durability.

Tracked skid steer loader machines or multi-terrain loader machines utilize an endless track undercarriage in place of the independently driven wheels to provide greater traction in mud, snow, ice and the like. An all-terrain vehicle is disclosed in U.S. Pat. No. 3,728,909 issued on Apr. 24, 1973 to Herbert A. Jesperson that is designed for high capability of travel over difficult and rough ground contours, conditions and textures. In particular, the Jesperson patent includes a body that has a center section with a bottom wall and front and rear walls extending from the bottom wall. Opposing side walls extending from the bottom wall and from the front and rear walls generally complete the center section. Located transversely on the underside of the bottom wall are a plurality of spaced parallel downwardly open channels which are formed in the continuous bottom wall surface. The channels cooperate with the track suspension group to permit modular assembly while, at the same time, affording maximum vertical clearance under the bottom wall and between the tracks, consistent with maintaining watertight integrity of the body and maximum depth to afford sufficient space in the center section for the power group and the user's legs. In this regard, the track suspension group includes a frame having a plurality of structural cross members which are respectively and individually located in the respective downwardly open channels. The cross members are connected to the body by means in the form of plates which are welded to the cross members and adapted to span the ends of the channels and contact the exterior surface of the side margins around the channel ends. Screws or bolts are used to attach the plates to the side walls of the body. Although the open channels provide vertical clearance and depth, axial loads from the upper portion of the machine are directed on the screws or bolts attaching the cross members with the body. Therefore, such screws or bolts are likely to incur shear or torsional stresses that may damage or destroy the screws or bolts and, thereby, weaken the assembly. Further, the depth utilized to mount the cross members is not sufficient to lower the center of gravity of the machine to a maximum level.

The present invention is directed to overcoming the problems, as set forth above, by providing a structural design that enables a multi-terrain loader machine to be modularly assembled by mounting a solitary lower frame assembly or a fully assembled main frame to a pre-assembled undercarriage in a manner that distributes axial loading on the undercarriage.

SUMMARY OF THE INVENTION

In one aspect of the present invention, a frame assembly for a loader machine is disclosed that has an undercarriage with at least one crossmember. The frame assembly comprises a main frame assembly with a base portion and front and rear sections. At least one recessed channel is defined on the base portion of the main frame assembly. The at least one recessed channel extends across at least a portion of the width of the base portion for seating upon the at least one crossmember.

In another aspect of the present invention, a frame assembly for a loader machine is disclosed with an undercarriage that has at least one crossmember. The frame assembly comprises a main frame assembly with a base portion and front and rear sections. At least one recessed opening is defined on the base portion of the main frame assembly. The at least one opening extends across at least a portion of the width of the base portion. The at least one opening is operably engagable with the at least one crossmember in a manner that distributes a vertical load of the loader machine substantially evenly along the at least one crossmember.

The present invention provides modular assembly of a main frame and an undercarriage. The modular assembly includes the use of at least one recessed opening defined in the main frame assembly that is seated upon at least one crossmember of the undercarriage. Such assembly provides external torsional strength and transverse support to the multi-terrain loader machine because the seating of the recessed opening on the crossmember evenly distributes the vertical load of the machine along the length of the crossmembers. Furthermore, because the recessed opening is seated on the crossmember, the machine's center of gravity is lowered to a maximum level, thereby resulting in additional machine stability.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention and advantageous refinements thereof are explained in more detail below with the aid of diagrammatic, exemplary embodiments in the drawing, in which:

FIG. **1** shows a tracked multi-terrain loader machine in an exploded, perspective view;

FIG. **2** shows an assembled main frame assembly having an upper frame assembly and a lower frame assembly according to the present invention;

FIG. **3** shows the underside of the lower frame assembly;

FIG. **4** shows the modular assembly of the lower frame assembly having recessed channels onto a tracked undercarriage having crossmembers;

FIG. **5** shows the upper frame assembly and the lower frame assembly before they are connected to form the main frame assembly;

FIG. **6** provides a side view of the main frame assembly; and

FIG. **7** is a flow chart illustrating the modular assembly methods enabled using the structural design of the present invention.

DETAILED DESCRIPTION

While the invention described herein is susceptible to various modifications and alternative forms, one or more specific embodiments thereof have been shown solely by way of example in the drawings and are herein described in detail. It should be understood, however, that there is no intent to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

In the following description of the invention, an overview will be provided, followed by a description of the structure of the lower frame assembly. Then, a general description of the upper frame assembly will be disclosed. Further, a general explanation of the various modular assembly methods for mounting the main frame assembly to the undercarriage will be provided.

Overview of a Modularly Assembled Work Machine

Referring to FIG. **1**, a loader machine **1** incorporating the features of the present invention and commonly known as a tracked skid steer loader or multi-terrain loader, is shown. Generally, the loader machine **1** has a front and rear end portion **2**, **4**. The loader machine **1** further includes a lower frame assembly **6** and an upper frame assembly **8**, which are mounted together to define a main frame assembly **10**, as further illustrated in FIG. **2**.

The main frame assembly **10** is operable to be modularly assembled with an undercarriage **12** as shown in FIG. **1**. Although the present invention is not limited to any specific undercarriage, a preferred embodiment of the undercarriage as depicted in FIG. **1** and used herein for exemplary purposes, is a tracked undercarriage **12**. The tracked undercarriage **12** includes a right and a left track assembly **13***a*, **13***b*. As illustrated in FIG. **1**, the track assemblies **13***a*,**13***b* include a set of wheels **14***a*,**14***b*, driven by a drive **16***a*,**16***b*, and surrounded by a track **17***a*,**17***b*. Each drive **16***a*, **16***b* typically comprises one or more hydraulic motors (not shown) that are controlled to operate at multiple speeds and in a forward and reverse direction, thereby providing the capability for controlled skid steering capability. The track assemblies **13***a*, **13***b* are connected via front and rear crossmembers **18***a*, **18***b*. Crossmembers **18***a*, **18***b* are attached to plates **19** that are affixed to the track assemblies **13***a*, **13***b*, respectively, by bolts **21**.

The loader machine **1** is controlled by an operator (not shown) from within an operator's compartment **22**. Through a joystick device **23**, the operator (not shown) controls the loader machine **1** in a specific manner to achieve independent movement of the sets of wheels **14***a*, **14***b* within the right and left track assemblies **13***a*, **13***b*.

The Lower Frame Assembly

Referring to FIG. **2**, a main frame assembly **10** with the upper frame assembly **8** and the lower frame assembly **6** according to the present invention is shown. The lower frame assembly **6** has a front end portion **205** and a rear end portion **207** and includes a pair of spaced, vertically oriented metallic side rails **225**, **226** that advantageously can be manufactured from a medium strength steel. The side rails **225**, **226** extend along the entire length of the lower frame **6** and have a plurality of mounting holes, an exemplary one of which is indicated by reference numeral **227**, configured to receive bolts **228** for attaching the upper frame assembly **8** to the lower frame assembly **6**. Each pair of side rails **225**,**226** has a front and rear end portion **229**, **230**, respectively, that defines the front and rear end portions **229**, **230** of the loader machine. A pair of recessed channels **346**, **348**, operable to receive the crossmembers **18***a*, **18***b*, respectively, of an undercarriage, as will be described below and shown best in FIG. **3**, is located near the respective front and rear end portion **229**, **230** of the side rails **225**, **226**. Additionally, an intermediate portion **231** is disposed between the front and rear portions **229**, **230** of the side rails **225**, **226**.

At the front portion **229** of the side rails of the lower frame assembly **6**, a substantially vertical metal supporting wall **234** and an upper connecting wall **236** are joined to side rails **225**, **226** and, respectively, extend upwardly therefrom and therebetween. The upper connecting wall **236** adjoins a lower connecting wall **237**, preferably at an angle, as illustrated in FIG. **2**, which also joins to side rails **225**, **226**. The upper and lower connecting walls **236**, **237** and supporting wall **234** define a front wall **238** of the loader machine. A pair of step assemblies **239** is attached to the supporting wall **234**.

Referring now to FIG. **3**, the base or belly portion **340** of the lower frame assembly **6** is shown. Specifically, the base portion **340** of the lower frame assembly **6** includes three horizontally oriented protective plates **341**, **342** and **343**. A first horizontally oriented front protective plate **341** abuts the lower connecting wall **237** and extends rearwardly between the side rails **225**, **226**. It should be understood that the front protective plate **341** forms a front portion of the base or belly portion **340** of the loader machine. According to one embodiment of the present invention, the front protective plate **341** extends between and is welded to the side rails **225**, **226**. In a preferred embodiment, the front plate **341** is reinforced by front reinforcement strips, **344***a*, **344***b* which extend horizontally along the undersides of the front plate **341**, as shown in FIG. **3**. Preferably, the front reinforcement strips **344***a*, **344***b* are welded to the front protective plate **341** and to the respective side rails **225**, **226**.

The second horizontally oriented intermediate protective plate **342** is positioned between front and rear recessed channels **346**, **348** and also forms a portion of the bottom base or belly **340** of the lower frame assembly **6**. According to one embodiment, the intermediate protective plate **342** extends between and is welded to the side rails **225**, **226**. Preferably, the intermediate plate **342** is reinforced by intermediate reinforcement strips **349***a*, **349***b*, which extend horizontally along the undersides of the intermediate protective plate **342**, as shown in FIG. **3** and which are preferably welded to the intermediate protective plate **342** and to the respective side rails **225**, **226**.

The intermediate protective plate **342** further contains a drainage opening (not shown), preferably positioned below the motor openings **350** and covered by a drainage panel **351**, as shown in FIG. **3**. The drainage panel **351** is connected to the intermediate protective plate **342** and can be removed for draining hydraulic fluid.

The third horizontally oriented rear protective plate **343** extends rearwardly a predetermined distance from the rear recessed channel **348**. The rear protective plate **343** is positioned between and extends beyond the side rails **225**, **226** to define a rearward compartment. Preferably, the rear plate **343** is reinforced by rear reinforcement strips **352***a*, **352***b*, that extend horizontally along the undersides of the rear plate **343**, as shown in FIG. **3** and which are preferably welded to the rear plate **343**. While the preferred embodi-

ment has been described as using reinforcing strips, there are many alternative designs that can provide the desired strength to the structure, as would be known to one skilled in the art. Moreover, two or all of the front, intermediate and rear protective plates can be formed as a unitary structure from a single plate of metal, with recessed channels, formed by stamping and reinforcing as needed, or other methods in accordance with designs known in the art.

As depicted in FIG. **3**, the front and a rear-recessed channel **346**, **348** extend transversely across the width of the lower frame base portion **340**. It should be noted that the recessed channels **346**, **348** may have any of a plurality of shapes for seating in mating relation upon the respective crossmember **18***a*, **18***b* and may extend in a variety of ways transversely across the lower frame base portion **340**, each of such shapes and ways being within the scope of the present invention. For example, the loader machine **1** can foreseeably be manufactured using a single recessed channel.

Referring now to FIG. **4**, the modular assembly of the recessed channels **346**, **348** of the lower frame assembly **6** onto the associated crossmembers of a tracked undercarriage **12** is shown. The channels **346**, **348** are recessed to receive the respective crossmembers **18***a*, **18***b*, as shown in FIG. **4**. Advantageously, the recessed channels **346**,**348** permit the modular assembly of the main frame assembly **10** with the undercarriage **12** and increase the torsional stiffness of the lower frame assembly **6** resulting from the use of recessed channels **346**, **348**. First, for example, vertical and horizontal metal surfaces that form the recessed channel **348** will provide support that is not found where there is simply a flat plate as in a conventional design.

Second, in the assembled loader machine **1**, the surfaces of recessed channels **346**, **348** rest and are seated against the respective crossmembers **18***a*, **18***b* and thereby increase the torsional support for the lower frame and maintain the machine's ground clearance while lowering its center of gravity. Conventional machine frames experience twisting when adverse terrain is encountered because the axles are mounted at the side corners of the machine, thereby providing torsional support only at machine corner locations, such as conventional tire locations. The present invention, however, structurally benefits from the recessed channels **346**, **348** because the recessed channels **346**, **348** provided added stiffness locally where the crossmembers **18***a*, **18***b* mount. Specifically, the crossmember bolts (or crossmember mounting holes) are located close to the recessed channels **346**, **348** on the side rails which adds to the stiffness and strength of the design.

Additionally, due to the recessed channels **346**,**348** of the present invention being seated on the crossmembers **18***a*, **18***b* and the bolting of the crossmembers **18***a*, **18***b* around the respective channel **346**,**348**, as explained below, the loader machine loads are transmitted across the entire width of the loader machine **1** instead of at the bolting locations. In addition to providing torsional support, the recessed channels **346**,**348** result in a loader machine **1** with a lower center of gravity while maintaining conventional ground clearance distances. The lower center of gravity provided by the recessed channels **346**, **348** further improves overall stability of the loader machine **1**.

Furthermore, because the recessed channels **346**,**348** provide a strengthened belly structure, there is no need to affix a heavy strength steel plate over the protective plates **341**, **342**,**343** of the lower frame assembly **6**. Therefore, the lower frame assembly components may be formed of medium strength steel, due to the increased torsional stiffness of the lower frame assembly **6** provided by the strengthened area of the recessed channels. Manufacturing the lower frame components using medium strength steel can reduce the overall weight of the lower frame assembly **6**, despite the addition of additional material to form the channels. Moreover, using medium strength steel for lower frame components significantly reduces the manufacturing costs for the lower frame assembly **6**, due to the lower cost of the lighter steel.

Referring yet again to FIG. **3**, motor openings **350** are formed in each of the side rails **225**, **226** of the lower frame assembly **6** for partially receiving hydraulic motors (not shown). Preferably, the motor openings **350** are positioned near the rear recessed channel **348**.

The Upper Frame Assembly

Referring now to FIG. **5**, a perspective view of the upper frame assembly **8** and the lower frame assembly **6**, before being connected to form a main frame assembly **10** is shown. In particular, the upper frame assembly **8** has front and rear end portion **554**, **555**. A pair of spaced tower assemblies **556**, **557** are positioned near the rear portion **555** of the upper frame assembly **8**. According to one embodiment, each of the pair of tower assemblies **556**, **557** includes metallic inner and outer plates **558**, **559**. Preferably, the outer plates **559** are formed for welded connection with the inner plates **558** to define a spatial region **560** therebetween. More preferably, the inner plates **558** each have a contoured airflow defined therein. The inner and outer plates **558**, **559** each have a predetermined height and width. Preferably, each of the pair of tower assemblies **556**, **557** are rigidly supported by a plurality of metallic strengthening members welded between the inner and outer plates **558**, **559**, some of which are shown at **561** in FIG. **5**.

A pair of metallic side members **562**, **563** extend along the entire length of the upper frame assembly **8** and have a shorter length than the length of the side rails **225**, **226** of the lower frame assembly **6**. Each one of the pair of side members **562**, **563** are connected to a respective tower assembly **556**, **557** by disposing a rear end portion **564** of the side members **562**, **563** within a portion of the spatial regions **560**. As indicated in FIG. **5**, a front-end portion **565** of the side members **562**, **563** extends longitudinally from each pair of tower assemblies **556**, **557**. Each of the pair of side members **562**, **563** are formed to define a side wall **666**, as shown more clearly in FIG. **6**, with a plurality of mounting holes (not shown) positioned along the length of the upper frame assembly **8**.

Referring now to FIG. **6**, a side view of the main frame assembly **10** is shown. Specifically, an upper wall **667** of the side members **562** is substantially perpendicular to the side wall **666** and preferably includes a bent flange **668** which extends substantially along the length of the upper frame assembly **8**. The bent flange **668** has a mounting surface **687** substantially parallel with the side wall **666** and spaced therefrom.

Turning again to FIG. **5**, each of the inner plates **558** of the pair of tower assemblies **556**, **557** is welded to the upper wall **667** of the respective side member **562**, **563** along a portion of the length thereof. Each of the outer plates **559** of the pair of tower assemblies **556**, **557** has a middle portion **569** which is connected to the bent flange **668** at the mounting surface **687** of the respective side member **562**, **563** along a portion of the length thereof.

A crossmember assembly **572** is connected between the pair of tower assemblies **556**, **557** and side members **562**,

563. The crossmember assembly 572 is positioned between the front and rear end portions 565, 564 of the side members 562, 563. The crossmember assembly 572 includes lower and upper crossmembers 573, 574, which are formed using metallic plates. The upper crossmember 574 also has an upper substantially planar surface 575.

A frame structure 588 is partially defined by the inner plates 558 of the tower assemblies 556, 557 and includes a cross plate 589, which extends between the inner plates 558. The upper and lower crossmembers 574, 573 are welded to the frame structure 588, along the cross plate 589, for connection between the inner plates 558.

The crossmember assembly 572 and the front end portions 565 of the side members 562, 563 define an open access area 590 between the independent side members 562, 563, which is unobstructed by structural elements of the upper frame assembly 8. The crossmember assembly 572, the rear end portions 564 of the side members 562, 563, and the pair of tower assemblies 556, 557 define an open service area 591, which is separated from the open access area 590 by the crossmember assembly 572. Further, the cross plate 589 defines an open region 592 between the upper and lower crossmembers 574, 573 which provides access and air communication between the open access area 590 and open service area 591.

A cab mounting structure of any suitable type is connected on each of the inner plates 558 of the tower assemblies 556, 557 within the frame structure 588 at a juncture between the upper surface 575 of the upper crossmember 574 and the cross plate 589.

A method for assembling the loader machine 1 of the present invention includes manufacturing the lower frame assembly 6 and upper frame assembly 8 as described above and shown in FIG. 1. Additionally, the lower frame assembly 6 and upper frame assembly 8 may further receive various sub-components prior to their being mounted together.

Modular Assembly of the Main Frame with the Undercarriage

Using the structure described above, specifically the recessed channels 346,348 and associated crossmembers 18*a*,18*b*, the multi-terrain loader, and other machines, may be assembled to an undercarriage 12 using a variety of modular assembly methods. A preferred modular assembly method of the present invention, using the structures graphically illustrated in FIG. 4, is illustrated using the dashed line in FIG. 7. A second preferred modular assembly method of the present invention, using the structure graphically illustrated in FIG. 1, is illustrated by a solid line in FIG. 7.

A preferred modular manufacturing method, using the structure illustrated in FIG. 4, involves the mounting of a lower frame assembly 6, having recessed channels 346, 348, onto the respective crossmembers 18*a*, 18*b* of an undercarriage 12. In this particular embodiment, the modular assembly of a loader machine is manufactured from the bottom of the machine to the top of the machine. It is important to emphasize that the intermediate components utilized to build the loader machine, such as the lower frame assembly 6, upper frame assembly 8 and undercarriage 12, may all be pre-manufactured and inventoried, thereby requiring minimal process steps to build a complete skid steer loader.

As shown by the flowchart of FIG. 7, the lower frame assembly, having a structure similar to that disclosed above, may initially be assembled or taken from inventory storage in step S1. Similarly, the undercarriage assembly, having a structure similar to that described above, may be modularly assembled or taken from inventory storage in step S5. The lower frame assembly may either be directly mounted to the undercarriage as in step S9 or the upper frame assembly may first be mounted onto the lower frame assembly to create a main frame assembly as in step S7.

The dashed line in FIG. 7 represents a modular assembly method wherein the lower frame assembly 6 is initially assembled or taken from industry storage in step S1 and the undercarriage 12 is initially assembled or taken from inventory storage as in step S5, and the lower frame assembly is directly mounted onto the undercarriage in step S9. Specifically, the recessed channels of the lower frame assembly 6 accept the corresponding crossmembers 18*a*, 18*b* of the undercarriage 12, thereby mounting the undercarriage 12 with the lower frame assembly 6 to create a base for building the loader machine 1. In this regard, an upper frame assembly, having the structure described above, is either assembled directly onto the lower frame assembly/undercarriage or removed from inventory in step S3 and bolted onto the side rails of the lower frame assembly to create a main frame assembly on an undercarriage at step S11. The main frame assembly is supplied with the sub-components, such as a cooling system and hydraulic pump assembly, as necessary to create a completed loader machine at step S10.

A second embodiment of a modular manufacturing method, using the structure illustrated in FIG. 1, involves the mounting of a fully assembled main frame assembly to a tracked undercarriage. Moreover, the solid line depicted in FIG. 7 represents the corresponding manufacturing method using the structural design of the present invention. Specifically, the lower frame assembly and upper frame assembly are initially assembled or taken from inventory in step S1 and S3 respectively. The upper frame assembly is then-bolted onto the lower frame assembly to create a main frame assembly in step S7. The main frame assembly is then mounted onto the undercarriage in step S8 wherein the recessed channels 346,348 of the newly created main frame assembly 10 are mounted over the corresponding crossmembers 18*a*,18*b* of the undercarriage 12. As necessary, sub-components are added to the lower frame assembly, upper frame assembly and main frame assembly, thereby resulting in a completed loader machine 1 in step S10.

INDUSTRIAL APPLICABILITY

The main frame assembly 10, as described above, is operably configured to be modularly assembled using pre-assembled, intermediate components such as the lower frame assembly 6, upper frame assembly 8 and undercarriage 12. Although the features of the invention are demonstrated in the manufacture and assembly of a multi-terrain loader machine, it should be recognized that the recessed channels 346, 348 may be utilized with a plurality of main frame assemblies 10 and undercarriages 12 having associated crossmembers 18*a*, 18*b*. The ability to manufacture various work machines, from a common lower frame assembly 6, helps decrease manufacturing and assembly costs and increase production flexibility.

Further, the structure of the present invention allows intermediate components of the loader machine 1, such as the lower frame assembly 6, the upper frame assembly 8 and the undercarriage 12, to be pre-manufactured and stored in inventory. The production of multiple loader machines, having a variety of main frame assemblies and undercarriages may be efficiently built by simply supplying the necessary components from inventory to the production line. Advantageously, the main frame assembly 10 and undercar-

riage **12** may be built at two different sites, for the sake of efficiency, and even modularly assembled at a third site. For example, modular assembly may enable a manufacturer to first mount only a lower frame assembly **6** onto the crossmembers **18***a*, **18***b* of the fully assembled undercarriage **12** and then, at the same or a different location, attach the upper frame assembly **8** to the lower frame assembly **6**, thereby providing a completed loader machine **1**.

Each recessed opening **346**, **348** is engagingly associated with a respective crossmember **18***a*, **18***b* of the pre-assembled undercarriage **12**, thereby allowing for the modular assembly of the loader machine **1** when the recessed openings **346**, **348** of the lower frame assembly **6** are mounted over the crossmembers **18***a*, **18***b* of the pre-assembled undercarriage **12**. Therefore, the recessed channels **346**, **348** and structure of the present invention allow for maximum component interchangeability, thus resulting in a more efficient manufacturing process. The detachable feature inherent in the structure of the present invention allows the loader machine **1** to be easily detached in order to ease care and maintenance of the machine parts.

Additionally, because the recessed channels **346**, **348** extend across the width of the base **340** of the lower frame **6**, the weight and axial loads of the loader machine **1** are evenly distributed along the crossmembers **18***a*, **18***b*. This structural advantage also increases the ground clearance of the loader machine **1** and lowers the machine's center of gravity, thus, resulting in increased torsional support, external torsion strength and overall machine stability.

Other aspects, objects and advantages of this invention can be obtained from a study of the drawings, disclosure and the appended claims.

What is claimed is:

1. A frame assembly for a loader machine, said loader machine having an undercarriage including a first and a second crossmember, wherein said undercarriage is a tracked undercarriage having a first and a second ground engaging member, said frame assembly comprising:

a main frame assembly having a base portion;

a first recessed channel defined on said base portion and extending across the width of said base portion, wherein said first recessed channel is positioned to seat directly on said first crossmember of said undercarriage; and

a second recessed channel defined on said base portion and extending across the width of said base portion, wherein said second recessed channel is positioned to seat directly on said second crossmember of said undercarriage.

2. The frame assembly of claim **1** wherein said first and second recessed channels are positioned between a front and a rear section of said main frame assembly.

3. The frame assembly of claim **1**, wherein said main frame assembly includes:

an upper frame assembly having a pair of space tower assemblies, a pair of side members having front and rear portions with each of said side members being connected to a respective one of the pair of tower assemblies and extending longitudinally therefrom, and a crossmember assembly extending between the pair of tower assemblies for connection therewith; and

a lower frame assembly having a pair of spaced vertically oriented side rails and a front wall extending continuously between said side rails for connection therewith, said upper frame assembly is mounted to said lower frame assembly at a connection between said side members of said upper frame assembly and said respective side rails of said lower frame assembly.

4. The frame assembly of claim **3**, wherein said lower frame assembly is formed of medium strength steel.

5. The frame assembly of claim **3**, wherein said lower frame assembly further includes said base portion and said first and second recessed channels.

6. The frame assembly of claim **3**, wherein said crossmember assembly is disposed between said front and rear end portions of said upper frame assembly.

7. The frame assembly of claim **3**, wherein said side members of said upper frame assembly extend along said side rails of said lower frame assembly a predetermined distance and terminate rearward of said front wall.

8. The frame assembly of claim **1**, wherein said first and second recessed channels define a strengthened region of said main frame assembly and are operable to provide torsional stiffness to said loader machine.

9. A method of making a loader machine comprising the steps of:

providing an undercarriage having a first and a second crossmember;

providing a frame assembly having a base portion, front and rear sections, and a first and a second recessed channel defined on said base portion and extending across the width of said base portion; and

mounting said frame assembly to said undercarriage, wherein said first recessed channel is seated on said first crossmember and said second recessed channel is seated on said second crossmember.

10. The method of making a loader machine of claim **9**, wherein said undercarriage is a tracked undercarriage having a first and a second ground engaging member connected by at least one of said first and second crossmembers.

11. The method of making a loader machine of claim **10**, wherein said first and second ground engaging members are track assemblies.

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