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(54) SPROCKET DAMPING ASSEMBLY FOR A TRACK-TYPE MACHINE

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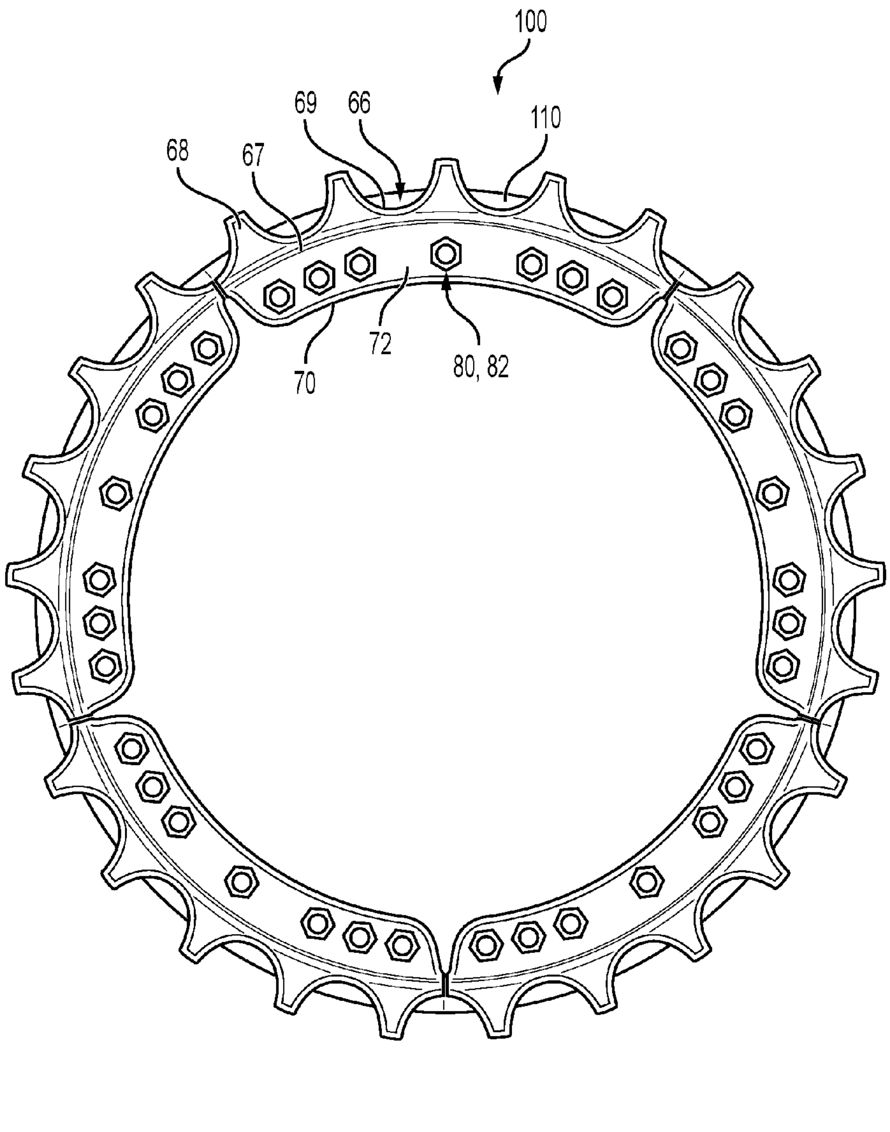
CPC ***B62D 55/0963*** (2013.01); ***B62D 55/125*** (2013.01); ***B62D 55/32*** (2013.01)

(57) **ABSTRACT**

A sprocket damping assembly may include at least one arc-shaped damping pad with a plurality of through holes, at least one arc-shaped backing plate with a plurality of through holes, and a plurality of tubular spacers, each including a central through hole. The sprocket damping assembly includes an assembled configuration, where a portion of the tubular spacers is located on one side of the at least one arc-shaped damping pad and the at least one arc-shaped backing plate is located on an opposite side of the at least one arc-shaped damping pad. An axial length of the tubular spacers may align the at least one arc-shaped damping pad with an edge of the drive sprocket, adjacent to teeth of the drive sprocket. The at least one arc-shaped damping pad may be formed of an elastomeric material.



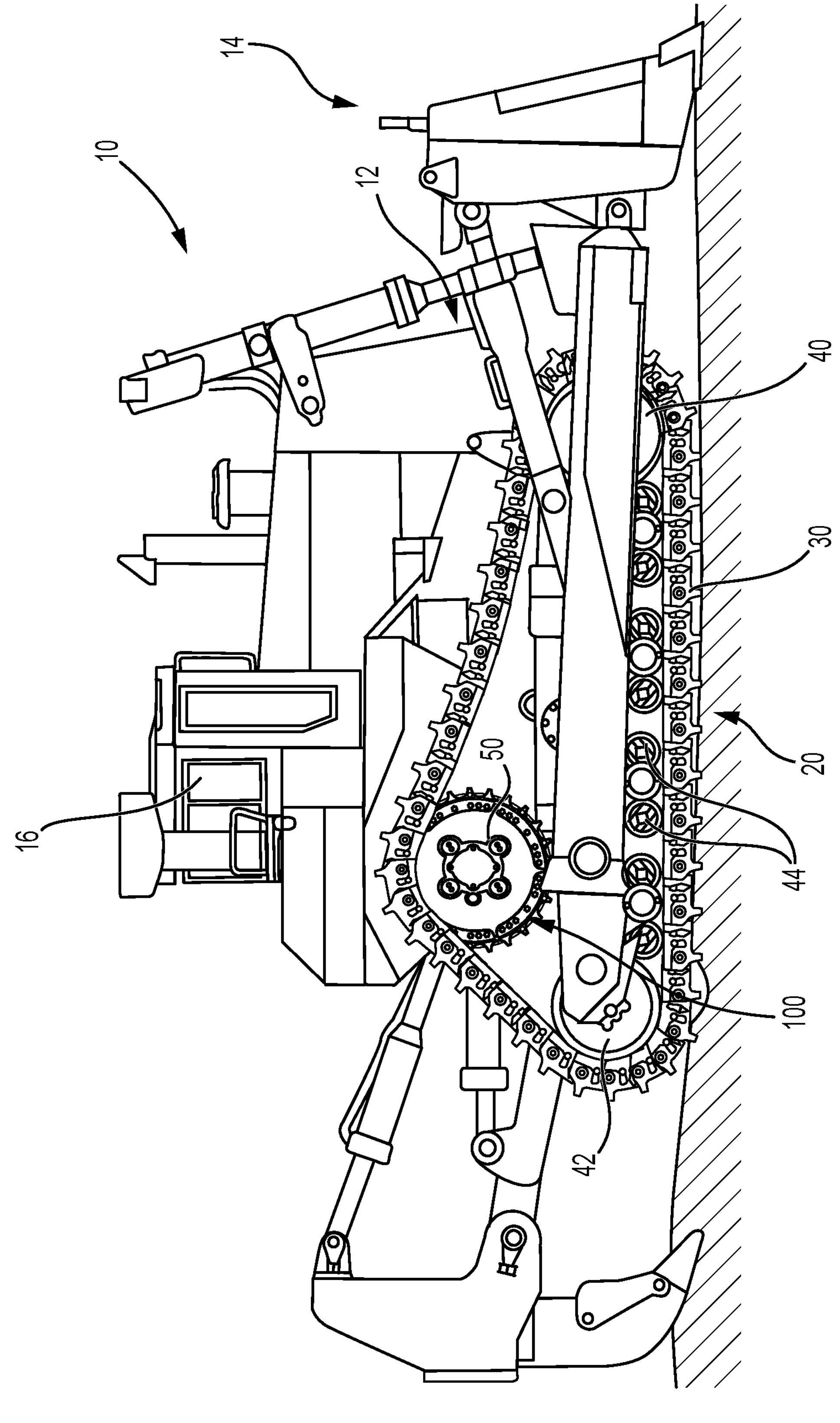


FIG. 1

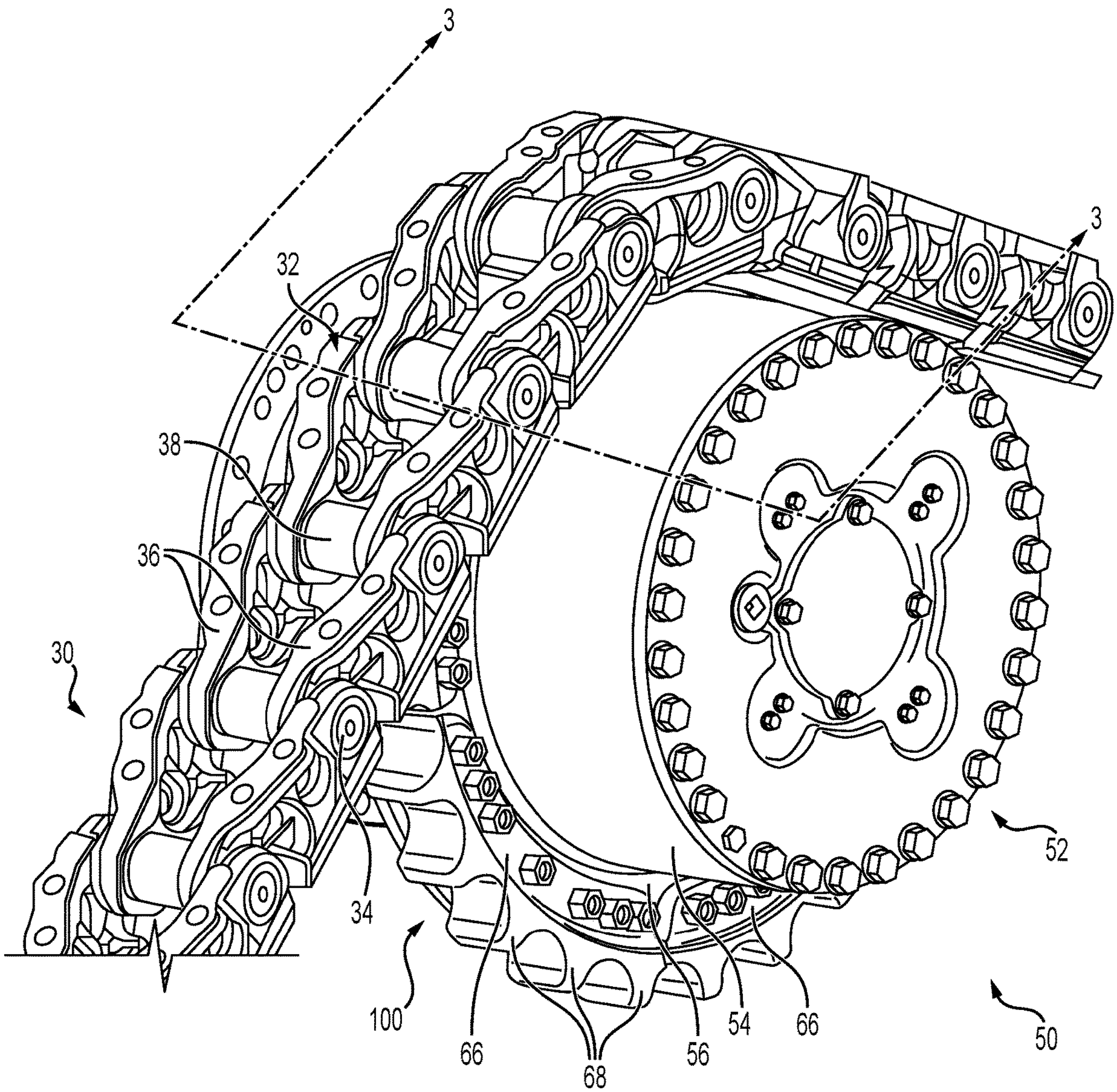


FIG. 2

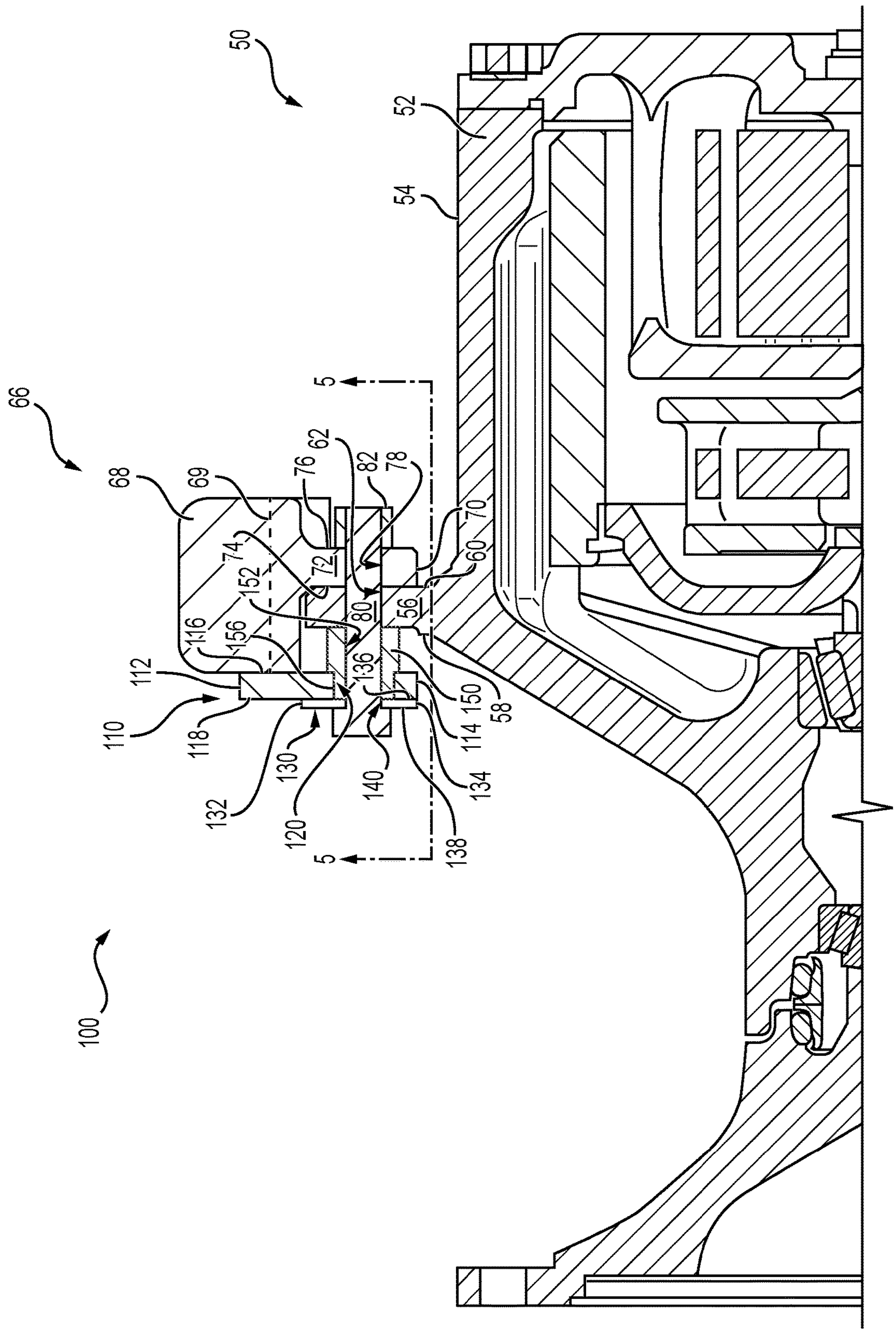

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FIG. 3

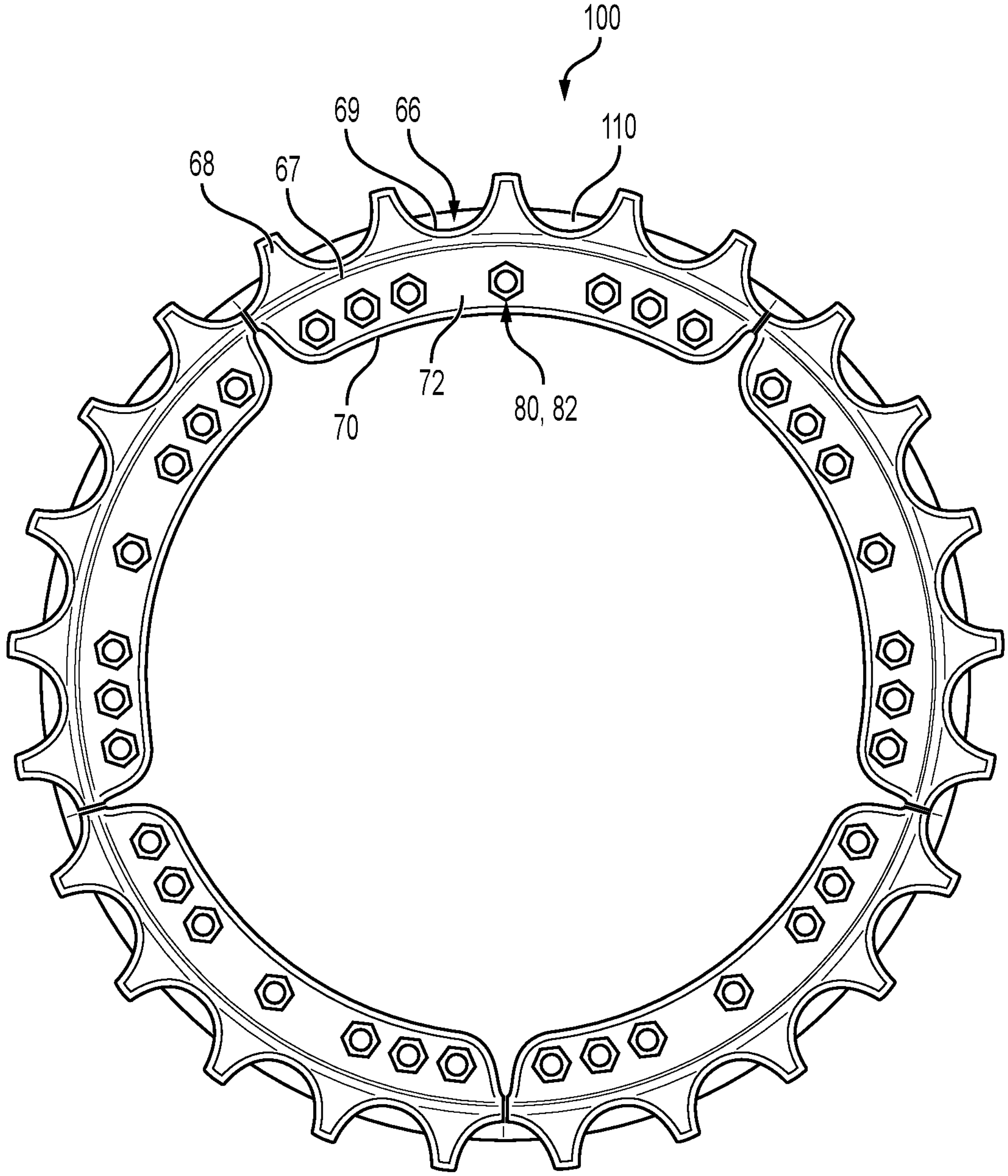

FIG. 4

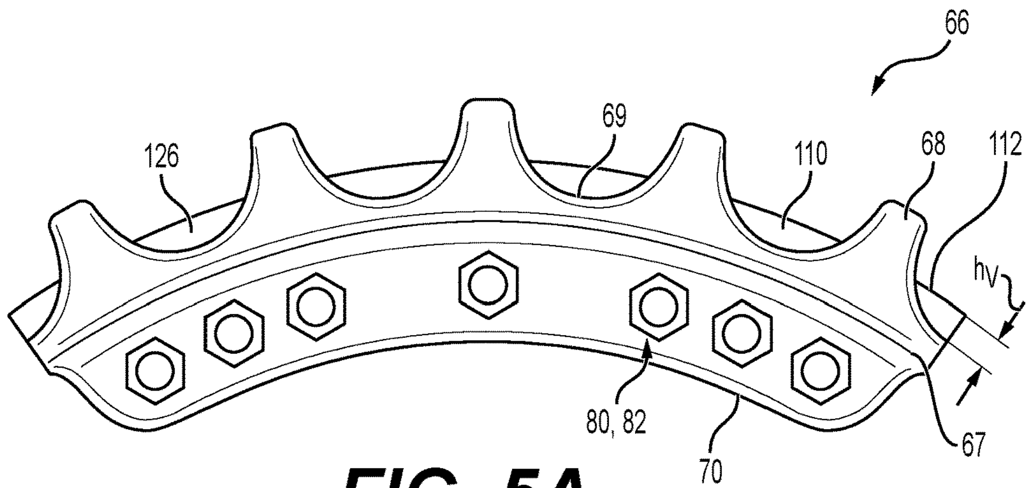

FIG. 5A

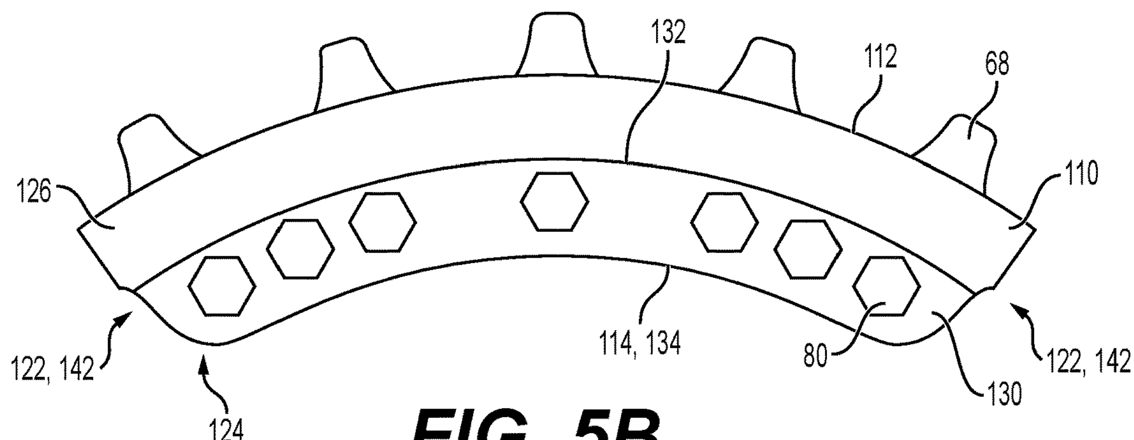

FIG. 5B

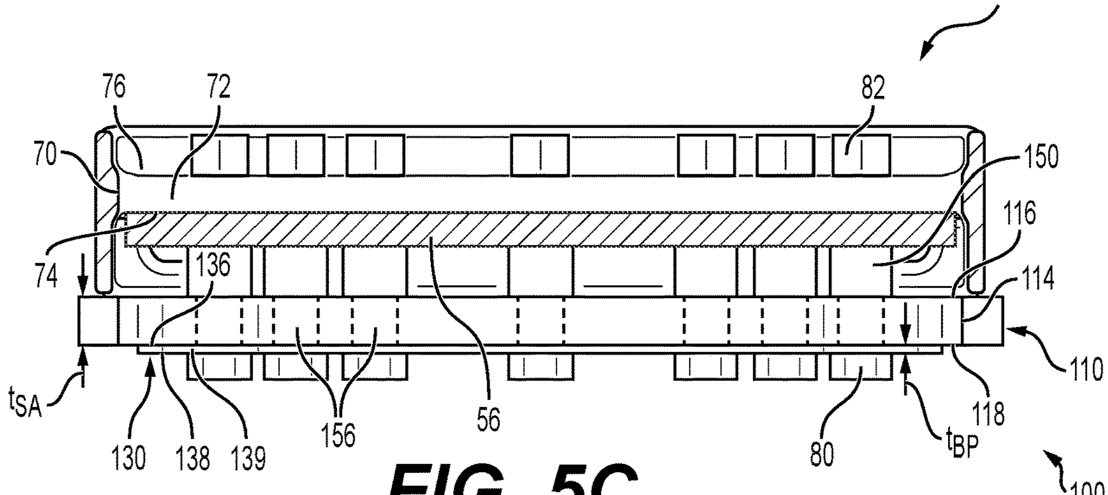

FIG. 5C

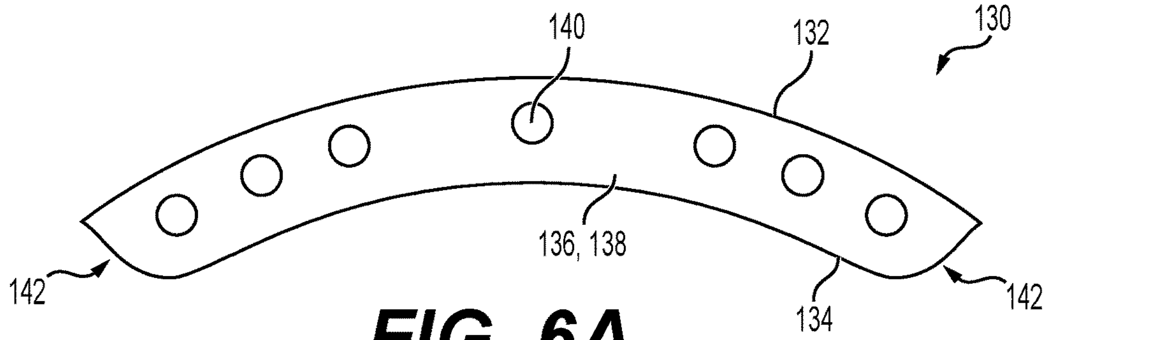

FIG. 6A

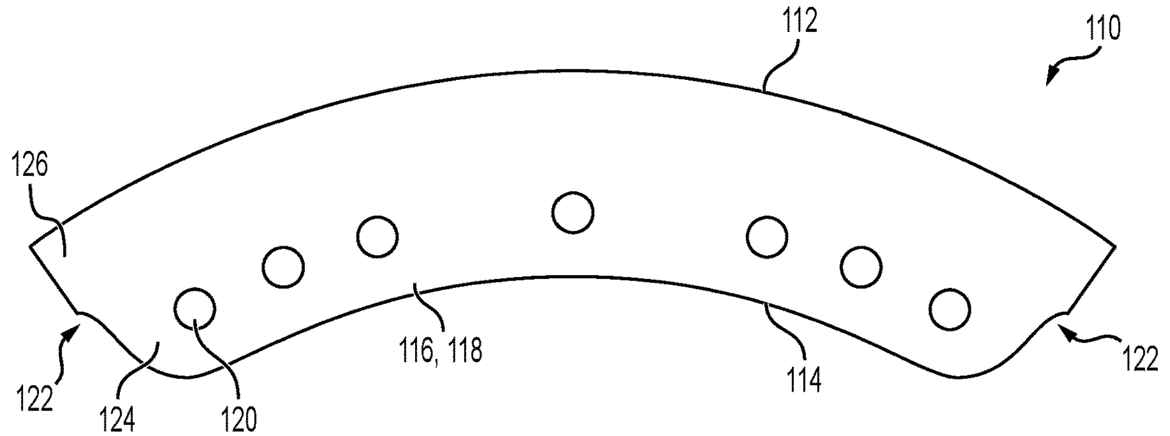

FIG. 6B

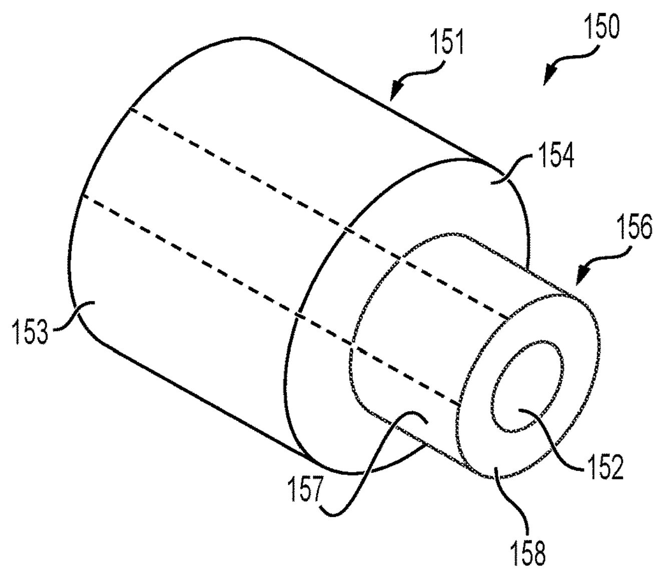

FIG. 6C

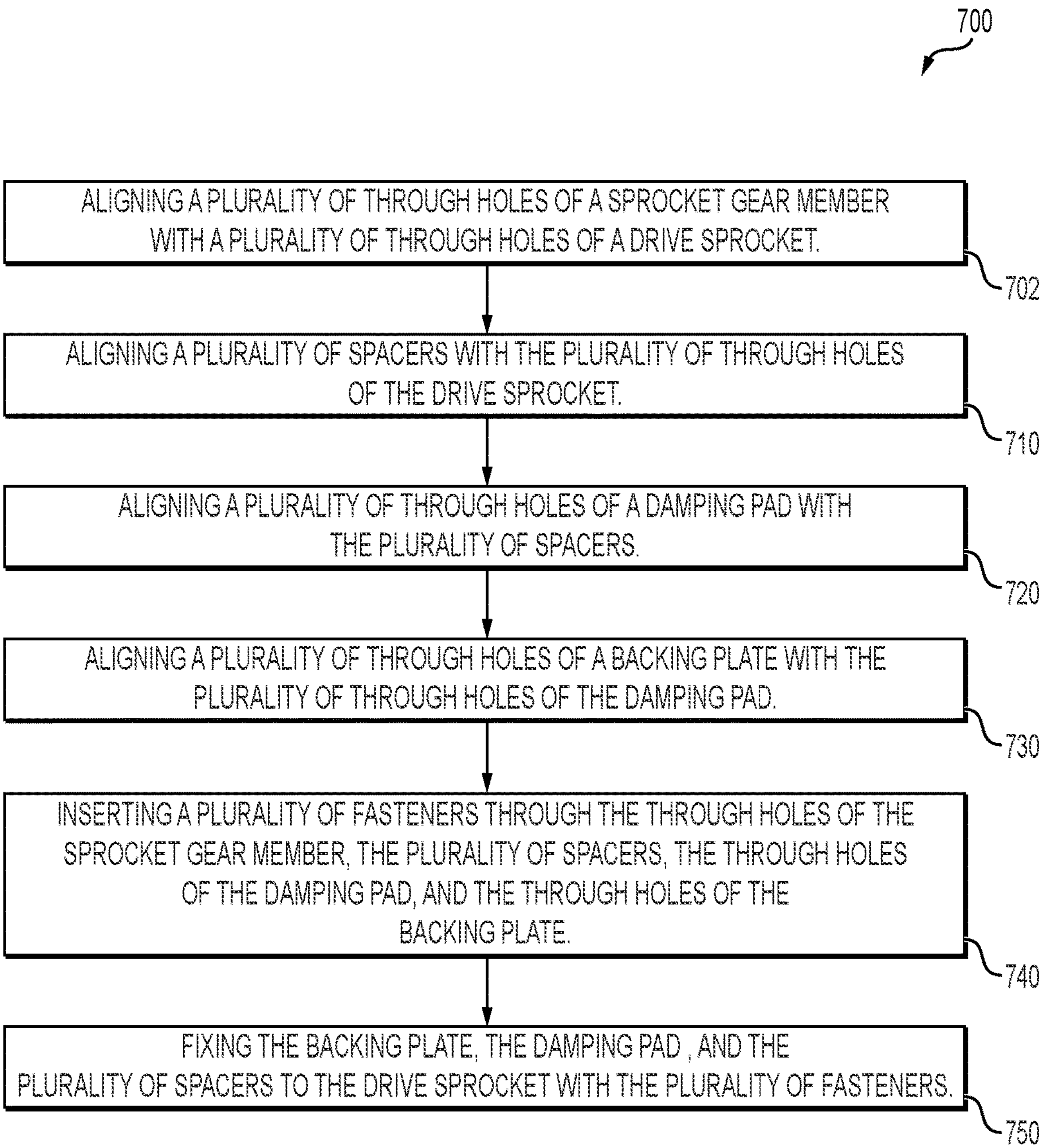
700
ALIGNING A PLURALITY OF THROUGH HOLES OF A SPROCKET GEAR MEMBER WITH A PLURALITY OF THROUGH HOLES OF A DRIVE SPROCKET.
702
ALIGNING A PLURALITY OF SPACERS WITH THE PLURALITY OF THROUGH HOLES OF THE DRIVE SPROCKET.
710
ALIGNING A PLURALITY OF THROUGH HOLES OF A DAMPING PAD WITH THE PLURALITY OF SPACERS.
720
ALIGNING A PLURALITY OF THROUGH HOLES OF A BACKING PLATE WITH THE PLURALITY OF THROUGH HOLES OF THE DAMPING PAD.
730
INSERTING A PLURALITY OF FASTENERS THROUGH THE THROUGH HOLES OF THE SPROCKET GEAR MEMBER, THE PLURALITY OF SPACERS, THE THROUGH HOLES OF THE DAMPING PAD, AND THE THROUGH HOLES OF THE BACKING PLATE.
740
FIXING THE BACKING PLATE, THE DAMPING PAD , AND THE PLURALITY OF SPACERS TO THE DRIVE SPROCKET WITH THE PLURALITY OF FASTENERS.
750

FIG. 7

SPROCKET DAMPING ASSEMBLY FOR A TRACK-TYPE MACHINE

TECHNICAL FIELD

[0001] The present disclosure relates generally to a track drive assembly and continuous ground-engaging track for a mobile industrial vehicle and, more particularly, to a sprocket damping assembly mounted to the side of a drive sprocket for the ground-engaging track.

BACKGROUND

[0002] Mobile industrial machines, such as track-type tractors, are used in a variety of applications and offer the advantage of a rugged build and good performance in challenging ground conditions on a work site. An undercarriage of a common track-type industrial machine may include an endless track made of a number of connected links, a drive sprocket driven by a power source of the industrial machine (e.g., an internal combustion engine or electric motor) that meshes with the links to drive the track, and a number of idler wheels and rollers that distribute the weight of the work machine along the track.

[0003] Track-type industrial machines may generate loud noises during operation, which may be objectionable when operating in highly populated areas. Environmental regulations, both in the United States and in other countries, are increasingly being directed to suppress noises generated by the operation of construction equipment. One potential source of operating noise that can also be a source of wear on the industrial machine is the metal-to-metal impact occurring between the teeth of the drive sprocket and the bushings of the track links during the meshing between the teeth and the links.

[0004] A sprocket damping assembly for a sprocket wheel is described in U.S. Pat. No. 11,535,319 B2, issued Dec. 27, 2022 ("the '319 Patent"). The sprocket damping system described in the '319 Patent includes a damping ring that is disposed on the sprocket wheel, the damping ring including an integrally formed retention groove for retaining a retention device. While the sprocket damping assembly described in the '319 Patent may be helpful in some circumstances, the sprocket damping assembly may be incompatible with certain sprocket designs, and the sprocket damping assembly may be improved.

[0005] Aspects of the present disclosure may solve one or more of the problems set forth above and/or other problems in the art. The scope of the current disclosure, however, is defined by the attached claims, and not by the ability to solve any specific problem.

SUMMARY

[0006] In one aspect, a damping assembly for a drive sprocket of a mobile industrial machine including at least one arc-shaped damping pad that includes a radially outer surface; a radially inner surface; a planar inner surface extending between the radially outer surface and the radially inner surface; a planar outer surface extending between the radially outer surface and the radially inner surface. The at least one arc-shaped damping pad further includes a plurality of through holes extending through the at least one arc-shaped damping pad from the planar inner surface to the planar outer surface, so that the through holes are normal to the planar inner surface and the planar outer surface of the at least one arc-shaped damping pad. Furthermore, the at least one arc-shaped damping pad is formed of an elastomeric material.

[0007] In another aspect, a damping assembly for a drive sprocket of a mobile industrial machine includes at least one arc-shaped damping pad, made of an elastomeric material, that includes a radially outer surface and a radially inner surface; a planar inner surface and a planar outer surface. Both the planar inner surface and the planar outer surface of the at least one arc-shaped damping pad extend between the radially outer surface and the radially inner surface. The at least one arc-shaped damping pad also includes a plurality of through holes extending through the at least one arc-shaped pad from the planar inner surface to the planar outer surface, and normal to the planar inner surface and the planar outer surface. The damping assembly includes at least one arc-shaped backing plate with a plurality of through holes that are configured to align with the plurality of through holes of the at least one arc-shaped damping pad. Lastly, the damping assembly includes a plurality of tubular spacers. When in an assembled configuration of the damping assembly, a portion of the spacers is located on one side of the at least one arc-shaped damping pad and the at least one arc-shaped backing plate is located on an opposite side of the at least one arc-shaped damping pad.

[0008] In a further aspect, a method of assembling a damping assembly for a drive sprocket of a mobile industrial machine, the damping assembly including an arc-shaped damping pad, an arc-shaped backing plate, and a plurality of spacers. The method includes coupling the arc-shaped damping pad, arc-shaped backing plate, and the plurality of spacers on a first side of drive sprocket so that the arc-shaped damping pad is located between a sprocket gear member of the drive sprocket and arc-shaped backing plate. The arc-shaped pad axially aligns with an edge of the drive sprocket, adjacent to a plurality of teeth of the drive sprocket. The coupling step includes securing fasteners through the arc-shaped damping pad, arc-shaped backing plate, the plurality of spacers, and a plurality of holes in a flange of the drive sprocket.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate various exemplary embodiments and together with the description, serve to explain the principles of the disclosed embodiments.

[0010] FIG. **1** is a side view of a track-type mobile industrial machine including a side-mounted sprocket damping assembly, according to aspects of the disclosure.

[0011] FIG. **2** is an enlarged, isometric view of the sprocket damping assembly on the drive sprocket of FIG. **1**.

[0012] FIG. **3** is a cross-sectional view taken through line **3-3** of FIG. **2** of a portion of the drive sprocket and the sprocket damping assembly.

[0013] FIG. **4** is an outer view of an assembled ring of sprocket gear members and the sprocket damping assembly of FIG. **1**.

[0014] FIG. **5**A is an outer view of an individual sprocket gear member and the sprocket damping assembly of FIG. **4**.

[0015] FIG. **5**B is an inner view of the individual sprocket gear member and the sprocket damping assembly of FIG. **4**.

[0016] FIG. **5**C is a radially outward view of the individual sprocket gear member and the sprocket damping assembly of FIG. **3**.

[0017] FIG. **6**A is a view of a backing plate of the sprocket damping assembly of FIGS. **5**B-**5**C.

[0018] FIG. **6**B is a view of a damping pad of the sprocket damping assembly of FIGS. **5**A-**5**C.

[0019] FIG. **6**C is an isometric view of an assembly spacer of the sprocket damping assembly of FIG. **5**C.

[0020] FIG. **7** is a flowchart illustrating a method for assembling the damping assembly onto a track-type mobile industrial machine, according to aspects of the present disclosure.

DETAILED DESCRIPTION

[0021] Both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the features, as claimed. As used herein, the terms "comprises," "comprising," "has," "having," "includes," "including," or other variations thereof, are intended to cover a non-exclusive inclusion such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements, but may include other elements not expressly listed or inherent to such a process, method, article, or apparatus. In this disclosure, unless stated otherwise, relative terms, such as, for example, "about," "substantially," and "approximately" are used to indicate a possible variation of ±10% in the stated value.

[0022] FIGS. **1** and **2** depicts a mobile industrial machine **10** comprising a track drive assembly **20** with a power source (not shown) and a sprocket damping assembly **100**. The track drive assembly **20** includes a pair of continuous ground-engaging tracks **30** (one of which is visible in FIG. **1**), a plurality of idler wheels and rollers **40**-**44**, and at least one drive sprocket **50**. The sprocket damping assembly **100**, as shown in FIG. **2**, is attached to a side surface of the drive sprocket **50** facing the machine **10**, according to aspects of the present disclosure. While the mobile industrial machine **10** of FIG. **1** is shown in the context of a heavy-duty track-type tractor, the sprocket damping assembly **100** of the present disclosure is not thereby limited, and other types of track-type work machines, such as excavators, track loaders, and other similar machines, may include the sprocket damping assembly **100**. As shown in FIG. **1**, track-type tractor **10** may include a tractor frame **12** mounted to the track drive assembly **20**, one or more implement systems **14** attached to a portion of the tractor frame **12**, and an operator cabin **16**.

[0023] The ground-engaging tracks **30** extend around the drive sprocket **50** and the idler wheels and rollers **40**-**44** of the track drive assembly **20**. Note that while only a single drive sprocket **50**, a single front idler **40**, a single rear idler **42**, and multiple idle rollers **44** are shown in FIG. **1**, additional drive sprockets **50** and idler wheels **40**-**44** may be used in the track drive assembly **20** and would have identical structural features. The track drive assembly **20** may also include several different drive configurations. For example, FIG. **1** illustrates a high-drive configuration, where the drive sprocket **50** is positioned vertically higher than a front idler wheel **40** and a rear idler wheel **42**; however, alternative configurations, such as a low-drive configuration where the drive sprocket **50** replaces the rear idler wheel **42**, are possible.

[0024] FIG. **2** illustrates the drive sprocket **50** and a portion of the ground-engaging track **30** in further detail. The drive sprocket **50** is a sprocket wheel that includes a sprocket drum **52** with an external circumferential surface **54**, and a plurality of sprocket gear members **66**. The sprocket gear members **66** are arc shaped with a plurality of sprocket teeth **68**. The sprocket gear members **66** are fixedly mounted, e.g., via bolts onto the sprocket drum **52** via a radial flange **56** (located beneath the sprocket gear members **66**; shown in FIG. **3**) extending radially outward from the external circumferential surface **54**, as shown in exemplary FIGS. **2** and **3**. While a pair of sprocket gear members **66** are illustrated in FIG. **2**, additional sprocket gear members **66** may be utilized to form a circumferential set of sprocket teeth **68**. Alternatively, the drive sprocket **50** may be made of a unitary body with integral sprocket teeth **68**, or may utilize a single, unitary, circumferential sprocket gear ring rather than multiple sprocket gear members **66**.

[0025] The ground-engaging track **30**, as shown in FIG. **2**, includes a plurality of track link assemblies **32** connected via link pins **34**. Each of the track link assemblies **32** includes a pair of track links **36** spaced apart by an integral link bushing **38**. While individual track components **32**-**38** of the ground-engaging track **30** are shown in FIG. **2**, additional track components **32**-**38** may be used in the ground-engaging track **30** and would have identical structural features. The spacing between the track links **36** allows sprocket teeth **68** to engage the link bushings **38** between the spaced track links **36** and drive the track link assemblies **32** with the drive sprocket **50**.

[0026] FIG. **3** illustrates a cross-sectional view of a portion of the drive sprocket **50** with the sprocket damping assembly **100** side-mounted to an individual sprocket gear member **66** of the drive sprocket **50**. It should be noted that the terms "inner" and "outer" discussed below are used to described structures with respect to the tractor frame **12** of the machine **10**. While FIG. **3** depicts a single sprocket damping assembly **100** and a single sprocket gear member **66**, additional damping assemblies **100** would be utilized on the drive sprocket **50** so as to circumferentially surround drive sprocket **50**, and each would have identical structural features. (See FIG. **4**.) Each sprocket gear member **66** includes a mounting flange **72** and the plurality of sprocket teeth **68** (shown in FIGS. **2** and **4**). The plurality of sprocket teeth **68** are circumferentially spaced along a radially outer portion **67** (shown in FIG. **4**) of the sprocket gear member **66**. The mounting flange **72** of the sprocket gear member **66** extends radially inward from the plurality of sprocket teeth **68** and terminates in a radially inner surface **70** of the sprocket gear member **66**. The mounting flange **72** includes an axially inner side surface **74** and an axially outer side surface **76** located on either side of the mounting flange **72**, and a plurality of through holes **78** spaced radially outward from the radially inner surface **70**. The plurality of sprocket gear members **66** are mounted to the radial flange **56** of the drive sprocket **50** along one of the axial side surfaces **74** of the mounting flange **72**.

[0027] The sprocket damping assembly **100** of FIG. **3** includes a damping pad **110** (individually shown in FIG. 6B), a rigid backing plate **130** (individually shown in FIG. 6A), and a plurality of assembly spacers **150** (individually shown in FIG. **6**C). Both the damping pad **110** and the backing plate **130** include a plurality of radial outer surfaces and radially inner surfaces **112**, **114** and **132**, **134**, respectively, and a planar outer surface and a planar inner surface **116**, **118** and **136**, **138**, respectively. Damping pad **110** and backing plate **130** also include a plurality of through holes **120**, **140** extending normal through an axial thickness t_{SA} of the damping pad **110** and a thickness t_{BP} of backing plate **130** (see FIGS. **5**C, **6**A, and **6**B). Referring to FIG. **6**C, the assembly spacers **150** each include a generally tubular body **151** with a central through hole **152** extending through the entirety of the spacer **150**. The through holes **120** of the damping pad **110** may be sized to allow for a portion of the tubular body **151** to extend through the damping pad **110**. The spacers **150** may be a full tubular shape, or as shown in FIG. **6**C may be a compound cylindrical shape including a stepped retaining feature **156** that is received in through holes **120** of the damping pad **110**. The stepped retaining feature may be formed by a step **154** transitioning the spacer **150** to a smaller diameter section **157** extending to an end **158** of the spacer **150**. As shown in FIG. **3**, the tubular body **151** of the spacers **150** extend between the outer surface **136** of backing plate **130**, through damping pad **110**, and to the inner side surface **58** of radial flange **56**. As noted above, the stepped retaining feature **156** may extend through the damping pad **110** and terminate at the backing plate **130** so that the damping pad **110** aligns with an inner edge of the drive sprocket **50** adjacent the plurality of teeth **68**. Thus, the full length of the spacers **150** serve to axially align the damping pad **110** with the edge of the drive sprocket **50** adjacent to the plurality of teeth **68**.

[0028] As shown in FIG. **3**, the mounting flange **72** of the sprocket gear member **66** is mounted to an axially outer side surface **60** of the radial flange **56**. On the axially inner side surface **58** of the radial flange **56**, the through holes **152**, **120**,**140** of the sprocket damping assembly components **150**, **110**, and **130** are aligned with the through holes **62**,**78** of the radial flange **56** and the mounting flange **72**, and the sprocket damping assembly components **150**, **110**, and **130** are mounted to an axially inner side surface **58** of the radial flange **56**. As shown in FIG. **3**, the radially inner bottom surfaces **114**, **134** of the damping pad **110** and the backing plate **130** are spaced away from an external surface of the sprocket drum **52**. Stated another way, the radially inner bottom surfaces **114**, **134** of the sprocket damping assembly **100** do not contact the drive sprocket **50**, resulting in a void of empty space between the sprocket damping assembly **100** and the drive sprocket **50**.

[0029] The sprocket damping assembly components **110**, **130**, and **150** are mechanically connected to the radially flange **56** and the mounting flange **72** by a plurality of threaded fasteners **80**, **82**. In FIG. **3**, the plurality of threaded fasteners are a plurality of threaded bolts **80** and threaded nuts **82**, although other similar mechanical fasteners may be used. Additionally or alternatively, the sprocket damping assembly **100** may include a plurality of washers (not shown), which may be used either in support of or as a replacement to the backing plate **130** to provide additional rigidity and structural support to the damping pad **110** when coupled to the radial flange **56**. As shown, the plurality of fasteners **80**, **82** may also used to secure sprocket gear members **66** to the radial flange **56**. Furthermore, while FIG. **3** illustrates that the sprocket gear members **66** are side-mounted to an axially outer side face **60** and the damping assemblies **100** side-mounted to an axially inner side face **58** of the radial flange **56**, the positions of the sprocket gear members **66** and damping assemblies **100** could, alternatively, be reversed and side-mounted on the opposite sides of the radial flange **56**. Furthermore, in an alternative design, the damping assemblies **100** may be attached to a drive sprocket **50** that does not utilize such gear members **66** (not shown).

[0030] FIGS. **5**A-**5**C illustrate various views of the sprocket damping assembly **100** mounted to an individual sprocket gear member **66**. In particular, FIG. **5**A depicts an outer view, FIG. **5**B depicts an inner view, and FIG. **5**C depicts an under view, respectively, of the sprocket damping assembly **100**. The damping pad **110** extends from the radially inner bottom surface **114** to the radially outer top surface **112**, located at a height above the radially outer portion **67** of the sprocket gear member **66**. This upper portion **126** of the damping pad **110** extends vertically above groove or trough sections **69** between the adjacent sprocket teeth **68** that receive the bushings **38** of the continuous ground-engaging track **30** (shown in FIG. **2**). The upper portion **126** of the damping pad **110** includes a variable coverage height h_V measured from a groove midpoint or (maximum depth) located between two adjacent sprocket teeth **68** to the radially outer top surface **112** of the damping pad **110**. The variable coverage height h_V may vary depending on the size of the sprocket gear member **66** and the size of the damping pad **110** used.

[0031] The inner view of FIG. **5**B depicts the damping pad **110** and the backing plate **130**, specifically illustrating the placement of the backing plate **130** and threaded bolts **80** along a lower portion **124** of the damping pad **110**. The damping pad **110** and the backing plate **130** both include a pair of matching contoured ends **122**, **142** that substantially match the shape of the sprocket gear member **66** (shown in FIGS. **5**A and **5**C). The contoured edges **122**,**142** allow for the combined damping pad **110** and the backing plate **130** to be arranged along the radial flange **56** in an aligned and uniform manner (shown in FIGS. **1**, **2**, and **4**).

[0032] In the under view of FIG. **5**C, the combined sprocket damping assembly **100** and sprocket gear member **66** are shown, with the sprocket damping assembly components **110**, **130**, **150** and the sprocket gear member **66** having a general alignment. The stepped retaining feature **154** of the spacers **150** extends through the axial thickness of the damping pad (t_{SA}) to contact the backing plate **130**. Additionally, FIG. **5**C shows the axial thicknesses of the backing plate (t_{BP}) and the damping pad (t_{SA}). In the current example, the axial thickness of the backing plate (t_{BP}) is shown to be less than the axial thickness of the damping pad (t_{SA}).

[0033] The individual components **110**, **130**, **150** of the sprocket damping assembly **100** are shown in FIGS. **6**A-**6**C. The backing plate **130**, as shown in FIG. **6**A, includes a generally arc or arcuate shape and may be fabricated from a rigid material, such as steel, other metal materials, polymers or other appropriate rigid materials. The damping pad **110**, as shown in FIG. **6**B, may include a similar arc or arcuate shape along its lower portion **124** with a plurality of through holes **120** which corresponds to the shape and placement of through holes **140** of the backing plate **130**. As noted above, the upper portion **126** of the damping pad **110** extends above the radially outer surface **67** of the sprocket gear assembly **66** (shown in FIG. **5**A). In particular, the plurality of through holes **120** are located on a radially lower half of the at least one arc-shaped damping pad **110** and positioned to secure the arc-shaped damping pad **110** to the drive sprocket **50** at a location to protrude to a height h_V above a maximum depth of the trough section **69** formed between teeth **68** of the drive sprocket **50** (FIG. **5**A).

[0034] Due to the need for a resilient material that can withstand the extreme forces generated by the ground-engaging track **30** (shown in FIG. **2**), the damping pad **110** may be fabricated from an elastomeric or resilient material, such as rubber, polyurethane, other polymers and elastomers, or other similar materials. Thus, damping pad **110** maybe be more flexible than backing plate **130**, while the backing plate **130** is stiffer than the damping pad **110**.

[0035] FIG. **6**C generally depicts an individual assembly spacer **150**, including the generally tubular body **151** and the stepped retention feature **156** with the central through hole **152** extending through both structures **151**, **156**. As noted above, the stepped retaining feature **156** includes a smaller diameter section **157** that is spaced radially inwardly from a greater diameter section **153** of the spacer **150**. The assembly spacer **150** may be fabricated from rigid materials, such as steel; however, other materials are contemplated, such as alternative metals, thermoplastic polymers, or other appropriate materials.

INDUSTRIAL APPLICABILITY

[0036] The disclosed aspects of the sprocket damping assembly **100** for the drive sprocket **50** of the present disclosure may be used on a track assembly of a track-type mobile machine to reduce the amount of noise generated by the metal-to-metal contact of sprocket teeth **68** coming into contact with bushings **38** of track link assemblies **32** when the tractor-type industrial machine **10** is operating. Specifically, side mounting the sprocket damping assembly **100** to the drive sprocket **50** may assist in reducing the forces experienced by the sprocket teeth **68** and preventing excessive noise generation.

[0037] FIG. **7** is a flowchart illustrating an exemplary method **700** for incorporating the damping assembly **100** onto a drive sprocket **50** of the mobile industrial machine **10** according to aspects of the present disclosure. In order to facilitate installation, the sprocket damping assembly **100** may be included in a kit (not shown) that includes the damping pads **110**, the backing plates **130**, the plurality of spacers **150**, and a plurality of fasteners **80**, **82**. As shown in FIGS. **1** and **2**, due to the variable coverage height h_V of the damping pad **110** above the midpoint or (maximum depth) of trough section **69**, the damping pad **110** contacts the track links **22** prior to the bushings **30** engaging with the sprocket teeth **68**. This is achieved by the sprocket damping assembly **100** and a plurality of sprocket gear members **66** being installed onto axial side surfaces **58**, **60** of a sprocket drum radial flange **56**. The plurality of assembly spacers **150** serves as to axially align the damping pad **110** with the drive sprocket **50**, while also acting as a support for the damping pad **110** while the damping pad **110** is being compressed against the backing plate **130** and the radial flange **56**. Each of the components of the sprocket damping assembly **100** (i.e., the plurality of assembly spacers **150**, the at least one damping pad **110**, and the at least one backing plate **130**) include at least one through hole **120**, **140**, **152** respectively, and these through holes **120**, **140**, **152** are configured to align with a plurality of through holes **78** in the sprocket gear member **66**, as shown in FIG. **5**C. FIG. **5**C specifically illustrates coupling the sprocket damping assembly **100** and the sprocket gear member **66** to the sprocket drum radial flange **56**.

[0038] Referring back to exemplary FIG. **3**, when installing the sprocket damping assembly **100** onto the radial flange **56** of the sprocket drum **52**, the through holes **120**,**140**,**152** of the sprocket damping assembly **100** align with a plurality of through holes **62** in the radial flange **56** on a first axial side (FIG. **7**, steps **710**-**730**) and with the through holes **78** of the sprocket gear member **66** on a second axial side of the radial flange **56** (FIG. **7**, **702**). To maintain alignment and to secure the sprocket damping assembly **100** in place, a stepped retaining feature **156** of each spacer **150** may be inserted into the individual through holes **120** of the damping pad **110** to contact the backing plate **130**. A plurality of threaded bolts **80** are inserted into the sprocket damping assembly component through holes **140** and **152** on the first axial side of the radial flange **56**, through the through holes **62** of the radial flange **56**, and extend through the through holes **78** of the sprocket gear member **66** (FIG. **7**, step **740**). The plurality of threaded bolts **80** are attached to a plurality of threaded nuts **82** on the second axial side of the radial flange **56**, thereby coupling and securing the sprocket damping assembly **100** and the sprocket gear member **66** to the radial flange **56** (FIG. **7**, step **750**). The installation of the components **110**, **130**, **150** of the sprocket damping assembly **100** may be repeated until the radial flange **56** includes a continuous ring of sprocket damping assemblies **100**, as shown in exemplary FIGS. **2** and **4**. It should be noted, however, that the user may instead choose to strategically space the sprocket damping assembly **100** and sprocket gear members **66** apart from one another in order to develop zones of protection.

[0039] While the installation of the sprocket damping assembly **100** is shown to be on an axial outer side face **58** of the drum sprocket radial flange **56** as shown in exemplary FIG. **3**, the sprocket damping assembly **100** may be installed on either axial side face **58**,**60** of the drum sprocket radial flange **56** depending on the configuration of a particular drive sprocket **52** on which the sprocket damping assembly **100** is implemented. For example, in an alternative design, the sprocket damping assembly **100** could be located on an axial outer side face **60** of the sprocket drum radial flange **56** and the sprocket gear member **66** could be located on an axial inner side face **58** of the radial flange **56**.

[0040] In accordance with the present disclosure, the sprocket damping assembly **100** may reduce the noise generated by the metal-to-metal contact of the sprocket teeth **68** and the ground-engaging track **30** during operation, while fixedly securing the sprocket damping assembly **100** in both the axial and radial directions. Additionally, by securing the damping pads **110** to an axial side face **58** of the radial flange **56**, the sprocket damping assembly **100** of the present disclosure helps ensure that the assembly **100** will contact the track **30** and assist in reducing the forces imparted onto the sprocket teeth **68**, thereby decreasing the amount of wear and strain on the sprocket teeth and potentially resulting in reduced maintenance costs. Further, the assembly of the sprocket damping assembly with the same fasteners as the sprocket gear member **66** may facilitate installation, maintenance, and cost associated with the drive sprocket **50**.

[0041] It will be apparent to those skilled in the art that various modifications and variations can be made to the disclosed system without departing from the scope of the disclosure. Other embodiments of the system will be apparent to those skilled in the art from consideration of the specification and practice of the system disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope of the disclosure being indicated by the following claims and their equivalents.

What is claimed is:

1. A damping assembly for a drive sprocket of a mobile industrial machine, the damping assembly comprising:
- at least one arc-shaped damping pad including:
  - a radially outer surface;
  - a radially inner surface;
  - a planar inner surface extending between the radially outer surface and the radially inner surface;
  - a planar outer surface extending between the radially outer surface and the radially inner surface; and
  - a plurality of through holes extending through the at least one arc-shaped damping pad from the planar inner surface to the planar outer surface, and normal to the planar inner surface and the planar outer surface;
  - wherein the at least one arc-shaped damping pad is formed of an elastomeric material.

2. The damping assembly of claim **1**, wherein the plurality of through holes are located to secure the arc-shaped damping pad to the drive sprocket at a location to protrude to a height above a maximum depth of a trough formed between teeth of the drive sprocket.

3. The damping assembly of claim **1**, wherein the plurality of through holes are all located on a radially lower half of the at least one arc-shaped damping pad.

4. The damping assembly of claim **3**, further including at least one arc-shaped backing plate, the at least one backing plate being formed of a material that is stiffer than the at least one arc-shaped damping pad.

5. The damping assembly of claim **4**, wherein the arc-shaped backing plate includes a plurality of through holes that align with the plurality of through holes of the at least one arc-shaped damping pad.

6. The damping assembly of claim **5**, further including a plurality of tubular spacers, wherein each of the plurality of spacers include a length to axially align the at least one arc-shaped damping pad with an edge of the drive sprocket adjacent teeth of the drive sprocket.

7. The damping assembly of claim **6**, wherein, in an assembled configuration of the damping assembly, a portion of the spacer is located on one side of the at least one arc-shaped damping pad and the arc-shaped backing plate is located on an opposite side of the at least one arc-shaped damping pad.

8. The damping assembly of claim **7**, further including a plurality of fasteners connecting the damping assembly to the drive sprocket.

9. The damping assembly of claim **8**, wherein the at least one arc-shaped damping pad includes a plurality of arc-shaped damping pads sized to circumferentially surround the drive sprocket.

10. A damping assembly for a drive sprocket of a mobile industrial machine, the damping assembly comprising:
- at least one arc-shaped damping pad made of an elastomeric material, the at least one arc-shaped damping pad including:
  - a radially outer surface and a radially inner surface;
  - a planar inner surface and a planar outer surface, wherein both the planar inner surface and the planar outer surface extend between the radially outer surface and the radially inner surface of the at least one arc-shaped damping pad; and
  - a plurality of through holes extending through the at least one arc-shaped pad from the planar inner surface to the planar outer surface, and normal to the planar inner surface and the planar outer surface;
- at least one arc-shaped backing plate, the arc-shaped backing plate including a plurality of through holes that align with the plurality of through holes of the at least one arc-shaped damping pad; and
- a plurality of tubular spacers,
- wherein, in an assembled configuration of the damping assembly, a portion of the spacers is located on one side of the at least one arc-shaped damping pad and the at least one arc-shaped backing plate is located on an opposite side of the at least one arc-shaped damping pad.

11. The damping assembly of claim **10**, wherein the plurality of through holes of the at least one arc-shaped damping pad are located to secure the arc-shaped damping pad to the drive sprocket at a location to protrude to a height above a maximum depth of a trough formed between teeth of the drive sprocket.

12. The damping assembly of claim **11**, wherein the plurality of through holes of the at least on arc-shaped damping pad are all located on a radially lower half of the at least one arc-shaped damping pad.

13. The damping assembly of claim **12**, wherein each of the plurality of spacers include a length to axially align the at least one arc-shaped damping pad with an edge of the drive sprocket adjacent teeth of the drive sprocket.

14. The damping assembly of claim **13**, wherein the at least one arc-shaped backing plate is formed of a metal material.

15. The damping assembly of claim **10**, wherein the drive sprocket includes an arc-shaped gear member with a plurality of teeth, the arc-shaped gear member including a plurality of through holes configured to attach the arc-shaped gear member with a circumferential flange of the drive sprocket,
- wherein the plurality of through holes of the arc-shaped damping pad and the plurality of through holes of the arc-shaped backing plate align with the plurality of through holes of the arc-shaped gear member.

16. The damping assembly of claim **15**, wherein, in an assembled configuration of the damping assembly,
- the at least one arc-shaped damping pad, the arc-shaped backing plate, and the plurality of spacers are coupled on one side of the drive sprocket, and
- the at least one arc-shaped gear member is coupled on an opposite side of the drive sprocket, and secured to the drive sprocket by the same fastening members as the at least one arc-shaped damping pad, the arc-shaped backing plate, and the plurality of spacers.

17. A method of assembling a damping assembly for a drive sprocket of a mobile industrial machine, the damping assembly including an arc-shaped damping pad made of an elastomeric material, an arc-shaped backing plate, and a plurality of spacers, the method comprising:
- coupling the arc-shaped damping pad, arc-shaped backing plate, and the plurality of spacers on a first side of drive

sprocket so that the arc-shaped damping pad is located between a sprocket gear member of the drive sprocket and arc-shaped backing plate, and the arc-shaped pad axially aligns with an edge of the drive sprocket adjacent to teeth of the drive sprocket,

wherein the coupling includes securing fasteners through the arc-shaped damping pad, arc-shaped backing plate, the plurality of spacers, and a plurality of holes in a flange of the drive sprocket.

18. The method of claim **17**, wherein each fastener extends through each of the flange of the drive sprocket, a spacer, an arc-shaped pad, and an arc-shaped backing plate.

19. The method of claim **18**, the method further including fastening an arc-shaped gear member having a plurality of teeth to the flange of the drive sprocket during the fastening of the damping assembly.

20. The method of claim **19**, wherein the arc-shaped gear member is fastened on a side of the flange opposite the plurality of spacers, arc-shaped damping pad, and arc-shaped backing plate.

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