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(54) **Low noise track profile**

Geräuscharmes Kettengliedprofil

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(73) Proprietor: **Arctic Cat Inc.**
Thief River Falls, MN 56701 (US)

(72) Inventors:
- **Konickson, Mike**
Thief River Falls,
Minnesota 56701 (US)
- **Bergman, Ron**
Mentor,
Minnesota 56736 (US)
- **Black, Ronald M.**
Red Lake Falls,
Minnesota 56750 (US)

(74) Representative: **Jörgensson, Leif Sixten et al**
Awapatent AB
Box 5117
200 71 Malmö (SE)

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Description

[0001] The invention relates to a profile for a track, such as a track used on a snowmobile or other tracked vehicle. More particularly, the invention relates to a track that produces less noise and/or vibration when in use than conventional tracks.

Description of Related Art

[0002] Track drives and their use on vehicles are well known. Conventional track drives typically include one or more continuous tracks, which move in a closed loop. Conventionally, one or more wheels may be used to help keep the track moving in its desired path. Rails or other additional support structures may also be used to help guide the track. Also, conventional track drives typically include a drive wheel or other mechanism to cause the track to move circumferentially, so as to drive the vehicle.

[0003] Track drives provide good traction, and can accommodate rough terrain. In addition, because track drives can be made so that they contact the ground (or other surface) with a large area, they are useful for moving across soft or giving surfaces, and for supporting heavy loads.

[0004] For these reasons, track drives are commonly used on snowmobiles, which operate primarily on snow and ice, and are often used in difficult terrain.

[0005] A snowmobile with a conventional track drive is illustrated in Figure 1. As may be seen therein, a continuous track **10** is directed in part by one or more wheels **30.** The wheels **30** are not powered, but rotate as the track **10** moves.

[0006] As may be seen in Figure 2, a conventional vehicle track consists of a track substrate **11**, and may include drive lugs **16** distributed circumferentially along an inner surface **12** of the track **10**. Typically, the drive lugs **16** are shaped to provide good engagement between the track **10** and a drive wheel or other drive mechanism (not shown).

[0007] In addition, a conventional vehicle track may include terrain lugs **18** distributed circumferentially along an outer surface **14** of the track substrate **11.** Typically, the terrain lugs **18** are shaped to engage the terrain on which the vehicle moves, i.e. snow and ice for the snowmobile illustrated in Figure 1.

[0008] A magnified view of a section of a conventional track **10** is shown in Figure 2.

[0009] A conventional track typically is constructed of some flexible material, so that it bends as it passes around the drive mechanism, wheels, and/or other guide structures. Exemplary arrangements of wheels **30** that make up a portion of a conventional suspension system for a tracked vehicle may be seen in Figures 3-5.

[0010] It is noted that the individual wheels in a given track system may have different functions, different sizes, etc. For example, certain of the wheels **30** shown in Figures 3-5 are used to change the direction of a track, while other wheels **30** shown therein are used to support the vehicle's weight and transfer it to the track, to keep the track from contacting other components, or to perform other functions. Wheels may have names specific to their function or location, i.e. "idler wheel", "roller wheel", etc. However, for purposes of this application, the precise nature and function of the wheels is of concern primarily insofar as the wheels interact with a track to produce noise and vibration. For this reason, the wheels are referred to collectively herein, although they may not be identical in form or function.

[0011] As is visible from Figure 2, the presence of the drive lugs **16** and the terrain lugs **18** significantly increases the thickness of the track **10** at some points along its circumference. Even if the drive lugs **16** and terrain lugs **18** also are made of flexible material, the track **10** often is much less flexible in the vicinity of the drive lugs **16** and the terrain lugs **18** at least in part because of the increased thickness. In addition, as shown in Figure 2, conventional tracks **10** may be deliberately made stiffer in the vicinity of the drive lugs **16** and terrain lugs **18**, for example by including bars **17** of relatively rigid material therein.

[0012] One result of this may be seen in Figure 6. Figure 6 shows a schematic view of a portion of a conventional track **10** where it passes around a wheel **30**, changing direction as it does so. Because the track **10** is thicker near the drive lugs **16** and terrain lugs **18**, it is relatively rigid there. As a result, the track **10** does not bend readily in the areas near the drive lugs **16** and terrain lugs **18,** and those areas of the track **10** remain relatively flat. Most or all of the bending of the track **10** occurs in areas in between adjacent drive lugs **16** and terrain lugs **18.**

[0013] As may be seen from Figure 6, with such an arrangement, a conventional track **10** does not fit closely to a conventional wheel **30** while changing direction around the wheel **30**. As illustrated, the track **10** actually makes contact with the wheel **30** only in the immediate vicinity of the drive lugs **16** and terrain lugs **18**.

[0014] It is believed that such an arrangement contributes to the generation of noise and vibration as the track **10** moves around the wheel **30**. For example, as the track **10** moves around the wheel **30**, the track **10** makes contact with the wheel **30** only at intermittent points, rather than smoothly engaging the wheel **30**. This process is essentially a series of impacts between the track **10** and the wheel **30,** which may generate considerable noise and/or vibration.

[0015] In addition, in the areas between the drive lugs **16** and terrain lugs **18**, the track **10** is unsupported. The track **10** in those areas is free to move back and forth with any existing vibrations or impacts, potentially causing it to strike the wheel **30**. This also may contribute to the noise and vibration produced by the track drive.

[0016] Interaction between a conventional track **10** and wheels **30** may also contribute to noise and vibration in other ways, even if the track is not changing direction as shown in Figure 6.

[0017] For example, in Figure 7 two wheels **30** are shown in schematic form in an arrangement wherein they support at least part of the weight of a vehicle. The wheel **30** that is shown to be aligned with a drive lug **16** and terrain lug **18** does not appreciably deform the track **10.** However, the wheel **30** that is shown to be between adjacent drive lugs **16** and terrain lugs **18** does deform the track **10**; the weight of the vehicle presses the wheel downward.

[0018] The phenomenon illustrated in Figure 7, which is sometimes referred to as "bridging", results in the wheels **30** moving up and down as the track **10** moves. This motion is in some ways similar to what would occur if a wheel is made to move over a series of fixed obstacles in its path. The noise and/or vibration may resulting from such motion may be considerable.

[0019] It is noted that in actuality, the deformation of the track **10** between adjacent drive lugs **16** and terrain lugs **18** may be sinusoidal, or otherwise curved. However, for clarity it is pictured as straight-line deformity in Figure 7.

[0020] In CH-A-322 852 noise generated by a conventional snowmobile track is reduced in a conventional arrangement of a track with terrain lugs labeled **32** and drive lugs labeled **34**. CH-A-322 852 reduces noise by changing the periodic spacing between the terrain lugs **32** and the drive lugs **34** but does not deal with noise caused by bands of track extending between the terrain lugs **32** or drive lugs **34** or with the interaction of these bands of track with drive wheels or idler wheels.

[0021] Regardless of the precise source(s), it be desirable to reduce the noise and/or vibration generated in conventional track drives For example, track vibration may be unpleasant for the vehicle operator, track noise likewise may be disadvantageous to the vehicle operator and/or persons nearby. In addition, mechanical vibrations may contribute to wear on the track drive and/or other vehicle components.

Summary of the Invention

[0022] It is the purpose of the claimed invention to overcome these difficulties, thereby providing an improved track profile that produces less noise and/or vibration in operation. It is noted that, although noise may be considered to be vibration for many purposes, not all vibrations are noise. Thus, vibration referred to herein includes, but is not limited to, non-noise vibration such as mechanical vibration of a vehicle or components thereof.

[0023] An exemplary embodiment of a track in accordance with the principles of the claimed invention includes a plurality of terrain lugs distributed about the circumference of the track on its outer surface.

[0024] The track also includes a plurality of drive profiles distributed about the circumference of the track on its inner surface. Each of the drive profiles includes at least one drive lug arranged somewhere along the lateral width of the track. The drive profiles may include two or more drive lugs spaced apart laterally across the width of the track.

[0025] A plurality of projections is distributed about the circumference of the track on the inner surface. The projections are arranged to engage a wheel in a track system that includes the track. Each of the projections is disposed circumferentially between two of the drive profiles, and/or may be disposed laterally between two drive lugs.

[0026] The projections have a height such that the noise and/or vibration generated when the track moves in a track system is less than the noise and/or vibration generated when a conventional hack without such projections moves in a track system.

[0027] The projections may define gaps therein extending laterally across their width, in order to facilitate bending of the track in the area of the projections.

[0028] The projections may have a curved cross section. Alternatively, the projections may have a cross section in the shape of two flat wedges.

[0029] For a track for an otherwise conventional snowmobile having a wheel with a radius of approximately 6.35 cm (2.5 inches), the projections may have a height of approximately 1.9 to 4.4 mm (.075 to .175 inches) More generally, the projections may have a height that is approximately 3% to 7% of the wheel radius.

[0030] The noise produced by a track in accordance with the principles of the claimed invention may be at least 4 dB less than the noise produced by a conventional track, preferably at least 6 to 8 dB less. It is noted that, dB are a logarithmic unit, a noise decrease of 4 dB represents a noise reduction of 50%. The reduction in vibration produced by a track in accordance with the principles of the claimed invention also is believed to be substantial.

Brief Description of the Drawings

[0031] Like reference numbers generally indicate corresponding elements in the figures.

Figure 1 is an illustration of a snowmobile with a conventional track, as known from the prior art.

Figure 2 a magnified circumferential cross section of a portion of a conventional track, as known from the prior art.

Figure 3 is an illustration of a suspension system with a conventional arrangement of wheels, as known from the prior art.

Figure 4 is another view of the suspension system shown in Figure 3.

Figure 5 is another view of the suspension system shown in Figure 3.

Figure 6 is a schematic figure showing engagement between an exemplary wheel and a conventional track, as known from the prior art.

Figure 7 is a schematic figure showing engagement between other exemplary wheels and a conventional track, as known from the prior art.

Figure 8 is an overhead view of a portion of the outer surface of an exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 9 is an overhead view of a portion of the inner surface of the portion of the track shown in Figure 8.

Figure 10 is a lateral cross section of the portion of the track illustrated in Figures 8 and 9.

Figure 11 is a circumferential cross section of the portion of the track illustrated in Figures 8 and 9.

Figure 12 is a magnified lateral cross section of a portion of an exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 13 is a magnified lateral cross section of a portion of another exemplary embodiment of a track in accordance with the principles of the claimed invention, with a projection that does not include a gap.

Figure 14 is a magnified lateral cross section of a portion of another exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 15 is a magnified lateral cross section of a portion of another exemplary embodiment of a track in accordance with the principles of the claimed invention, with a projection that does not include a gap.

Figure 16 is an overhead view of a portion of the outer surface of another exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 17 is a circumferential cross section of a portion of the track illustrated in Figure 16.

Figure 18 is a lateral cross section of a portion of the track illustrated in Figure 16.

Figure 19 is a schematic figure showing the engagement between an exemplary wheel and an exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 20 is a schematic figure showing engagement between other exemplary wheels and an exemplary embodiment of a track in accordance with the principles of the claimed invention.

Figure 21 is a plot showing noise at a range of frequencies for a conventional track and an exemplary embodiment of a track in accordance with the principles of the claimed invention at 64.4 km/h (40 mph), on the right side of a vehicle.

Figure 22 is a plot showing noise generated at a range of frequencies for a conventional track and an exemplary embodiment of a track in accordance with the principles of the claimed invention at 64.4 km/h (40 mph), on the left side of a vehicle.

Figure 23 is a lateral cross section of a portion of another exemplary embodiment of a track in accordance with the principles of claimed invention

Figure 24 is an overhead view of a portion of the inner surface of another exemplary embodiment of a track in accordance with the principles of the claimed invention.

Detailed Description of the preferred Embodiment

[0032] Referring to Figure 8, a track **50** in accordance with the principles of the claimed invention includes a track substrate **51**. The substrate **51** is adapted to form a continuous loop through a track system. However, the precise structure of the track substrate **51** may vary considerably depending on the particular embodiment. In some embodiments, the track substrate **51** may be formed as a continuous loop. In other embodiments, the track substrate **51** may be made of one or more segments that are joined together.

[0033] For purposes of this application, the term "lateral" is used to refer to locations, directions, distributions, etc. in the direction perpendicular to the track's motion within a track system, i.e. the width of the track **50**. Thus, lugs distributed laterally across the track **50** are spread across the width of the track.

[0034] In a similar manner, the term "circumference" is used herein to describe the perimeter of the continuous loop structure of the track **50.** Thus, lugs distributed circumferentially are spread around the perimeter of the track **50.**

[0035] Although the term "circumference" is sometimes used specifically to describe the perimeter of a circle, it is not so used herein; use of the term "circumference" herein in reference to the track **50** should not be considered to imply that the track **50** necessarily is circular in shape.

[0036] The track substrate **51** is sufficiently flexible to enable the track **50** to curve and/or bend as it moves along the path of a track system. The precise structure and materials of the track substrate **51** may vary from embodiment to embodiment. In certain embodiments, the track substrate **51** may be made partially or completely of a flexible material, such as rubber.

[0037] Alternatively, in other embodiments the track substrate **51** may be made partially or completely of rigid materials structured so as to be flexible. For example, a track substrate **51** constructed of a series of movable links or segments connected with articulated joints could be made flexible, even if the individual links were rigid.

[0038] Both rigid and flexible material track substrates **51** are well known, and are not further described herein.

[0039] It is noted that the track substrate **51**, as well as other elements of the track **50**, may include reinforcing members or structures not otherwise described herein. For example, a reinforcing layer such as a flexible steel mesh belt may be incorporated into the track substrate **51**.

[0040] Similarly, the drive lugs **56** and/or terrain lugs **58** (see below) may include reinforcing members such as rigid plates or rods, either on the surface of the lugs or incorporated therein. For example, as illustrated in Figures 12 and 14, the track **50** includes rods **57** embedded in the substrate **51** and aligned with the drive lugs **56** and terrain lugs **58,** to increase the stiffness of the track **50** at those points. Such rods **57** may be made of relatively stiff materials, including but not limited to fiberglass.

[0041] As illustrated, the rods **57** have a cross section with one flat side and a convex side opposite the flat side. However, this is exemplary only; a wide variety of shapes may be equally suitable. Furthermore, the orientation of such structures may vary considerably, i.e., as shown in Figure 14 the rods **57** are inverted as compared to the rods **57** shown in Figure 12.

[0042] In addition, the use of rods **57** as shown in Figures 12 and 14 is itself exemplary only. Embodiments having reinforcing members or structures other than those described and shown may be equally suitable. Likewise, embodiments without reinforcing members or structures may also be equally suitable.

[0043] On the outer surface **54** of the track substrate **51**, the track **50** includes a plurality of terrain lugs **58**. The terrain lugs **58** are adapted to engage the terrain over which the vehicle with the track **50** thereon passes. For example, for a snowmobile, the terrain lugs **58** might be formed with shapes, sizes, and arrangements especially suitable for engaging snow and ice.

[0044] The precise configuration of the terrain lugs **58** may vary from embodiment to embodiment. A variety of factors may determine the configuration of the terrain lugs **58**, including but not limited to: the surface to be traversed; the weight of the vehicle; the desired speed, maneuverability, acceleration, and other performance of the vehicle; and the desired ride characteristics for the vehicle, i.e. smoothness, good "road feel", etc.

[0045] As illustrated in Figure 8, the configurations of the individual terrain lugs **58** on the section of the track **50** shown are dissimilar. The uppermost portion of the track **50** has a single terrain lug **58** that is continuous across the width of the track substrate **51,** while the middle portion has two terrain lugs **58** spaced apart laterally, and the lower portion has three terrain lugs **58** also spaced apart laterally. Although for certain embodiments it may be advantageous for all the terrain lugs **58** on a given track **50** to be identical, as may be seen this is not necessary.

[0046] The arrangement of terrain lugs **58** on the track **50** in Figure 8 is exemplary only; other arrangements may be equally suitable.

[0047] Figure 9 shows the section of a track **50** in accordance with the principles of the claimed invention illustrated in Figure 8 , but from the opposite side. As may be seen from Figure 9, the track **50** includes a plurality of drive profiles **55,** distributed circumferentially about an inner surface **52** of the track substrate **51.**

[0048] Each of the drive profiles **55** includes at least one drive lug **56** arranged somewhere across the lateral width of the track substrate **51.** In certain embodiments, there may be at least two drive lugs **56** spaced apart from one another laterally across the track substrate **51.** One exemplary arrangement for embodiments having at least two drive lugs **56** is that shown in Figure 9, wherein at least some of the drive lugs **56** are arranged relatively close to one another, in pairs. However, this is exemplary only.

[0049] As shown in Figure 9, the drive profiles **55** include six drive lugs **56**. However, this is exemplary only, and drive profiles **55** having other numbers of drive lugs **56** may be equally suitable. In addition, although all of the drive profiles **55** shown in Figure 9 have the same number and arrangement of drive lugs **56**, this is also exemplary only. Other suitable embodiments include, but are not limited to, that illustrated in Figure 24, wherein some of the drive lugs **56** are shown to alternate from left to right when comparing one drive profile **55** to an adjacent drive profile **55**. Furthermore, the shapes illustrated for the drive lugs **56** are exemplary only; a variety of shapes for the drive lugs **56** other than those shown may be equally suitable.

[0050] The drive lugs **56** are adapted to engage the drive mechanism of the track system. The drive lugs **56** also may be adapted to engage other components of the track system, including but not limited to one or more wheels.

[0051] The precise configuration of the drive lugs **56** may vary from embodiment to embodiment. A variety of factors may determine the configuration of the drive lugs **56**, including but not limited to: the form and size of the drive mechanism; the form and size of any additional components that the drive lugs **56** are to engage; the weight of the vehicle; the desired speed, maneuverability, acceleration, and other performance of the vehicle; and the desired ride characteristics for the vehicle.

[0052] As shown in Figure 9, a track **50** in accordance with the principles of the claimed invention also includes a plurality of projections **60** on the inner surface **52** of the track substrate **51**. The projections **60** are arranged such that they engage a wheel **70** in a track system that includes the track **50.** The manner of this engagement may be seen from Figures 19 and 20, which are described further below.

[0053] A variety of arrangements may be suitable for the projections **60.** Returning to Figure 9, each projection **60** is disposed circumferentially between two drive profiles **55.**

[0054] In addition, in embodiments wherein at least some of the drive profiles **55** include two or more drive lugs **56**, the projections **60** also may be arranged so that each projection **60** is disposed laterally between two drive lugs **56.** Such an arrangement is visible in Figure 9.

[0055] However, this is exemplary only. As shown in Figure 23, the outermost projections **60** on the left and right edges of the track **50** are not disposed between two drive lugs **56**, but instead are arranged with a drive lug **56** on only one side. As shown in ghost form, the track **50** may be engaged by wheels **70** at those projections **60** that are not disposed between two drive lugs **56** as well as at those projections **60** that are disposed between two drive lugs **56**.

[0056] Furthermore, although as illustrated the projections **60** are shown to be proximate to the drive lugs **56** in a lateral direction (i.e. across the width of the track **50**), this also is exemplary only.

[0057] Returning to Figure 9, the projections **60** are disposed between the drive profiles **55,** it is not necessary for the projections **60** to be completely contained within the space between drive profiles **55.** That is, there need not be space between the ends of the projections **60** and the drive profiles **55**. As shown in Figure 9, the projections **60** extend the full distance between drive profiles **55**, and indeed extend into the drive profiles **55**. However, such an arrangement is exemplary only. Arrangements wherein the projections **60** extend only to the edge of the drive profiles **55**, or do not extend all the way to the drive profiles **55,** may be equally suitable. Likewise, arrangements wherein the projections **60** extend further than illustrated in Figure 9 may also be suitable, including but not limited to embodiments wherein the projections **60** extend far enough that they are in contact with adjacent projections **60**.

[0058] Furthermore, the general arrangement of the arrangement of the projections **60** as shown in Figure 9 is exemplary only. Although the projections **60** as illustrated are arranged so that each projection **60** is disposed circumferentially between two drive profiles **55**, and so that each projection **60** is disposed laterally between two drive lugs **56**, other arrangements may be equally suitable, so long as the projections **60** are arranged such that they engage the wheel **70**.

[0059] As is visible in Figures 10 through 15, the projections **60** extend some distance above the track substrate **51**, although it is emphasized that the figures herein should not be taken as being to scale. The projections **60** are further described below. The relative arrangement of the projections **60** to the drive profiles **55** and the individual drive lugs **56** can also be seen in Figures 10 through 15, which also are further described below. In addition, Figure 10 shows exemplary wheels **70** in ghost form, illustrating the positions in which they might engage the projections **60** and the track **50** as a whole.

[0060] Turning to Figure 19, a schematic illustration therein shows the engagement between a portion of a track **50** in accordance with the principles of the claimed invention and a wheel **70** about which the track **50** is changing direction.

[0061] As previously described, a track **50** in accordance with the principles of the claimed invention is sufficiently flexible to enable engagement with the track system. However, as also previously described, the increased thickness of a track **50** due to the presence of drive lugs **56** and terrain lugs **58** may make the track **50** less flexible in the vicinity of the drive lugs **56** and terrain lugs **58.** Consequently, the track **50** does not bend as readily in the vicinity of the drive lugs **56** and terrain lugs **58** as in areas between adjacent drive lugs **56** and terrain lugs **58.**

[0062] Thus, much of the bending of the track **50** occurs in areas in between adjacent drive lugs **56** and terrain lugs **58.** As a result, the track substrate between adjacent drive lugs **56** and terrain lugs **58** may not be in direct contact with the wheel **70**. However, because the projections **60** extend inward from the track substrate **51** towards the wheel **70**, the projections **60** can contact the wheel **70** even if the track substrate **51** does not.

[0063] In addition, with reference to Figure 20, a schematic illustration therein shows the engagement between a track **50** in accordance with the principles of the claimed invention and a wheel **70**.

[0064] As noted above, a track **50** in accordance with the principles of the claimed invention remains sufficiently flexible to bend, i.e. around a wheel **70** so as to change direction. Also as previously described, the weight of a vehicle when borne by wheels **70** and transferred to a track **50** in accordance with the principles of the claimed invention can be considerable. Consequently, the track **50** may deform in those areas where it is most flexible, i.e. between the drive lugs **56** and terrain lugs **58**, due to the weight of the vehicle.

[0065] However, because the projections **60** project inward from the track **50** towards the wheels **70** that are bearing down on the track **50**, the height of the projections **60** opposes the downward vertical motion of the wheels **70** when they are between the drive lugs **56** and terrain lugs **58.** Thus, as shown in Figure 20, the wheel **70** that is between the drive lugs **56** and terrain lugs **58** is held at or at least closer to the vertical position of the wheel **70** that is at one of the drive lugs **56** and terrain lugs **58.** As a result, the vertical motion of the wheels **70** is eliminated or reduced.

[0066] It is believed that because a track **50** in accordance with the principles of the claimed invention conforms well to a wheel **70,** and because a track **50** in accordance with the principles of the claimed invention reduces the vertical motion of load-bearing wheels **70**, noise and vibration generation by a track system with such a track **50** is reduced as compared to the same or a similar track system with a conventional track **10**.

[0067] The difference in noise between a track system with an exemplary embodiment of a track **50** in accordance with the principles of the claimed invention and a track system with a conventional track **10** is illustrated in Figures 21 and 22.

[0068] Figures 21 and 22 show plots of noise intensity at various frequencies. Traces **150** and **250** represent noise intensity for an exemplary embodiment of a track **50** in accordance with the principles of the claimed invention in Figures 21 and 22 respectively, while traces **110** and **210** represent noise intensity for a conventional track **10**. Figure 21 shows noise as measured from the right side of a snowmobile used as a test vehicle, while Figure 22 shows noise as measured from the left side.

[0069] As may be observed, the noise levels in traces **110** and **210** are generally higher than the noise levels in traces **150** and **250**. In particular, as is visible in Figure 21, trace **110** is significantly higher at the first and second order track pitches **112** and **114** than trace **150** at similar first and second order track pitches **152** and **154.** Likewise, as is visible in Figure 22 , trace **210** is significantly higher at the first and second order track pitches **212** and **214** than trace **250** at similar first and second order track pitches **252** and **254**.

[0070] Overall, noise output from a track system with an exemplary embodiment of a track **50** in accordance with the principles of the claimed invention is typically a minimum 4 dB lower than noise output from a track system with a conventional track **10**. However, the noise reduction is not limited to 4 dB; the measured difference in noise output may be 6 to 8 dB or more.

[0071] Exemplary indications of noise reduction may be seen, for example, by examination of the peaks at the frequencies having the highest levels of noise in Figures 21 and 22.

[0072] It is noted that decibels are logarithmic units. Therefore, peaks represent much greater levels of noise than surrounding non-peak regions. For example, an increase of 4 dB represents a doubling of the noise at a given frequency. Thus, even a relatively narrow peak of significant height can represent a substantial portion of the total noise output. Because of this, the differences in the height of the peaks in Figures 21 and 22 are not merely of interest with regard to the specific frequencies at which the peaks occur, but also may be considered indicative of a difference in overall noise between a conventional track and one in accordance with the principles of the claimed invention.

[0073] In addition, it is noted that for actual vehicles in "field" conditions, precise measurements of noise reduction depend to some degree upon the manner in which noise is measured, among other factors. A variety of common standards for noise measurement exist. For purposes of comparison, the noise readings described herein may be considered to be similar to those obtained by noise testing in accordance with SAE J-1161 for steady state operation. However, it is emphasized that actual noise reduction is not necessarily limited to noise reduction as measured only in accordance with SAE J-1161.

[0074] Returning to Figure 10, a cross section along line A-A of Figures 8 and 9 is shown therein. It may be conveniently seen therein that each of the projections **60** is disposed laterally between two drive lugs **56.**

[0075] Likewise in Figure 11, a cross-section along line B-B of Figures 8 and 9, it may be conveniently seen that each of the projections **60** is disposed circumferentially between two drive profiles **55**. Note that although only one drive lug **56** is visible for each drive profile **55** in Figure 11, the drive profiles **55** actually include several drive lugs **56,** as visible in Figures 9 and 10.

[0076] However, it is again emphasized that although the arrangement of the projections **60** as shown in Figures 10 and 11 may be suitable for certain embodiments of the track **50,** it is exemplary only, and other arrangements may be equally suitable.

[0077] Figure 11 also illustrates a gap **62** that may be present in some or all of the projections **60.** As shown, the gaps **62** extend laterally across the projections **60.** Because the presence of the projections **60** increases the local thickness of the track **50**, the flexibility of the track **50** may be slightly diminished, especially near the thickest part of the projections **60**. The gaps **62** in the projections **60** facilitate greater flexibility of the track **50** in those areas.

[0078] Turning to Figure 12, a magnified view of a portion of a cross section similar to that in Figure 11 is illustrated.

[0079] As has been previously stated, the figures herein should not be interpreted as being to scale. Although the relative heights of the projection **60**, drive lugs **56**, and terrain lugs **58** may be illustrative, they are exemplary only, and other embodiments with other relative heights may be equally suitable.

[0080] The actual height of the projections **60** is defined functionally. That is, the height of the projections **60** is sufficient as to yield a track **50** with reduced production of noise and/or vibration compared to a conventional track **10**. The height suitable for yielding such noise and/or vibration reduction may vary considerably from embodiment to embodiment.

[0081] In practice, it has been determined that for a wheel with a radius of approximately 6.35 cm (2.5 inches), the height of the projections **60** is preferably at least 1.9 mm (.075 inches). The height of the projections **60** is more preferably at least 2.54 mm (.100 inches). The height of the projections **60** is most preferably at least 3.2 mm (.125 inches). However, the height of the projections **60** also may advantageously be at least 3.81 mm (.150 inches). Furthermore, the height of the projections **60** also may be at least 4.4 mm (.175 inches).

[0082] The height of the projections may also be expressed in relative terms, as a function of the wheels or other structures in the track system. It has been determined that for a wheel of a given radius, the height of the projections **60** is preferably at least 3% of the wheel radius. The height of the projections **60** is more preferably at least 4% of the wheel radius. The height of the projections **60** is most preferably at least 5% of the wheel radius. However, the height of the projections **60** also may advantageously be at least 6% of the wheel radius. Furthermore, the height of the projections **60** also may be at least 7% of the wheel radius.

[0083] As described elsewhere, in embodiments wherein the track **50** engages two or more wheels **70,** the wheels **70** may be of different size. When determining the height of projections **60** for such embodiments based on a percentage of wheel radius for wheels **70** of different size, a variety of approaches may be suitable. For certain embodiments, it may be advantageous to determine the height of the projections **60** based on an extreme, i.e. the size of the smallest or largest wheel **70**. Alternatively, it may be advantageous in certain embodiments to determine the height of the projections **60** based on a mean radius, median radius, etc. of some or all of the wheels **70.** Other approaches also may be equally suitable.

[0084] It is noted that the height of the projections **60** in a given track **50** need not be the same for each projection **60,** though this may be the case for certain embodiments.

[0085] The width of the gap **62** also may vary considerably from embodiment to embodiment. As with the height of the projections **60**, factors including but not limited to the size and configuration of any wheels or other structures present in the track system may be relevant to determining a suitable width for the gap **62**. Given a wheel with a radius of approximately 6.55 cm (2.5 inches), in a preferred embodiment, the gap **62** may be 0.76 to 2.29 mm (.03 to .09 inches) wide. In a more preferred embodiment, the gap **62** may be 1.27 to 1.78 mm (.05 to .07 inches) wide. In a still more preferred embodiment, the gap **62** may be 1.40 to 1.65 mm (.055 to .065 inches) wide.

[0086] The width of the gaps **62** in a given track **50** need not be the same for each gap **62**, though this may be the case for certain embodiments.

[0087] Furthermore, the depth of the gaps **62** in a given track **50** need not be the same for each gap **62**, though this also may be the case for certain embodiments. The depth of the gaps **62** may vary, as may be seen from a comparison of Figures 11 and 12. The gaps **62** in Figure 11 extend only partway to the track substrate **51**, while the gap **62** shown in Figure 12 extends all the way to the track substrate **51.**

[0088] It is also noted that the presence of gaps **62** is exemplary only, and that embodiments without gaps **62** may be equally suitable.

[0089] Furthermore, the shape and configuration of the gap **62** may vary from embodiment to embodiment.

[0090] The gaps **62** in Figure 11 have flat bottoms with square comers, while the gap **62** shown in Figure 12 has a rounded bottom, with full radii on both sides. These configurations are exemplary only, however, and other configurations may be equally suitable.

[0091] Likewise, as may be seen from a comparison of Figures 12 and 13 with Figures 14 and 15, the shape of the projections **60** themselves also may vary from embodiment to embodiment. The projections **60** shown in Figures 12 and 13 are illustrated with a curved cross-section, in particular a cross section approximating segments of a circle. In contrast, the projections **60** shown in Figures 14 and 15 are illustrated with a cross-section in the form of a double wedge or flattened triangle. These configurations are exemplary only, and other configurations may be equally suitable.

[0092] It is noted that many of the figures herein are schematic, or are otherwise simplified for purposes of clarity. However, this should not be interpreted as suggesting that the actual structure of any particular embodiment of a track **50** in accordance with the principles of the claimed invention is or must be simple in shape or design. Figures 16, 17, and 18 show views generally similar to the views of Figures 8, 12, and 10 respectively. However, the embodiment of a track **50** in accordance with the principles of the claimed invention illustrated in Figures 16, 17, and 18 is significantly more complex in terms of structure and shape. As may be seen, the shape and structure of a track **50** in accordance with the principles of the claimed invention may vary considerably from embodiment to embodiment.

[0093] The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

Claims

1. A track (50) having:

a track substrate (51);
a plurality of terrain lugs (58) distributed circumferentially about said track substrate (51) on an outer surface of said track substrate;
a plurality of drive profiles (56) distributed circumferentially about said track substrate (51) on an inner surface of said track substrate; and
a plurality of projections (60) on said inner surface, said projections(60) being arranged so as to engage at least one wheel (30, 70) when said track(50) is in a track system;
the track (50) being **characterized in that** said projections (60) are disposed circumferentially between pairs of the plurality of drive profiles (56) and also disposed laterally between pairs of the plurality of drive profiles (56).

2. The track according to claim 1, wherein said projections (60) define a-gaps (62) therein, said gaps extending laterally across said projection.

3. The track (50) according to claim 2, wherein said gaps (62) are 0.76 to 2.29 mm (.03 to .09 inches) wide.

4. The track(50) according to claim 2, wherein said gaps (62) are 1.27 to 1.78 mm (.05 to .07 inches) wide

5. The track(50) according to claim 2, wherein said gaps (62) are 1.40 to 1.65 mm (.055 to .065 inches) wide.

6. The track (50) according to claim 1, wherein the height of said projections (60) is at least 1.9 mm (. 075 inches).

7. The track (50) according to claim 1, wherein the height of said projections (60) is at least 2.54 mm (. 100 inches).

8. The track (50) according to claim 1, wherein the height of said projections (60) is at least 3.2 mm (.125 inches).

9. The track (50) according to claim 1, wherein the height of said projections (60) is at least 3.81 mm (.150 inches).

10. The track (50) according to claim 1, wherein the height of said projections (60) is at least 4.4 mm (.175 inches).

11. The track (50) according to claim 1, wherein the height of said projections (60) is at least 3% of a radius of the wheel in said track system.

12. The track (50) according to claim 1, wherein the height of said projections (60) is at least 4% of a radius of the wheel in said track system.

13. The track (50) according to claim 1, wherein the height of said projections (60) is at least 5% of a radius of the wheel in said track system.

14. The track (50) according to claim 1, wherein the height of said projections (60) is at least 6% of a radius of the wheel in said track system.

15. The track (50) according to claim 1, wherein the height of said projections (60) is at least 7% of a radius of the wheel in said track system.

16. The track (50) according to claim 1, wherein said noise generated when said track (50) with said projections (60) moves in said track system is at least 4 dB less than said noise generated when said track without said projections moves in said track system.

17. The track (50) according to claim 1, wherein said noise generated when said track (50) with said projections (60) moves in said track system is at least 6 dB less than said noise generated when said track without said projections moves in said track system.

18. The track(50) according to claim 1, wherein said noise generated when said track (50) with said projections (60) moves in said track system is at least 8 dB less than said noise generated when said track without said projections moves in said track system.

19. The track (50) according to claim 1, wherein at least some of said projections (60) have a curved cross-section.

20. The track (50) according to claim 1, wherein at least some of said projections (60) have a double wedge cross-section.

21. The track (50) according to claim 1, wherein said track (50) is a vehicle track for a tracked vehicle.

22. A method of reducing noise produced by a moving track, comprising the steps of:

providing a track (50) having:

a track substrate (51);
a plurality ofterrain lugs (58) distributed circumferentially about said track substrate (51) on an outer surface of said track substrate (51); and a plurality of drive profiles (56) distributed circumferentially about said track substrate (51) on an inner surface of said track substrate;

providing a plurality of projections (60) on said inner surface, such that said projections (60) are arranged so as to engage a wheel (30, 70) when said track (50) is in a track system;
the method **characterized by** disposing said projections (60) circumferentially between pairs of the plurality of drive profiles (56) and also laterally between pairs of the plurality of drive profiles (56).

23. The method according to claim 22, further comprising the step of defining gaps (62) in said projections (60), said gaps extending laterally across said projection.

24. The method according to claim 24, wherein said gaps (62) are 0.76 to 2.29 mm (.03 to .09 inches) wide.

25. The method according to claim 24, wherein said gaps (62) are 1.27 to 1.78 mm (.05. to .07 inches) wide

26. The method according to claim 24, wherein said gaps (62) are 1.40 to 1.65 mm (.055 to .065 inches) wide.

27. The method according to claim 22, wherein the height of said projections (60) is at least 1.9 mm (.075 inches).

28. The method according to claim 22, wherein the height of said projections (60) is at least 2.54 mm (.100 inches).

29. The method according to claim 22, wherein the height of said projections (60) is at least 3.2 mm (.125 inches).

30. The method according to claim 22, wherein the height of said projections (60) is at least 3.81 mm (.150 inches).

31. The method according to claim 22, wherein the height of said projections (60) is at least 4.4 mm (. 175 inches).

32. The method according to claim 22, wherein the height of said projections (60) is at least 3% of a radius of the wheel in said track system.

33. The method according to claim 22, wherein the height of said projections (60) is at least 4% of a radius of the wheel in said track system.

34. The method according to claim 22, wherein the height of said projections (60) is at least 5% of a radius of the wheel in said track system.

35. The method according to claim 22, wherein the height of said projections (60) is at least 6% of a radius of the wheel in said track system.

36. The method according to claim 22, wherein the height of said projections (60) is at least 7% of a radius of the wheel in said track system.

Patentansprüche

1. Kettenglied (50) umfassend:

ein Kettengliedträger (51);
eine Mehrzahl von Geländenasen (58), die umlaufend über den Kettengliedträger (51) auf einer Außenfläche des Kettengliedträgers verteilt sind;
eine Mehrzahl von Antriebsprofilen (56), die umlaufend über den Kettengliedträger (51) auf einer Innenfläche des Kettengliedträgers verteilt sind; und
eine Mehrzahl von Vorsprüngen (60) auf der wie um mindestens in ein Rad (30; 70) einzugreifen, wenn sich das Kettenglied (50) in einem Kettengliedsystem befindet;
wobei das Kettenglied (50) **dadurch gekennzeichnet ist, dass** die Vorsprünge (60) umlaufend zwischen Paaren der Mehrzahl von Antriebsprofilen (56) angeordnet sind und auch seitlich zwischen den Paaren der Mehrzahl von Antriebsprofilen (56) angeordnet sind.

2. Kettenglied gemäß Anspruch 1, wobei die Vorsprungs (60) a-Spalten (62) darin definieren, wobei sich die Spalten seitlich über den Vorsprung erstrekken.

3. Kettenglied (50) gemäß Anspruch 2, wobei die Spalten (62) 0,76 bis 2,29 mm (.03 bis .09 Inch) breit sind.

4. Kettenglied (50) gemäß Anspruch 2, wobei die Spalten (62) 1,27 bis 1,78 mm (.05 bis .07 Inch) breit sind.

5. Kettenglied (50) gemäß Anspruch 2, wobei die Spalten (62) 1,40 bis 1,65 mm (.055 bis .065 Inch) breit sind.

6. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 1,9 mm (.075 Inch) beträgt.

7. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 2,54 mm (.100 Inch) beträgt.

8. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 3,2 mm (.125 Inch) beträgt.

9. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 3,81 mm (.150 Inch) beträgt.

10. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 4,4 mm (.175 Inch) beträgt.

11. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 3% eines Radius des Rades in dem Kettengliedsystem beträgt.

12. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 4% eines Radius des Rades in dem Kettengliedsystem beträgt.

13. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 5% eines Radius des Rades in dem Kettengliedsystem beträgt.

14. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 6% eines Radius des Rades in dem Kettengliedsystem beträgt.

15. Kettenglied (50) gemäß Anspruch 1, wobei die Höhe der Vorsprünge (60) mindestens 7% eines Radius des Rades in dem Kettengliedsystem beträgt.

16. Kettenglied (50) gemäß Anspruch 1, wobei das erzeugte Geräusch, wenn sich das Kertenglied (50) mit den Vorsprüngen (60) in dem Kettengliedsystem bewegt wenn sich des Kettenglied ohne die Vorsprünge in dem Kettengliedsystem bewegt.

17. Kettenglied (50) gemäß Anspruch 1, wobei das erzeugte Geräusch, wens sich das Kettenglied (50) mit den Vorsprüngen (60) in dem Kettengliedsystem bewegt mindestens 6 dB niedriger ist, als das erzeugte Geräusch, wenn sich das Kettenglied ohne die Vorsprünge in dem Kettengliedsystem bewegt.

18. Kettenglied (50) gemäß Anspruch 1, wobei das erzeugte Geräusch, wenn sich das Kettenglied (50) mit den Vorsprüngen (60) in dem Kettengliedsystem bewegt mindestens 8 dB niedriger ist, als das erzeugte Geräusch, wenn sich das Kettenglied ohne die Vorsprünge in dem Kettengliedsystem bewegt.

19. Kettenglied (50) gemäß Anspruch 1, wobei mindestens einige der Vorsprünge (60) einen gebogenen Querschnitt besitzen.

20. Kettenglied (50) gemäß Anspruch 1, wobei mindestens einige der Vorsprünge (60) einem Doppelkeilquerschnitt besitzen.

21. Kettenglied (50) gemäß Anspruch 1, wobei das Kettenglied (50) ein Fahrzeugkettenglied für ein Raupenfahrzeug ist.

22. Verfahren zum Reduzieren von einem durch ein sich bewegendes Kettenglied erzeugten Geräusch, das die folgenden Schritte umfasst:

Bereitstellen eines Kettengliedes (50) mit:

einem Kettengliedträger (51);
einer Mehrzahl von Geländenasen (58), die umlaufend über den Kettengliedträger (51) auf einer Außenfläche des Kettengliedträgers (51) verteilt sind; und
einer Mehrzahl von Antriebsprofilen (56), die umlaufend über den Kettengliedträger (51) auf einer Innenfläche des Kettengliedträgers verteilt sind; Bereitstellen einer Mehrzahl von Vorsprüngen (60) auf der Innenfläche, so dass die Vorsprünge (60) so angeordnet sind, dass sie in ein Rad (30; 70) eingreifen, wenn sich das Kettenglied (50) in einem Kettengliedsystem befindet; wobei das Verfahren durch umlaufendes Anordnen der Vorsprünge (60) zwischen Paaren der Mehrzahl von Antriebsprofilen (56) und auch seitlich zwischen den Paaren der Mehrzahl von Antriebsprofilen (56) gekennzeichnet ist.

23. Verfahren gemäß Anspruch 22, das ferner den Schritt des Definierens von Spalten (62) in den Vorsprüngen (60) umfasst, wobei die Spalten sich seitlich über den Vorsprung erstrecken.

24. Verfahren gemäß Anspruch 24, wobei die Spalten (62) 0,76 bis 2,29 mm (.03 bis .09 Inch) breit sind.

25. Verfahren gemäß Anspruch 24, wobei die Spalten (62) 1,27 bis 1,78 mm (.05 bis .07 Inch) breit sind.

26. Verfahren gemäß Anspruch 24, wobei die Spalten (62) 1,40 bis 1,65n mm (.055 bis .065 Inch) breit sind.

27. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (66) mindestens 1,9 mm (.075 Inch) beträgt.

28. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 2,54 mm (.100 Inch) beträgt.

29. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 3,2 mm (.125 Inch) beträgt.

30. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 3,81 mm (.150 Inch) beträgt.

31. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 4,4 mm (.175 Inch) beträgt.

32. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 3% eines Radius des Rades in dem Kettengliedsystem beträgt.

33. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 4% eines Radius des Rades in dem Kettengliedsystem beträgt.

34. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 5% eines Radius des Rades in dem Kettengliedsystem beträgt.

35. Verfahren gemäß Anspruch 22, wobei die Höhe der Vorsprünge (60) mindestens 6% eines Radius des Rades in

36. Verfahren gemäß Anspruch 22, wobei die Höhe der dem Kettengliedsystem beträgt.

Revendications

1. Chenille (50) ayant:

un substrat de chenille (51) ;
une pluralité de crampons (58) répartis de manière circonférentielle autour dudit substrat de chenille (51) sur une surface externe dudit substrat de chenille ;
une pluralité de profils d'entraînement (56) répartis de manière circonférentielle autour dudit substrat de chenille (51) sur une surface interne dudit substrat de chenille ; et
une pluralité de saillies (60) sur ladite surface interne, lesdites saillies (60) étant agencées afin de mettre en prise au moins une roue (30, 70)

lorsque ladite chenille (50) est dans un système de chenille;
la chenille (50) étant **caractérisée en ce que** lesdites saillies (60) sont disposées de manière circonférentielle entre des paires de la pluralité de profils d'entraînement (56) et également disposées latéralement entre des paires de la pluralité de profils d'entraînement (56).

2. Chenille selon la revendication 1, dans laquelle lesdites saillies (60) définissent des espaces (62) à l'intérieur de celles-ci, lesdits espaces s'étendant latéralement sur ladite saillie.

3. Chenille (50) selon la revendication 2, dans laquelle lesdits espaces (62) mesurent de 0,76 à 2,29 mm (0,03 à 0,09 pouces) de large.

4. Chenille (50) selon la revendication 2, dans laquelle lesdits espaces (62) mesurent de 1,27 à 1,78 mm (0,05 à 0,07 pouces) de large.

5. Chenille (50) selon la revendication 2, dans laquelle lesdits espaces (62) mesurent de 1,40 à 1,65 mm (0,055 à 0,065 pouces) de large.

6. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) est d'au moins 1,9 mm (0,075 pouces).

7. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) est d'au moins 2,54 mm (0,100 pouces).

8. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) est d'au moins 3,2 mm (0,125 pouces).

9. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) est d'au moins 3,31 mm (0,150 pouces).

10. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) est d'au moins 4,4 mm (0,175 pouces).

11. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) représente au moins 3% d'un rayon de la roue dans ledit système de chenille.

12. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) représente au moins 4% d'un rayon de la roue dans ledit système de chenille.

13. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) représente au moins 5% d'un rayon de la roue dans ledit système de chenille.

14. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) représente au moins 6% d'un rayon de la roue dans ledit système de chenille.

15. Chenille (50) selon la revendication 1, dans laquelle la hauteur desdites saillies (60) représente au moins 7% d'un rayon de la roue dans ledit système de chenille.

16. Chenille (50) selon la revendication 1, dans laquelle ledit bruit généré lorsque ladite chenille (50) avec lesdites saillies (60) se déplace dans ledit système de chenille, est d'au moins 4 dB de moins que ledit bruit généré lorsque ladite chenille, sans lesdites saillies, se déplace dans ledit système de chenille.

17. Chenille (50) selon la revendication 1, dans laquelle ledit bruit généré lorsque ladite chenille (50) avec lesdites saillies (60) se déplace dans ledit système de chenille est d'au moins 6 dB de moins que ledit bruit généré lorsque ladite chenille, sans lesdites saillies, se déplace dans ledit système de chenille.

18. Chenille (50) selon la revendication 1, dans laquelle ledit bruit généré lorsque ladite chenille (50) avec lesdites saillies (60) se déplace dans ledit système de chenille est d'au moins 8 dB de moins que ledit bruit généré lorsque ladite chenille, sans lesdites saillies, se déplace dans ledit système de chenille.

19. Chenille (50) selon la revendication 1, dans laquelle au moins certaines desdites saillies (60) ont une section transversale incurvée.

20. Chenille (50) selon la revendication 1, dans laquelle au moins certaines desdites saillies (60) ont une section transversale à double cale.

21. Chenille (50) selon la revendication 1, dans laquelle ladite chenille (50) est une chenille de véhicule pour un véhicule à chenille.

22. Procédé permettant de réduire le bruit produit par une chenille mobile, comprenant les étapes consistant à :

prévoir une chenille (50) ayant :

un substrat de chenille (51) ;
une pluralité de crampons (58) répartis de manière circonférentielle autour dudit substrat de chenille (51) sur une surface externe dudit substrat de chenille (51) ; et
une pluralité de profils d'entraînement (56)

répartis de manière circonférentielle autour dudit substrat de chenille (51) sur une surface interne dudit substrat de chenille ;
prévoir une pluralité de saillies (60) sur ladite surface interne, de sorte que lesdites saillies (60) sont agencées afin de mettre en prise une roue (30, 70) lorsque ladite chenille (50) est dans un système de chenille;
le procédé étant **caractérisé par** l'étape consistant à disposer lesdites saillies (60) de manière circonférentielle entre des paires de la pluralité de profils d'entraînement (56) et également latéralement entre des paires de la pluralité de profils d'entraînement (56).

23. Procédé selon la revendication 22, comprenant en outre l'étape consistant à définir des espaces (62) dans lesdites saillies (60), lesdits espaces s'étendant latéralement sur ladite saillie.

24. Procédé selon la revendication 24, dans lequel lesdits espaces (62) mesurent de 0,76 à 2,29 mm (0,03 à 0,09 pouces) de large.

25. Procédé selon la revendication 24, dans lequel lesdits espaces (62) mesurent de 1,27 à 1,78 mm (0,05 à 0,07 pouces) de large.

26. Procédé selon la revendication 24, dans lequel lesdits espaces (62) mesurent de 1,40 à 1,65 mm (0,055 à 0,065 pouces) de large.

27. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) est d'au moins 1,9 mm (0,075 pouces).

28. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) est d'au moins 2,54 mm (0,100 pouce).

29. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) est d'au moins 3,2 mm (0,125 pouces).

30. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) est d'au moins 3,81 mm (0,150 pouces).

31. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) est d'au moins 4,4 mm (0,175 pouces).

32. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) représente au moins 3% d'un rayon de la roue dudit système de chenille.

33. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) représente au moins 4% d'un rayon de la roue dans ledit système de chenille.

34. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) représente au moins 5% d'un rayon de la roue dans ledit système de chenille.

35. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) représente au moins 6% d'un rayon de la roue dans ledit système de chenille.

36. Procédé selon la revendication 22, dans lequel la hauteur desdites saillies (60) représente au moins 7% d'un rayon de la roue dans ledit système de chenille.

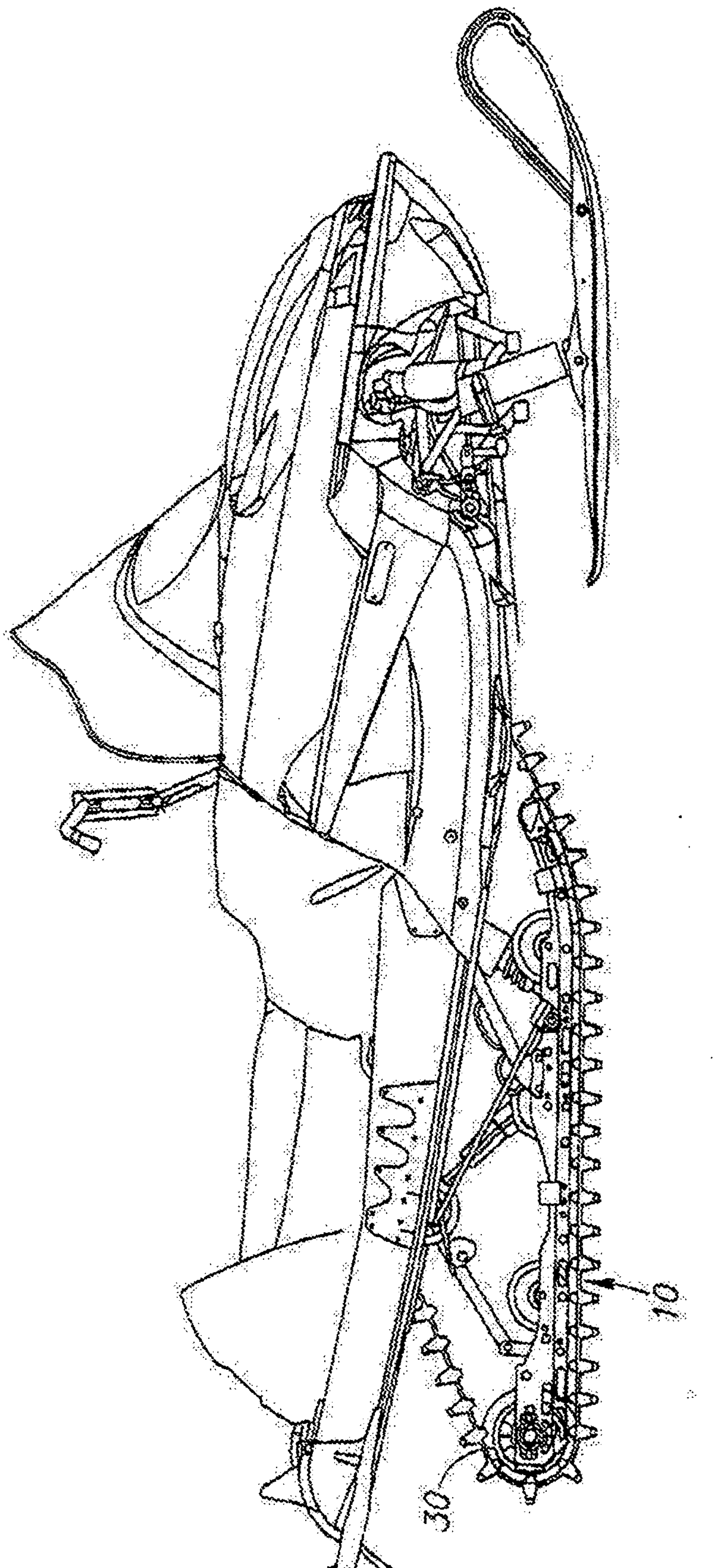


FIG.1
PRIOR ART

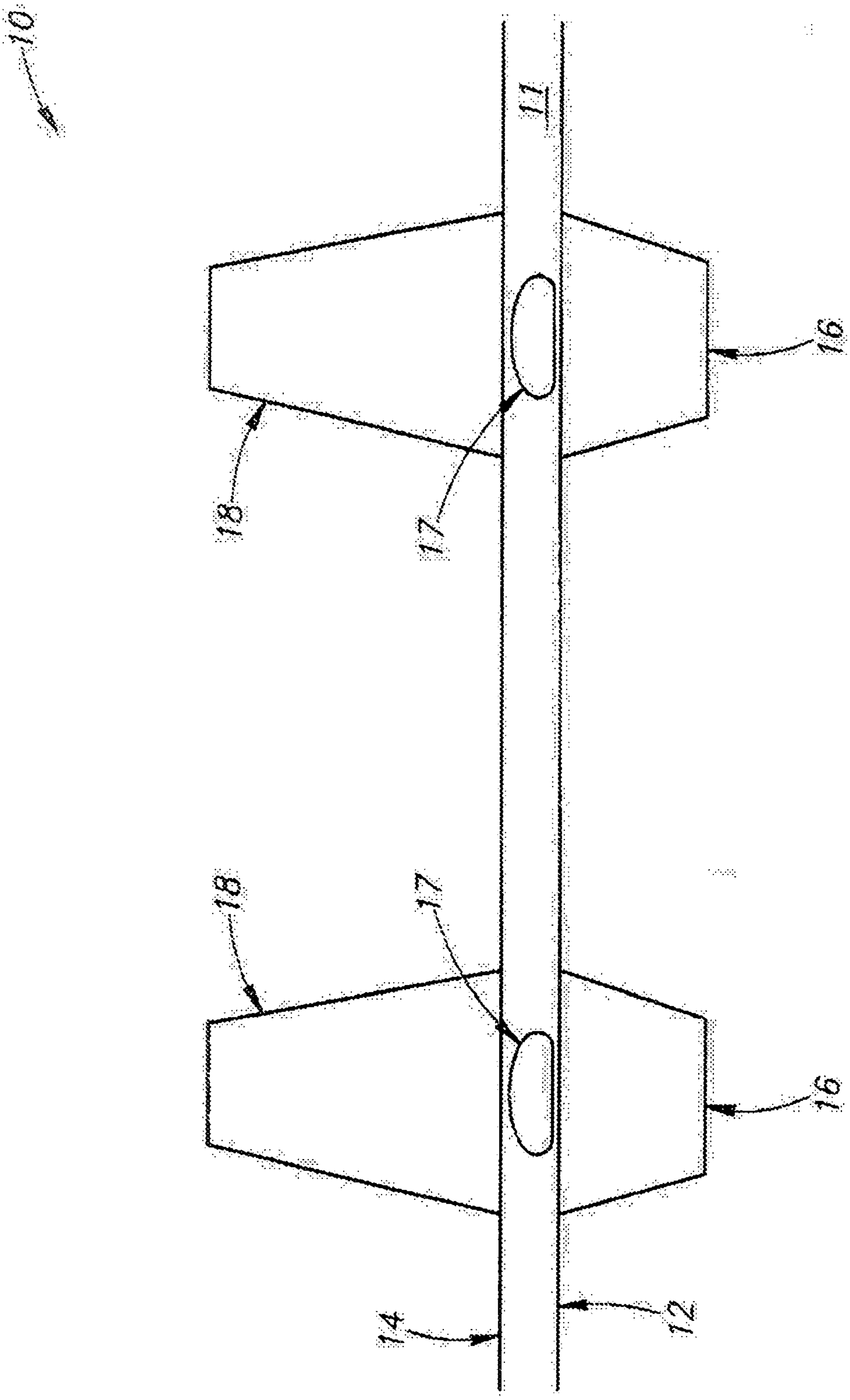


FIG.2
PRIOR ART

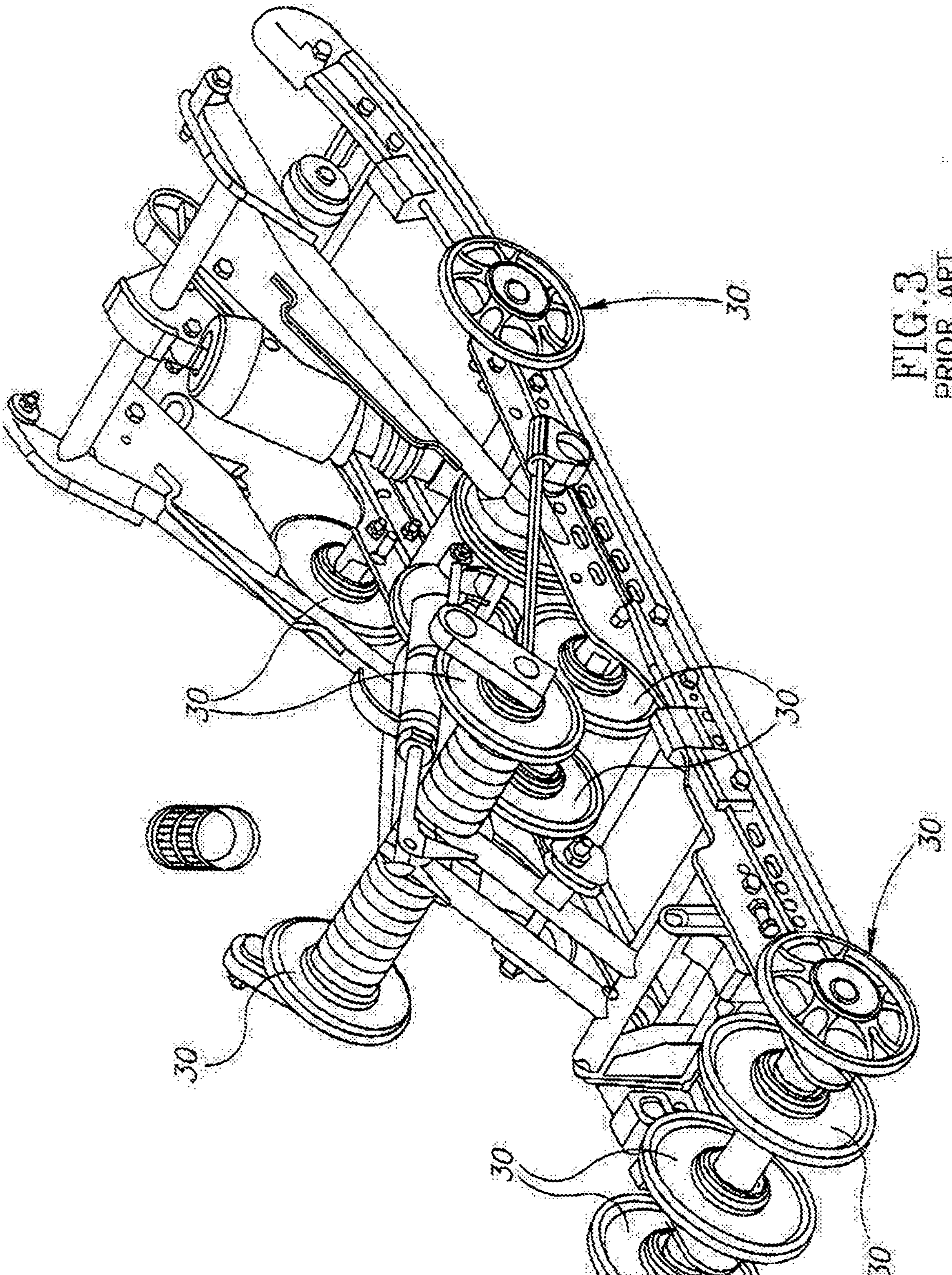


FIG. 3
PRIOR ART

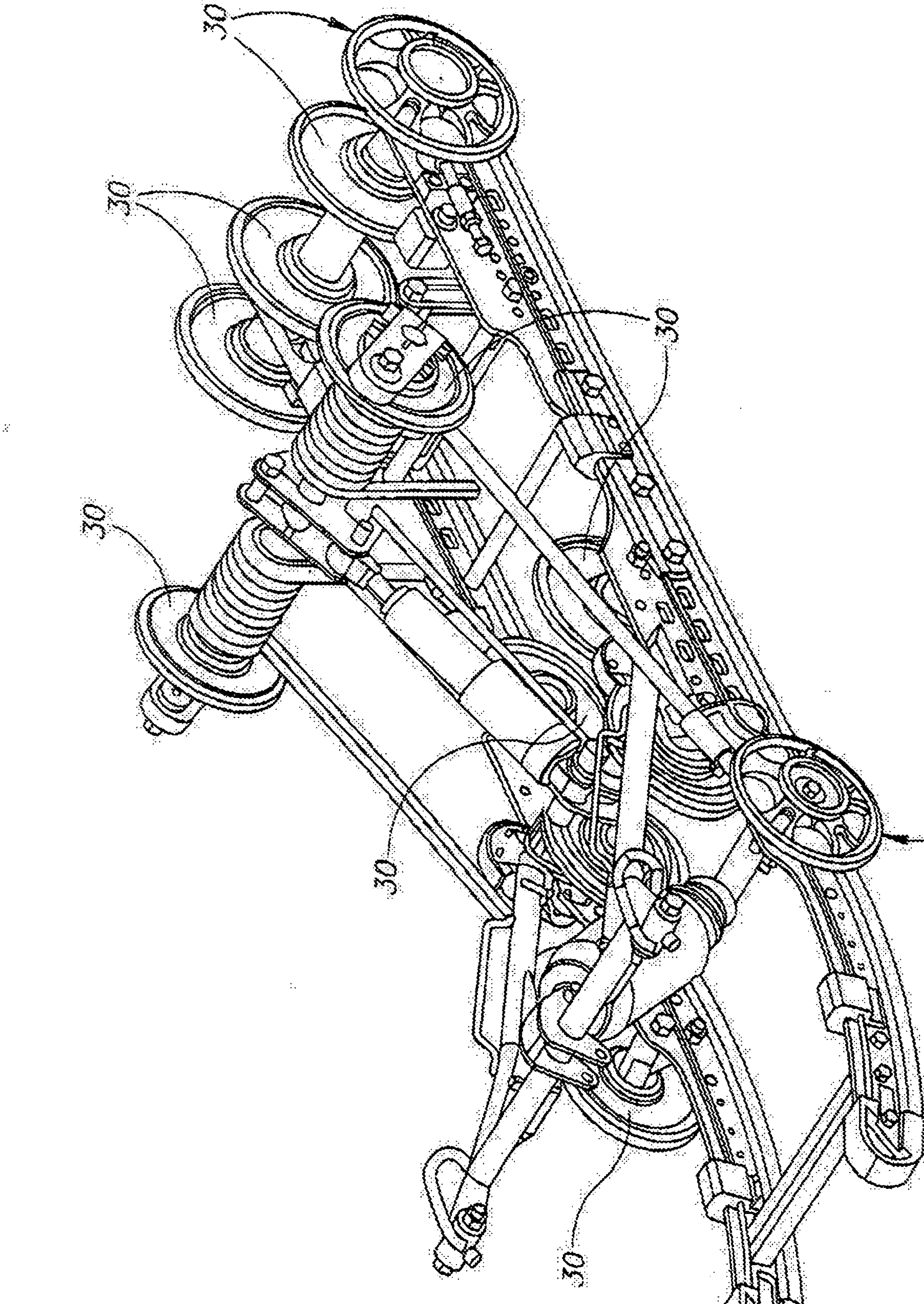


FIG. 4
PRIOR ART

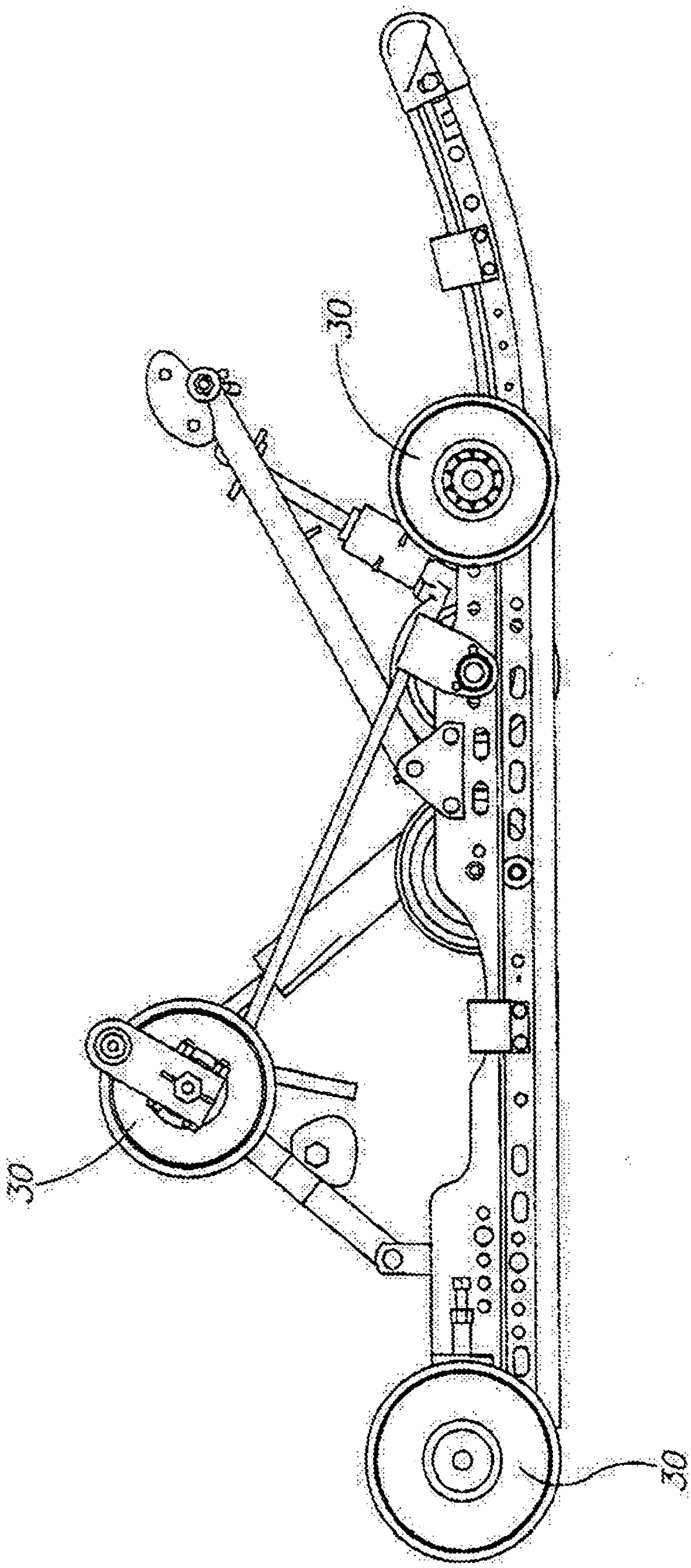


FIG.5
PRIOR ART

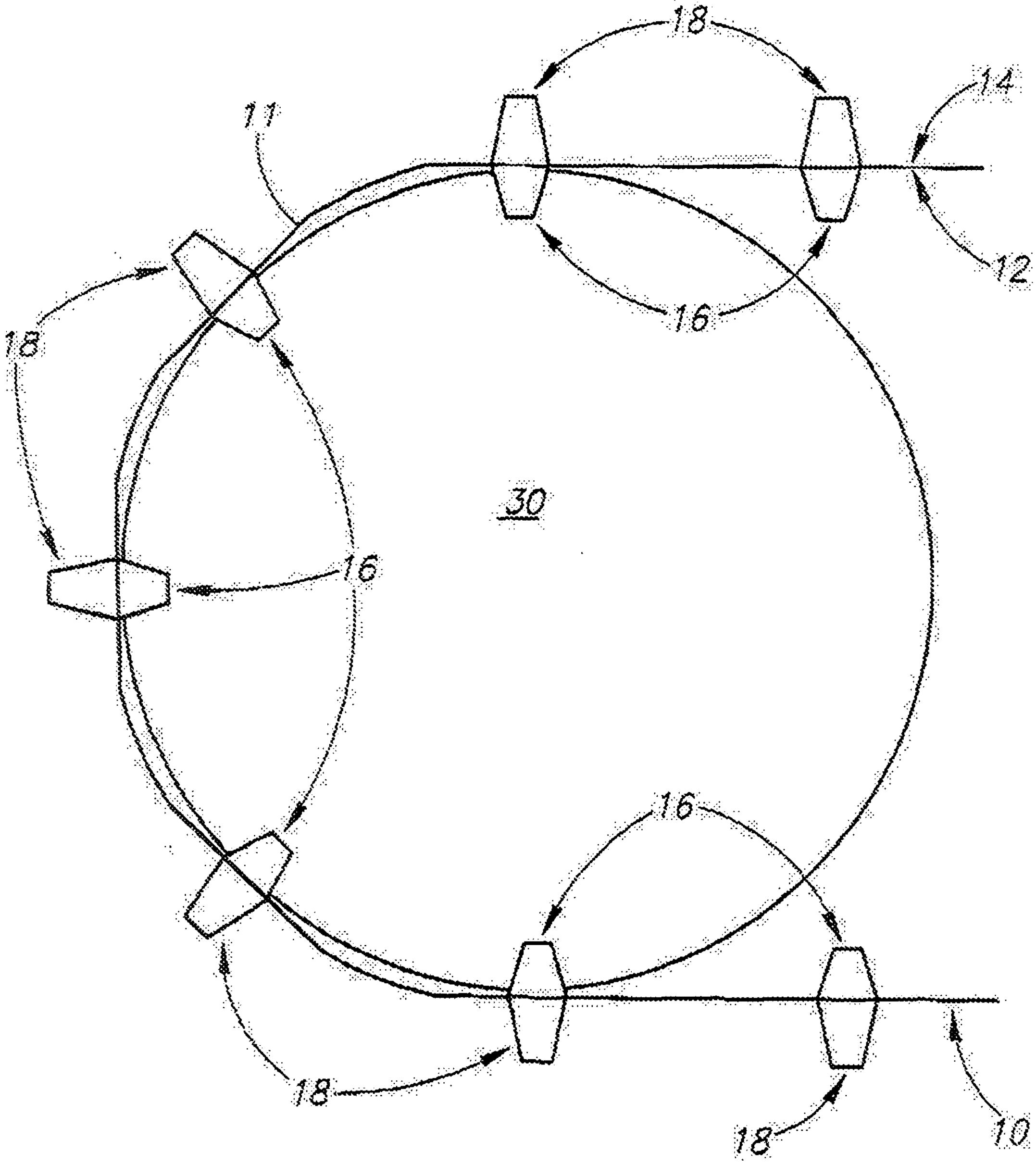


FIG.6
PRIOR ART

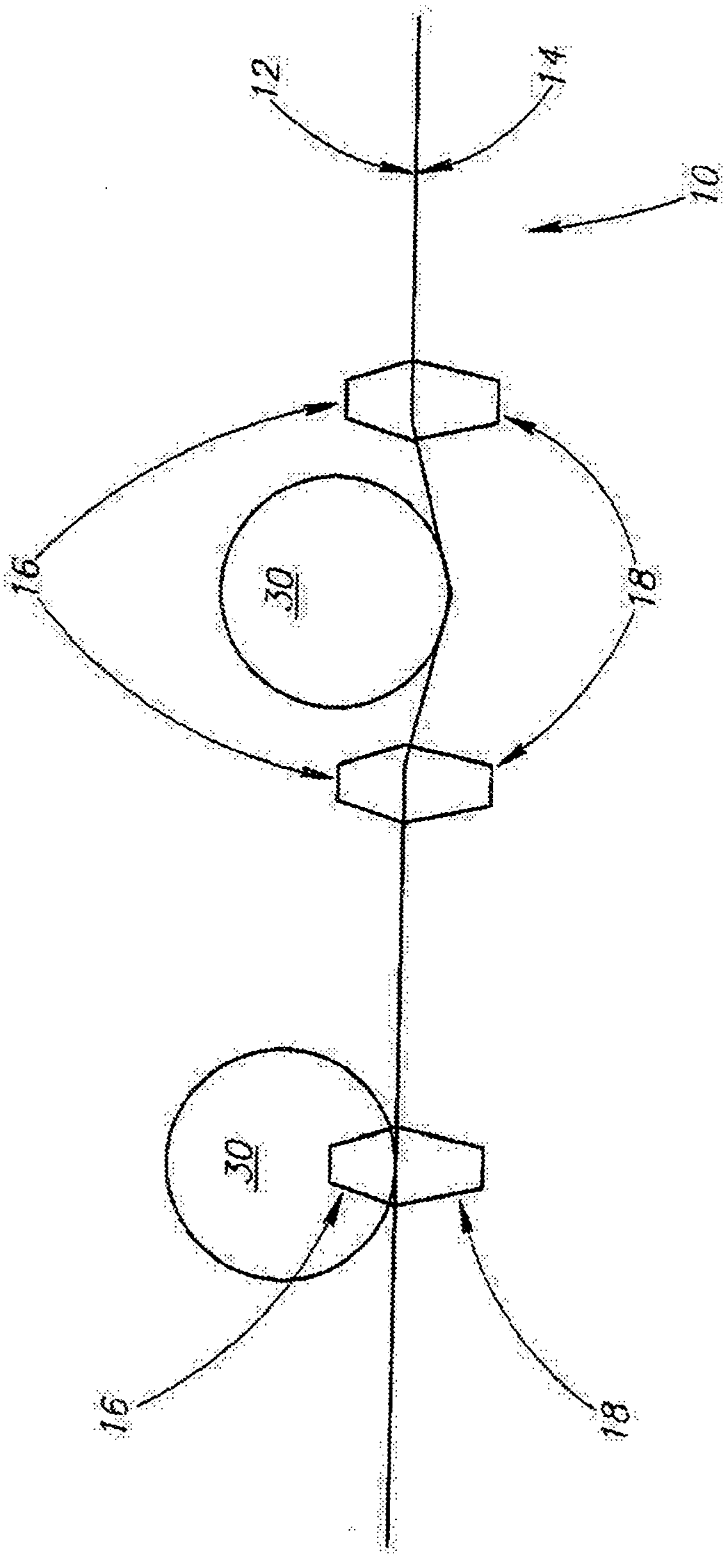


FIG. 7
PRIOR ART

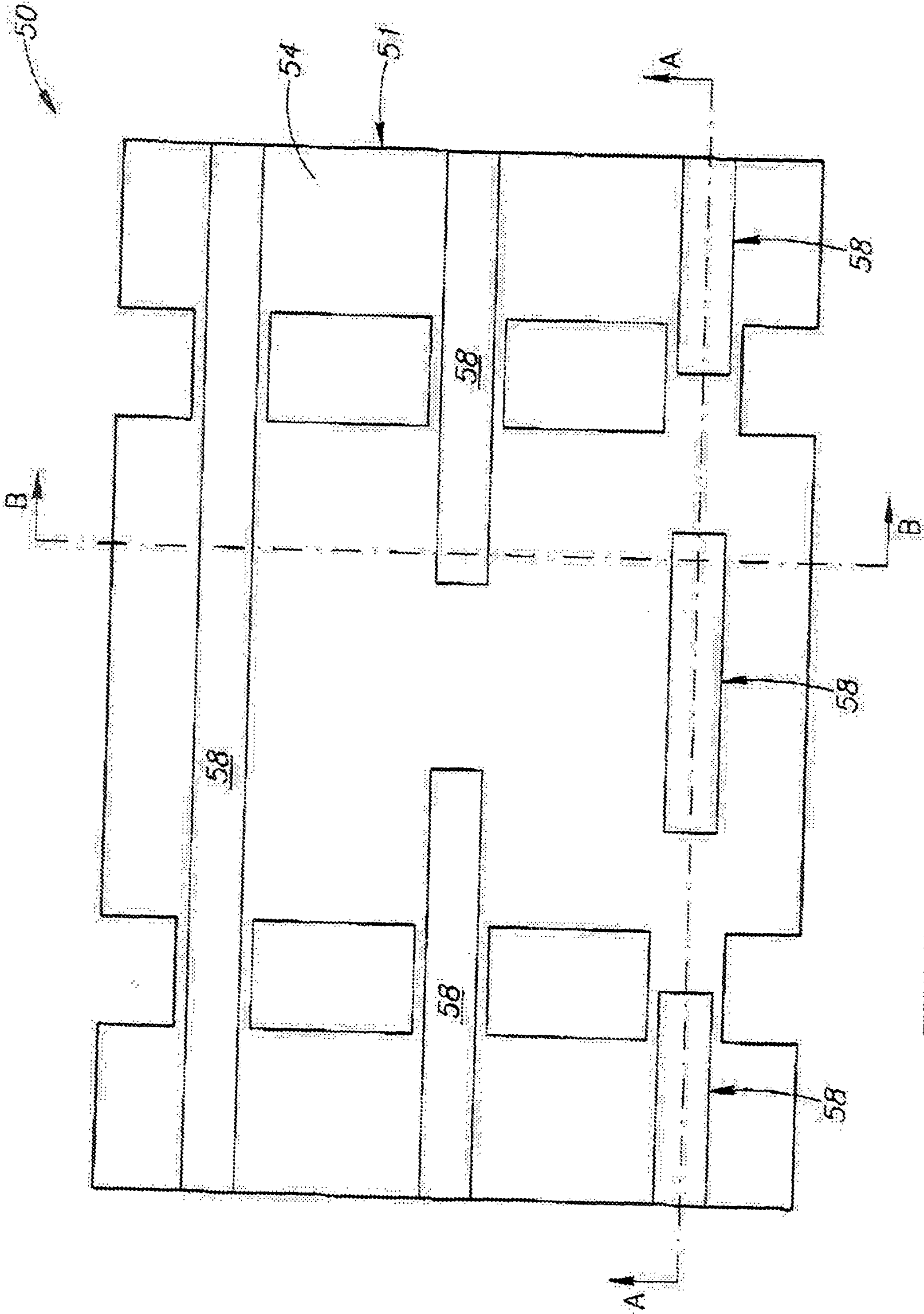


FIG.8

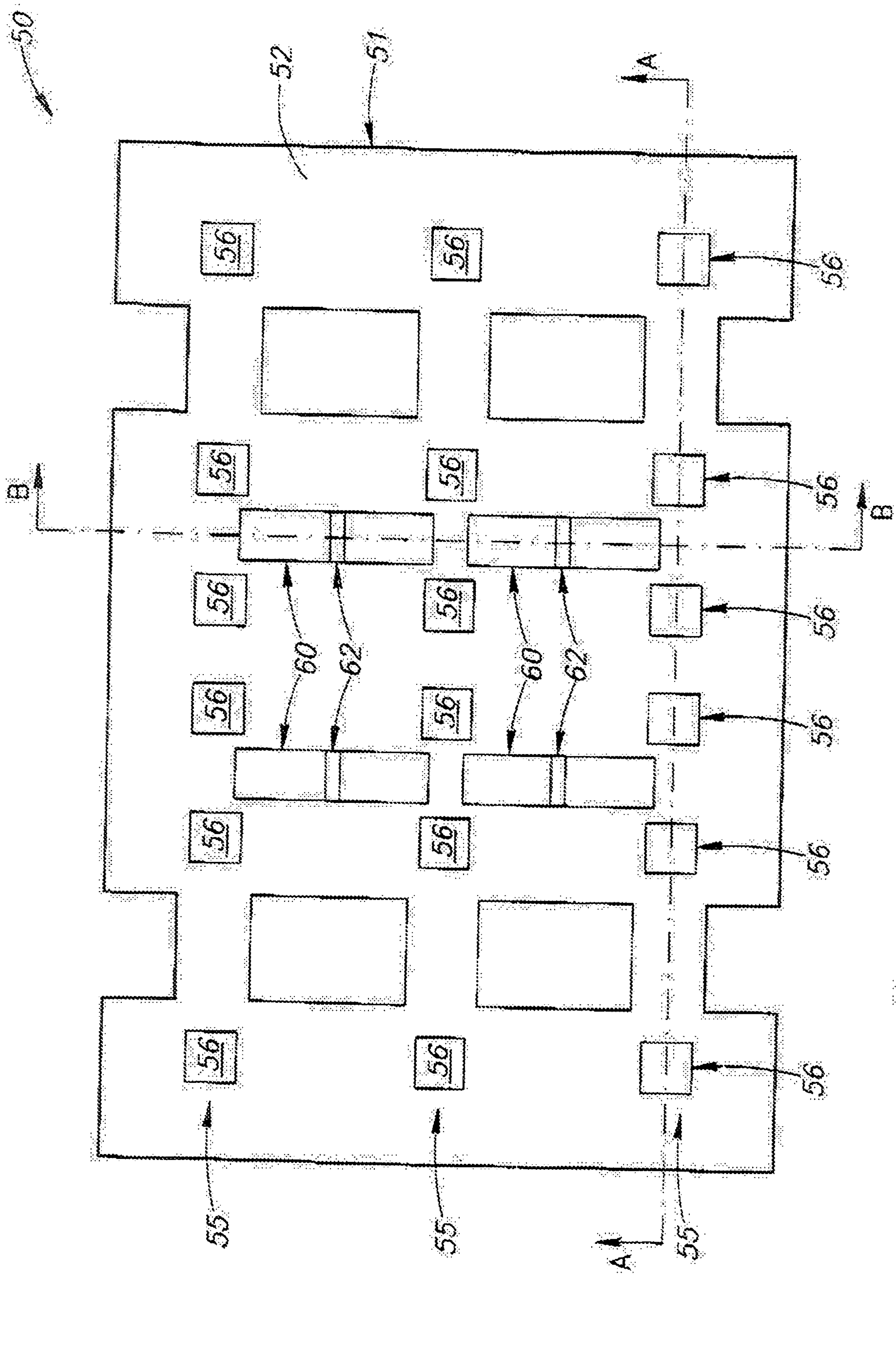
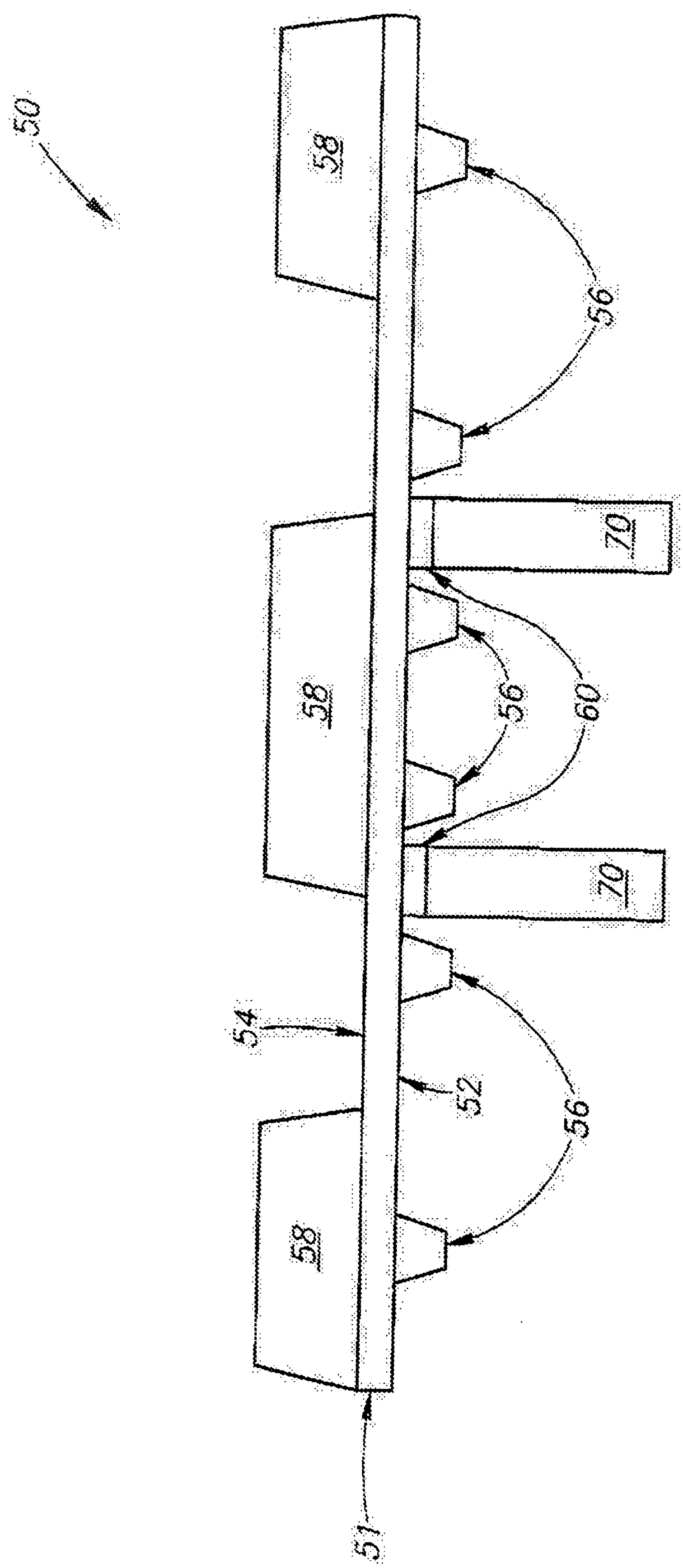


FIG. 9



SECTION A—A

FIG.10

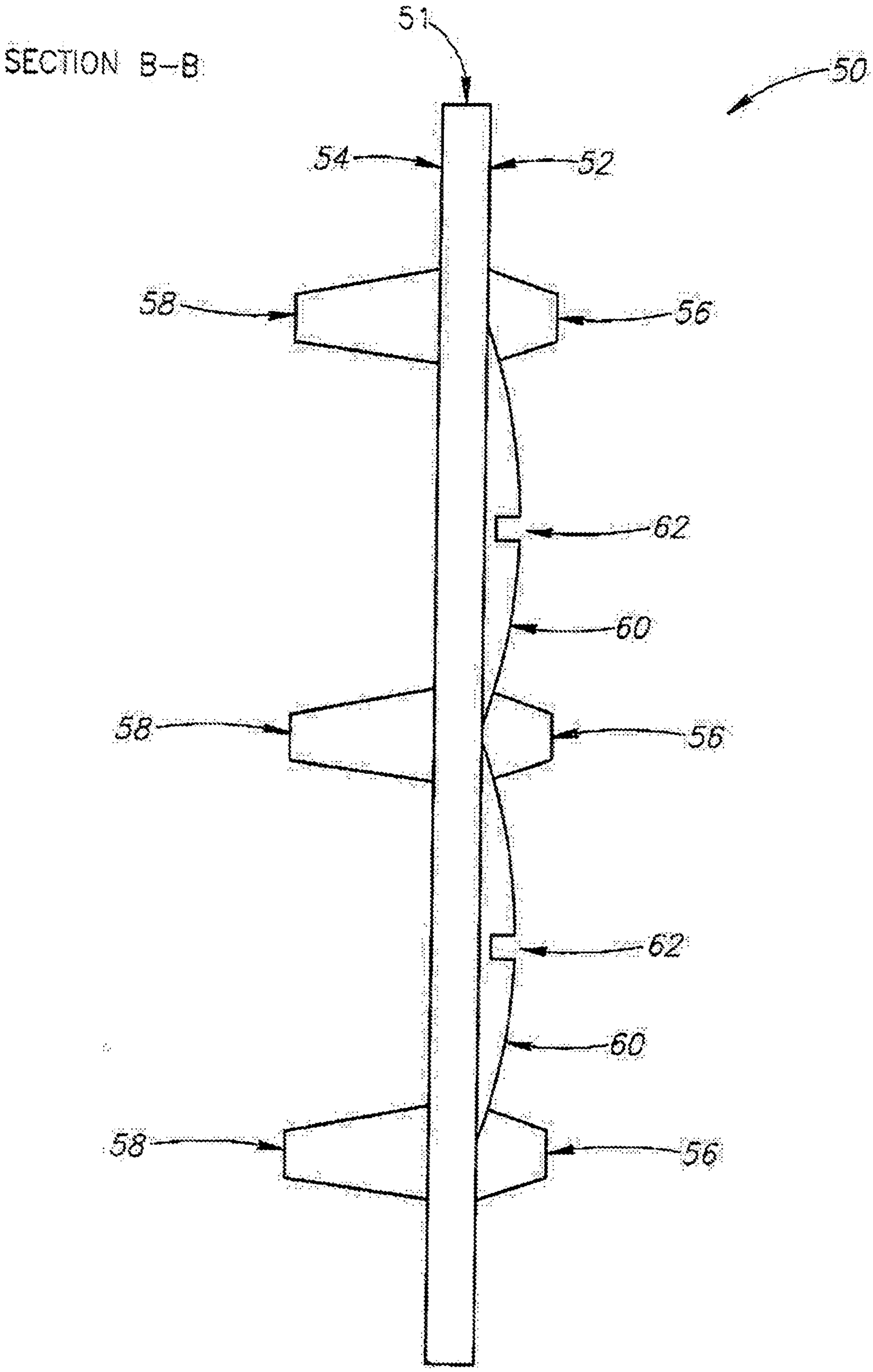


FIG.11

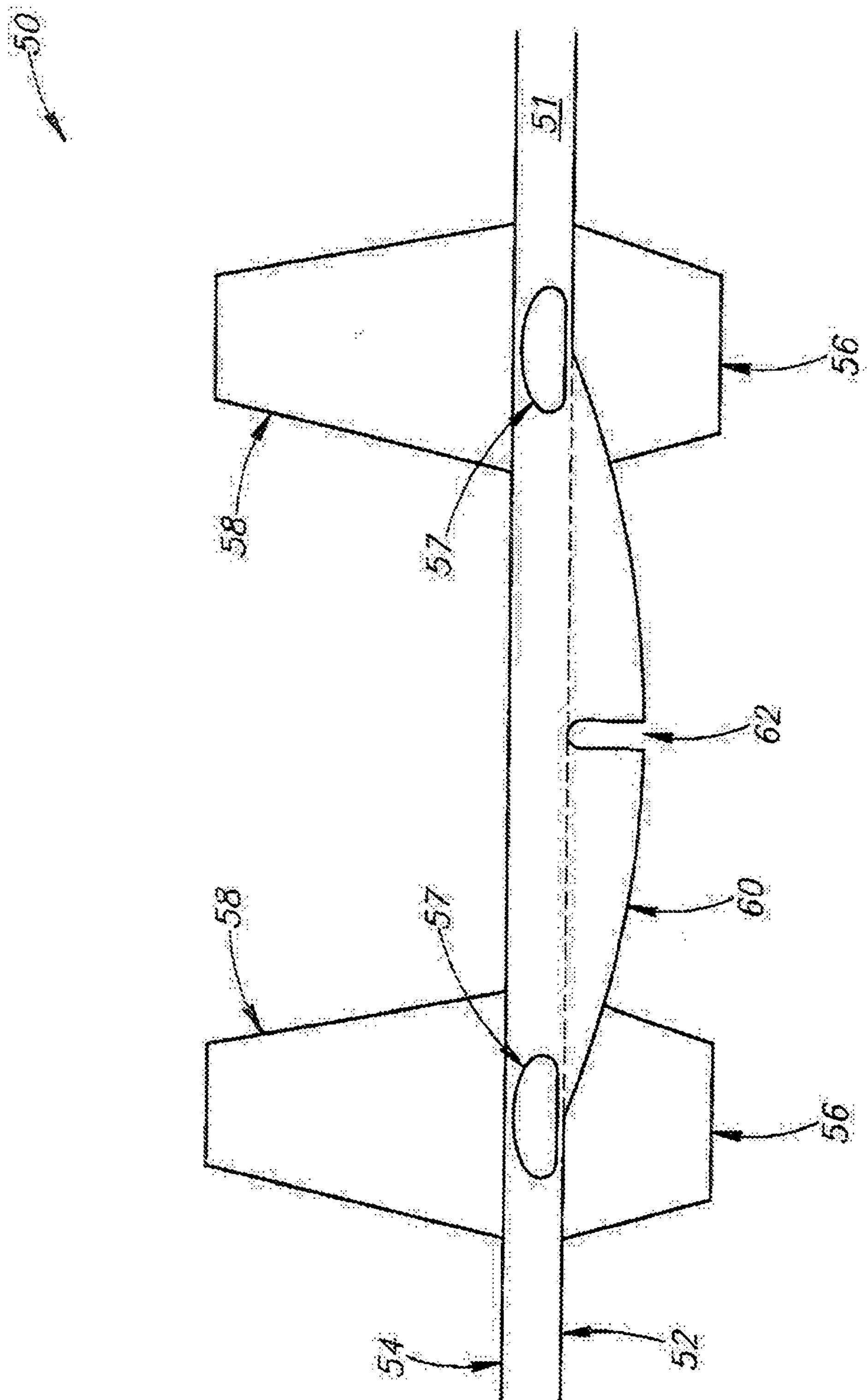


FIG.12

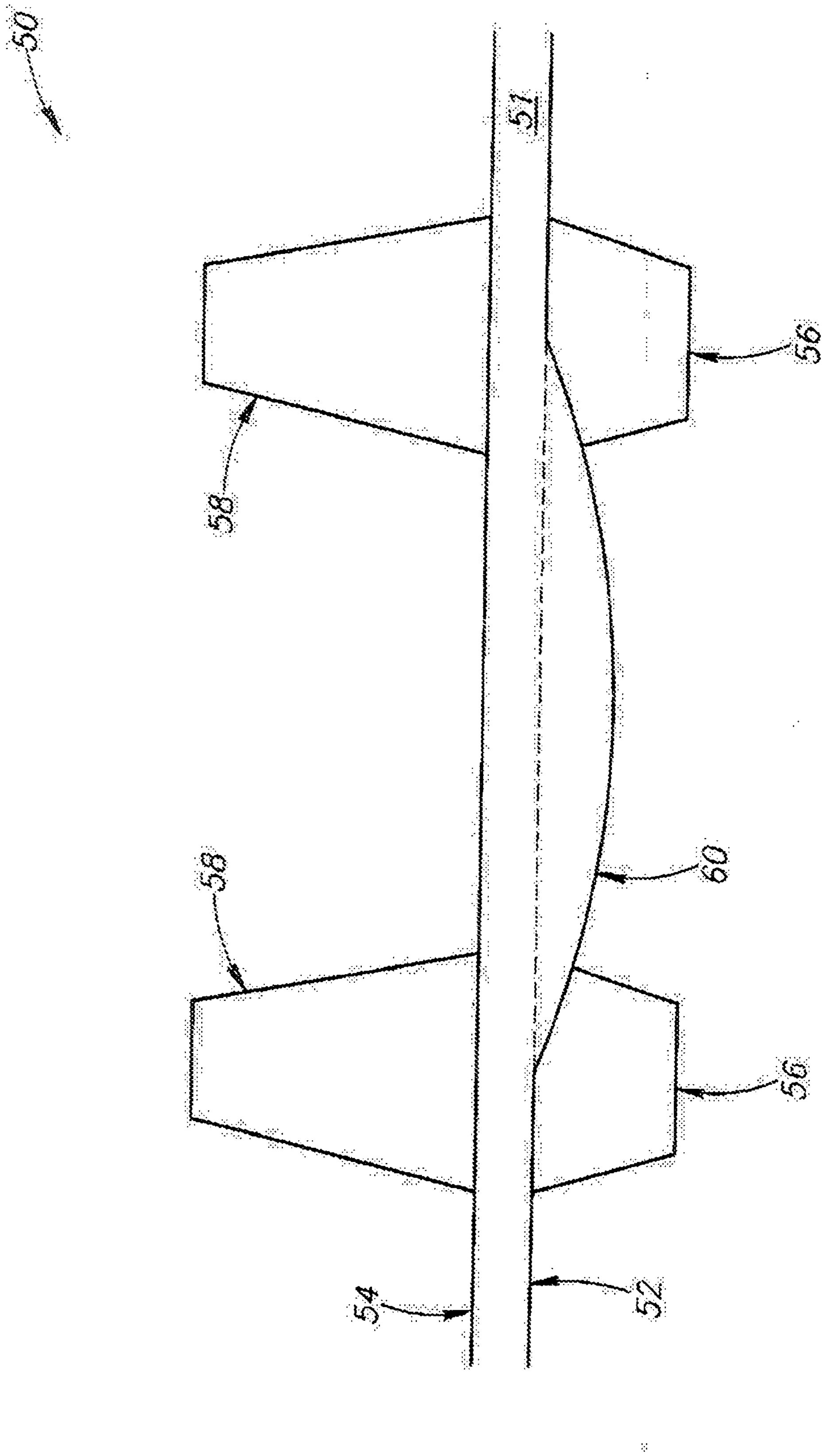


FIG. 13

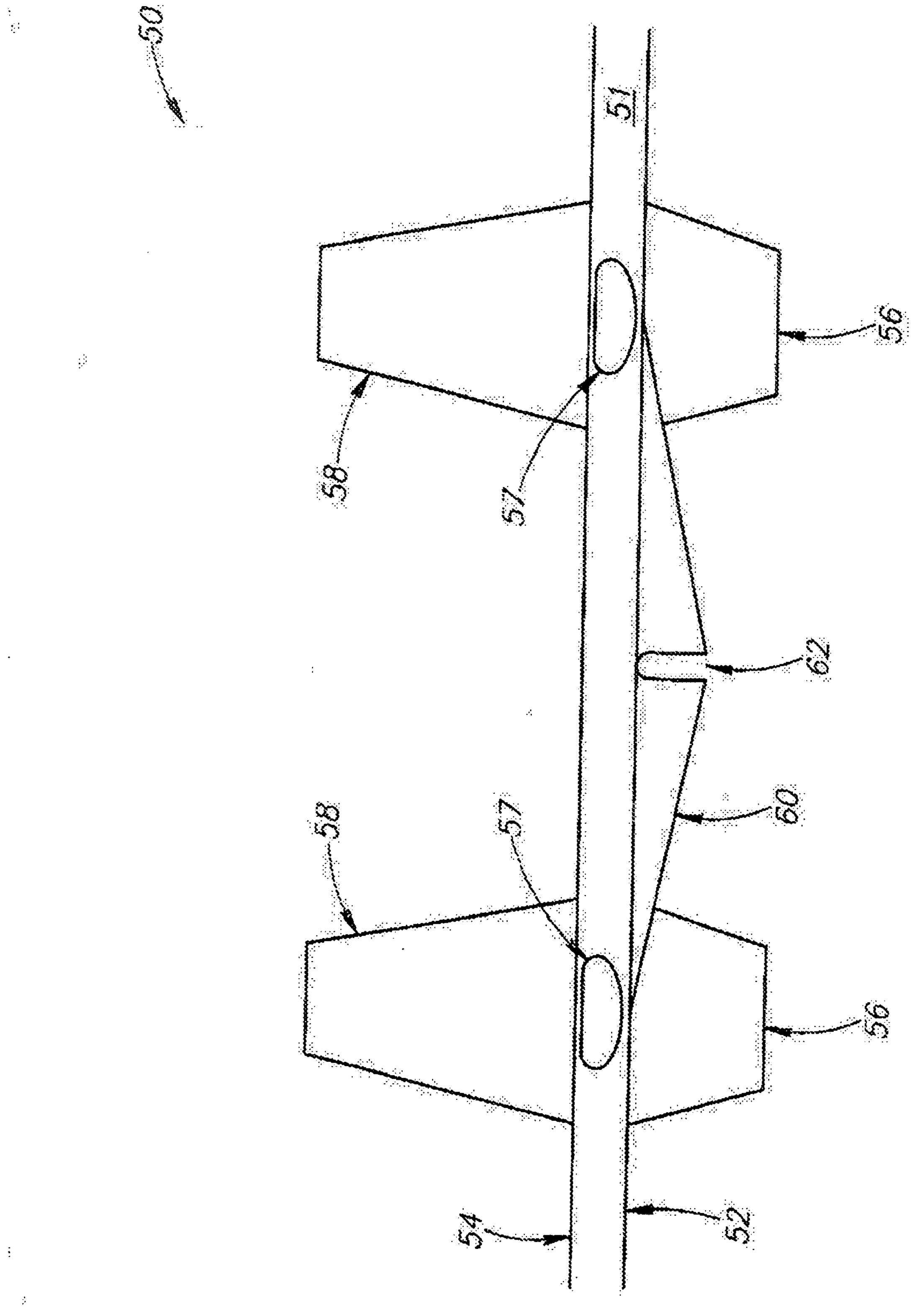


FIG.14

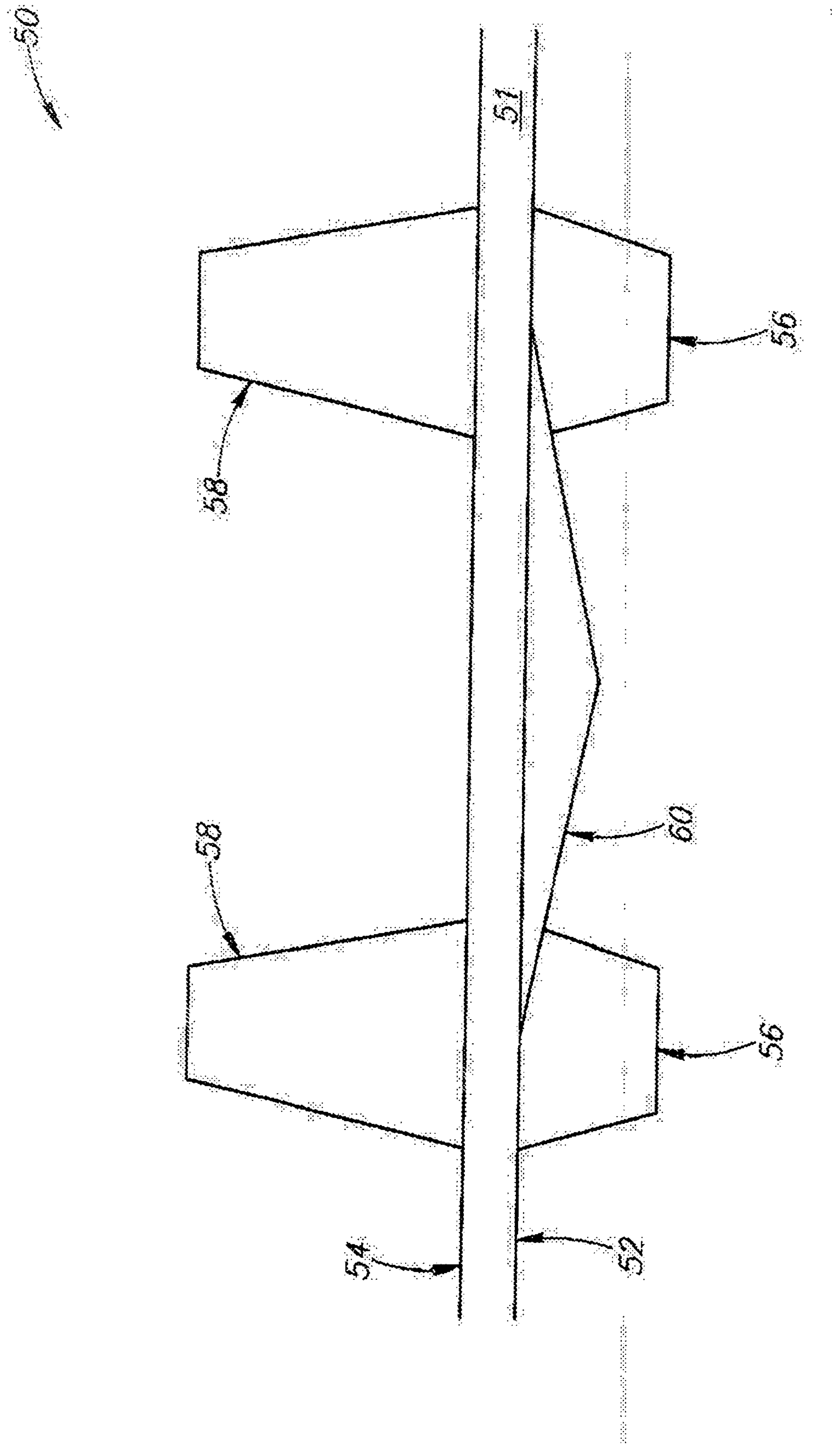


FIG.15

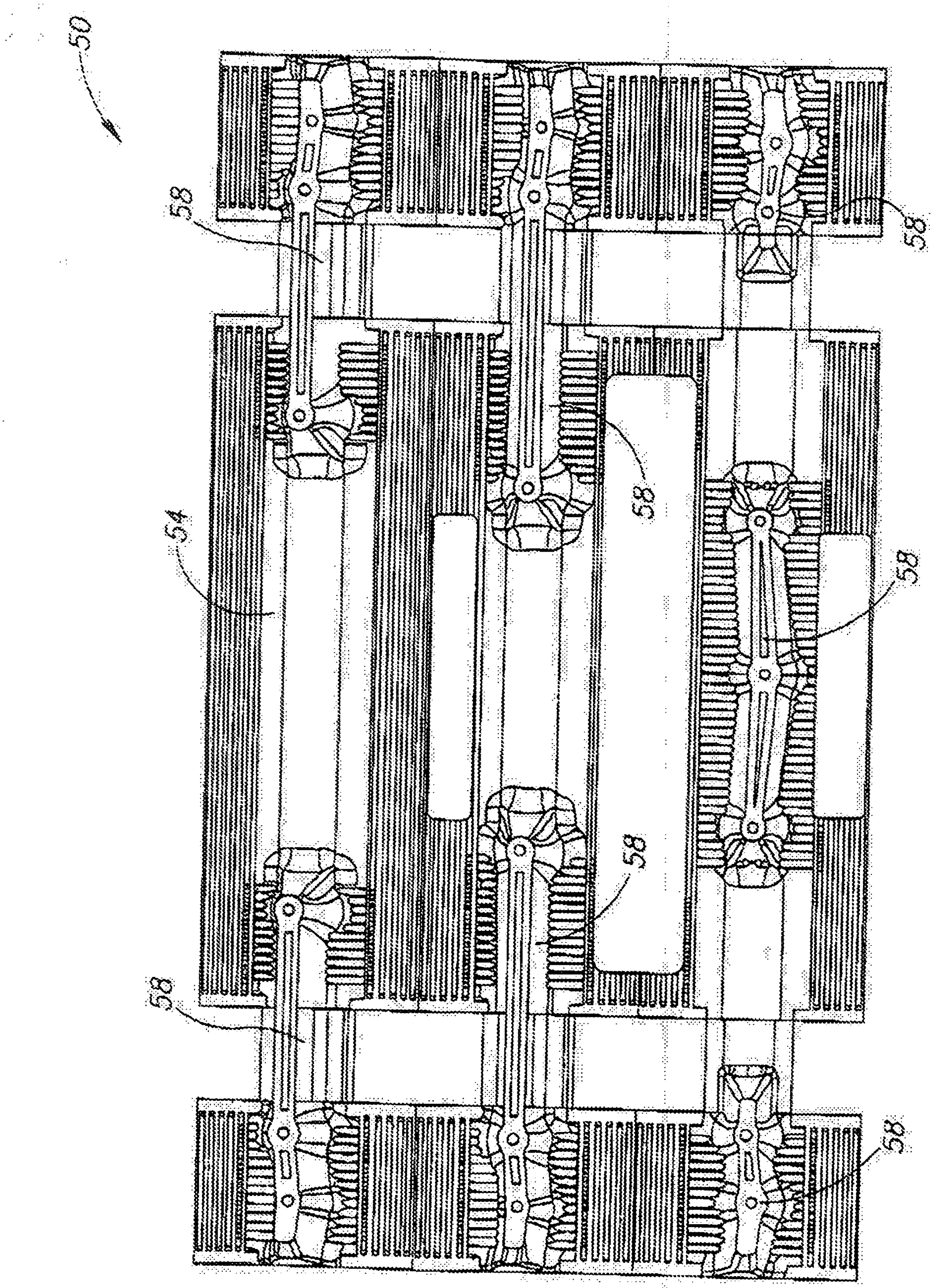


FIG.16

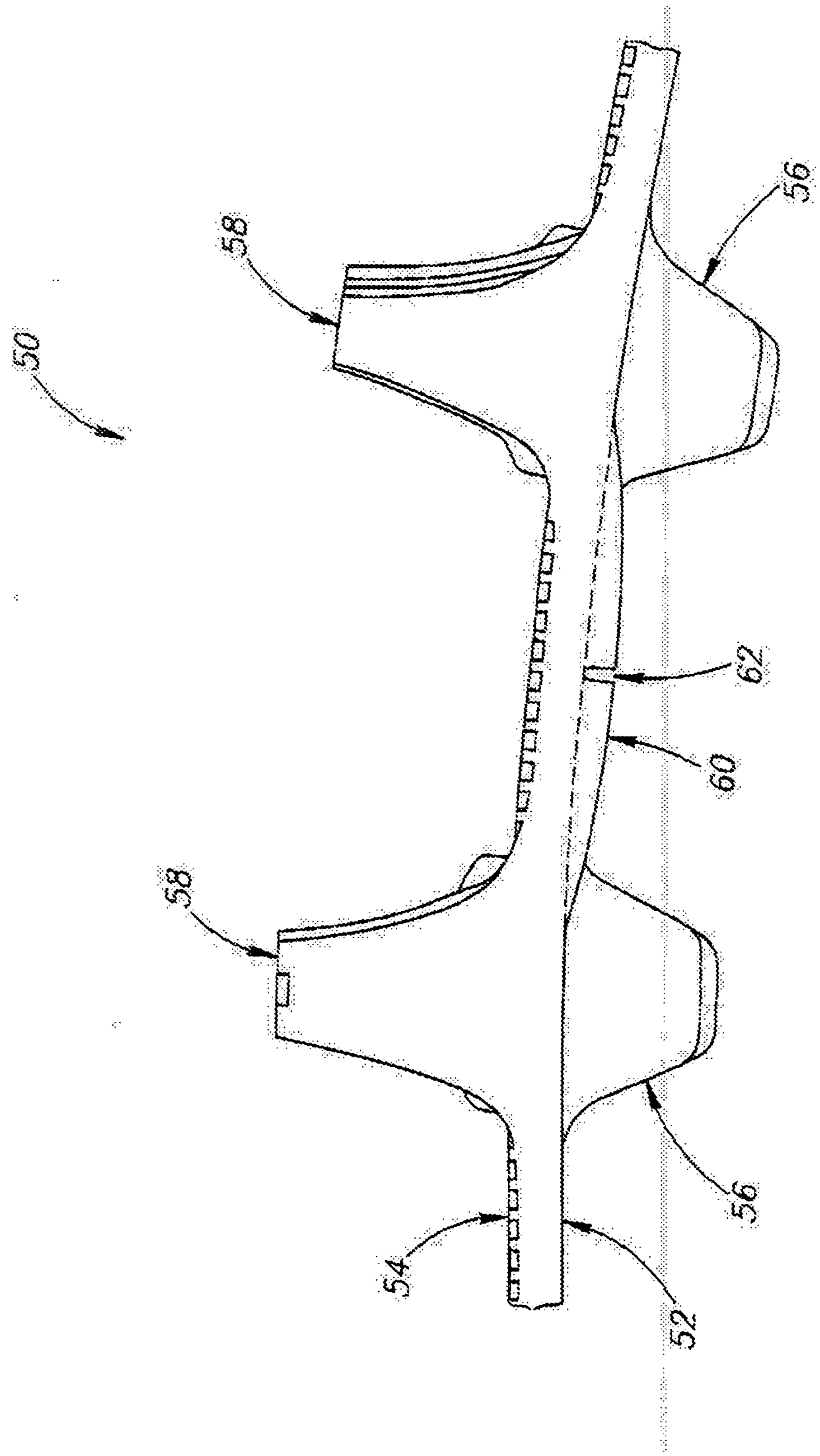


FIG.17

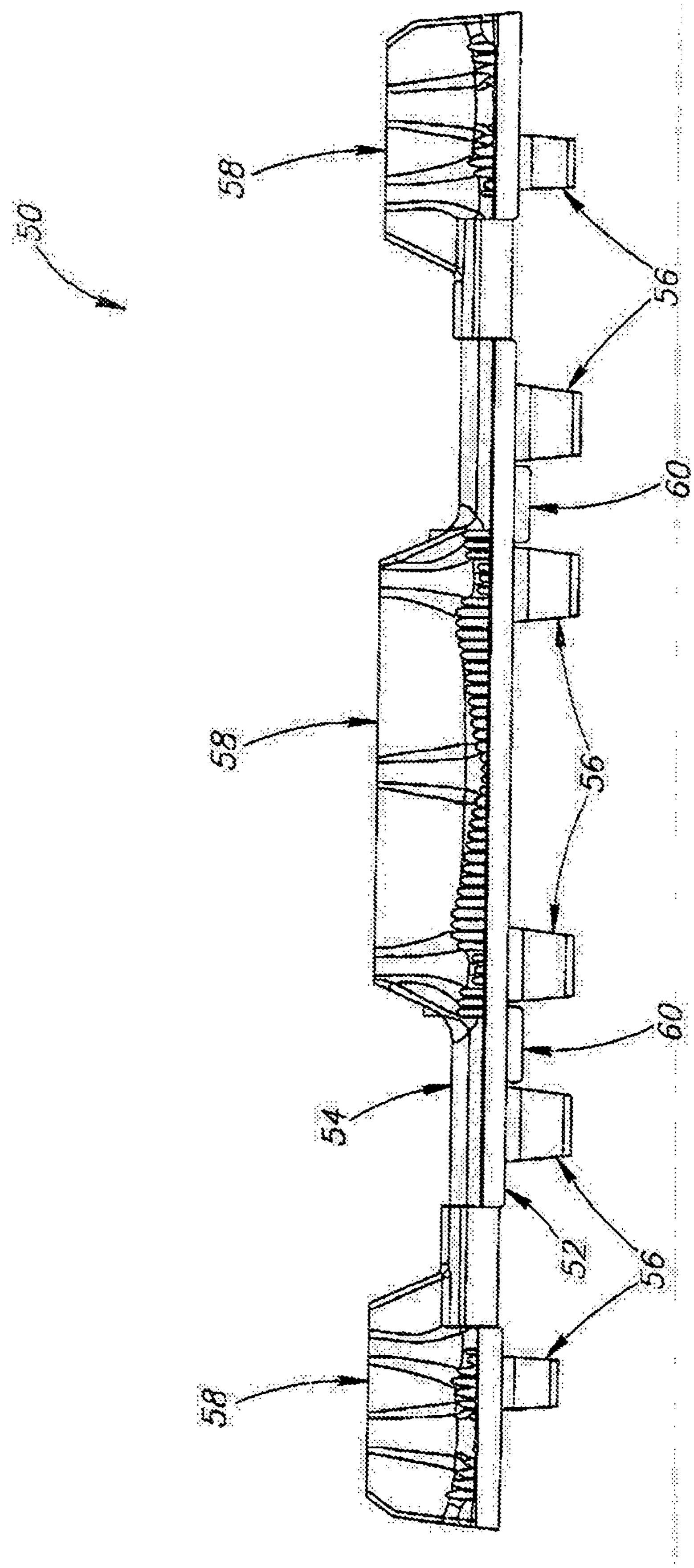


FIG.18

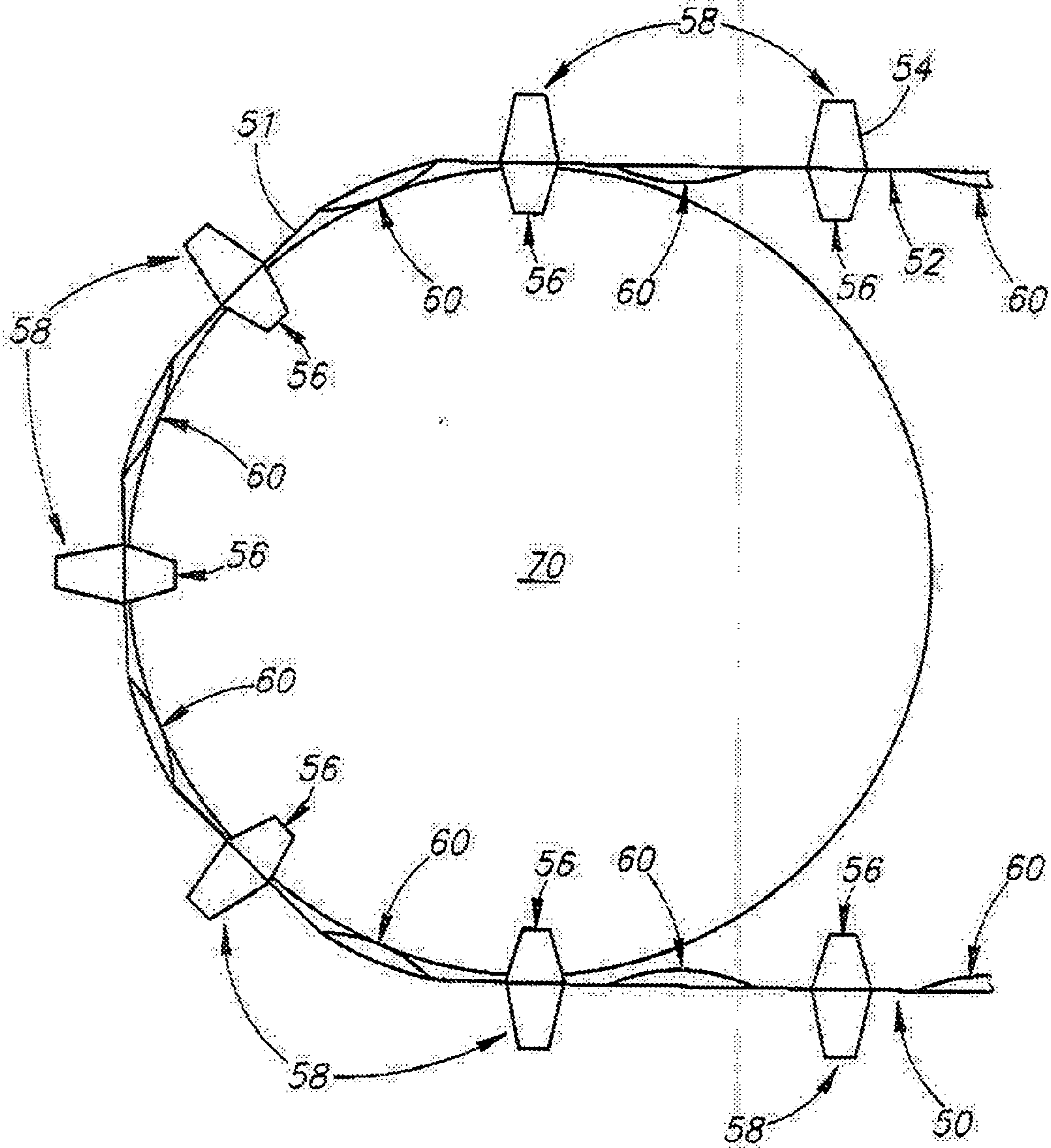


FIG.19

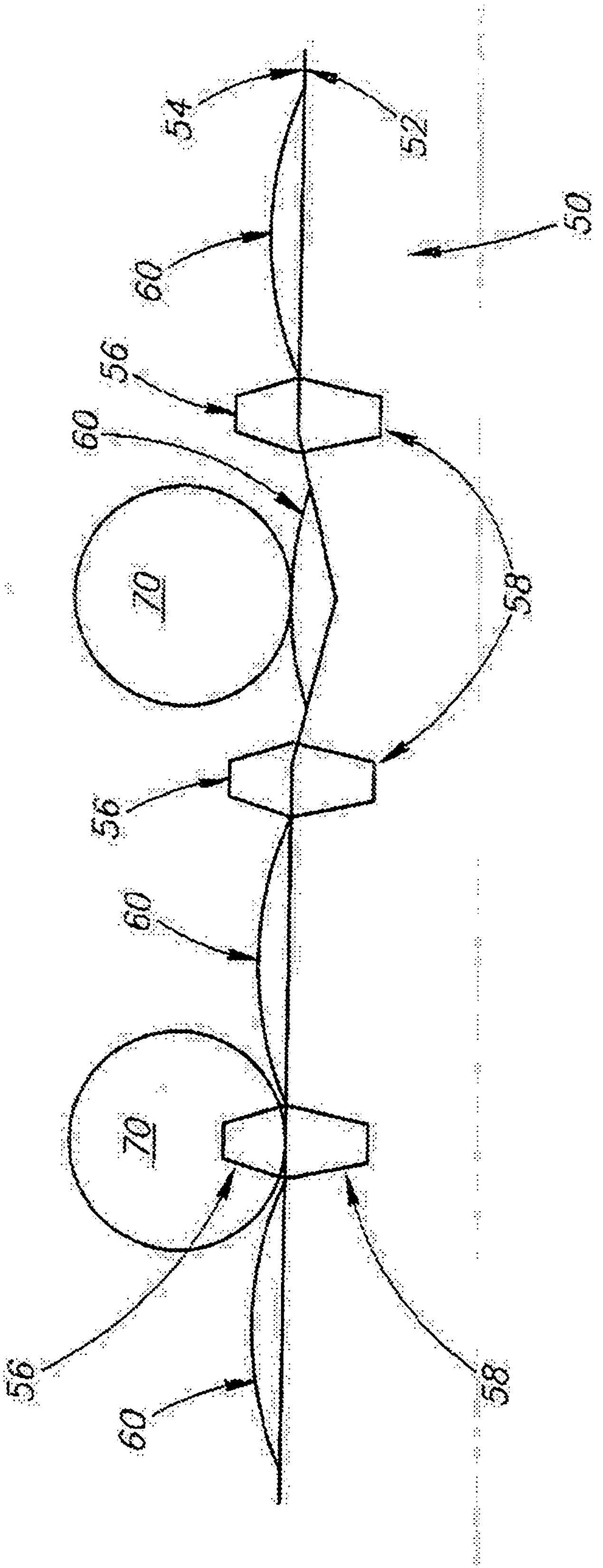


FIG. 20

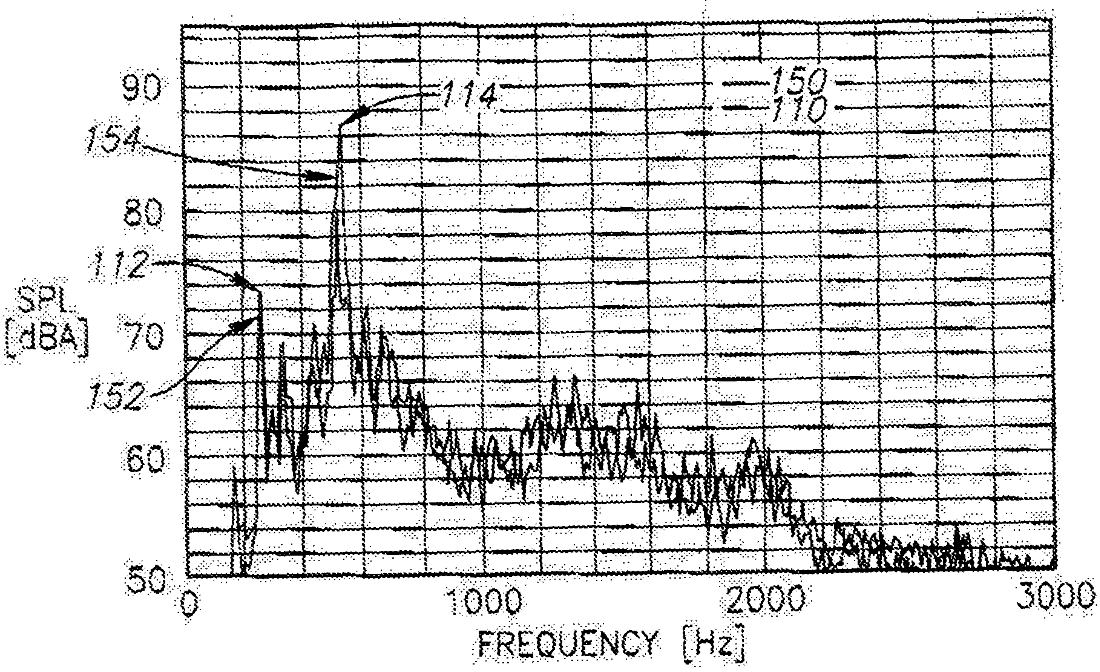

90
154
80
112
SPL [dBA]
70
152
60
50
114
150
110
0
1000
2000
3000
FREQUENCY [Hz]

FIG.21

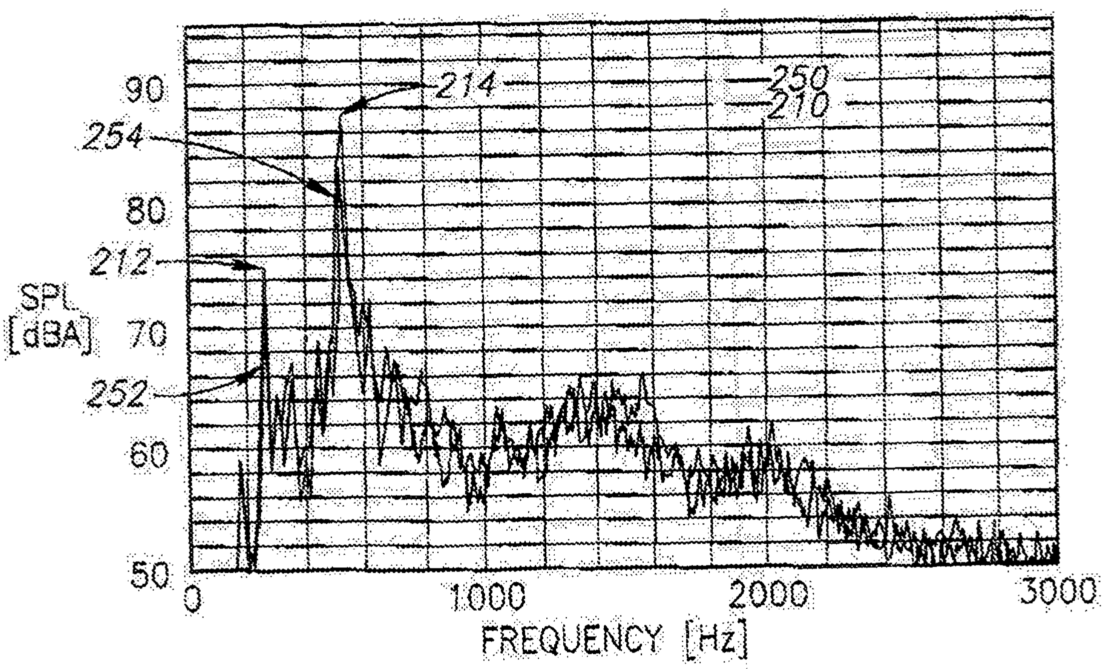

90
254
80
212
SPL [dBA]
70
252
60
50
214
250
210
0
1000
2000
3000
FREQUENCY [Hz]

FIG.22

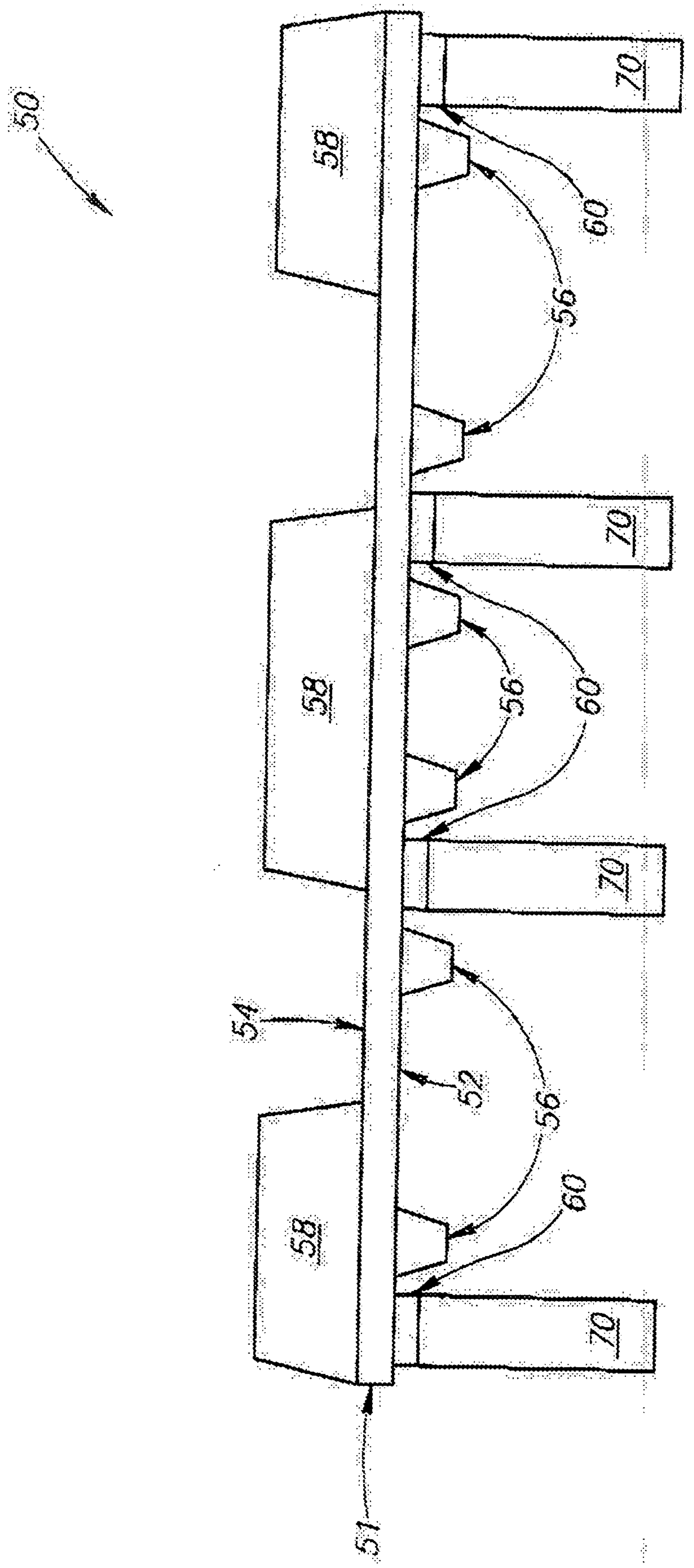


FIG. 23

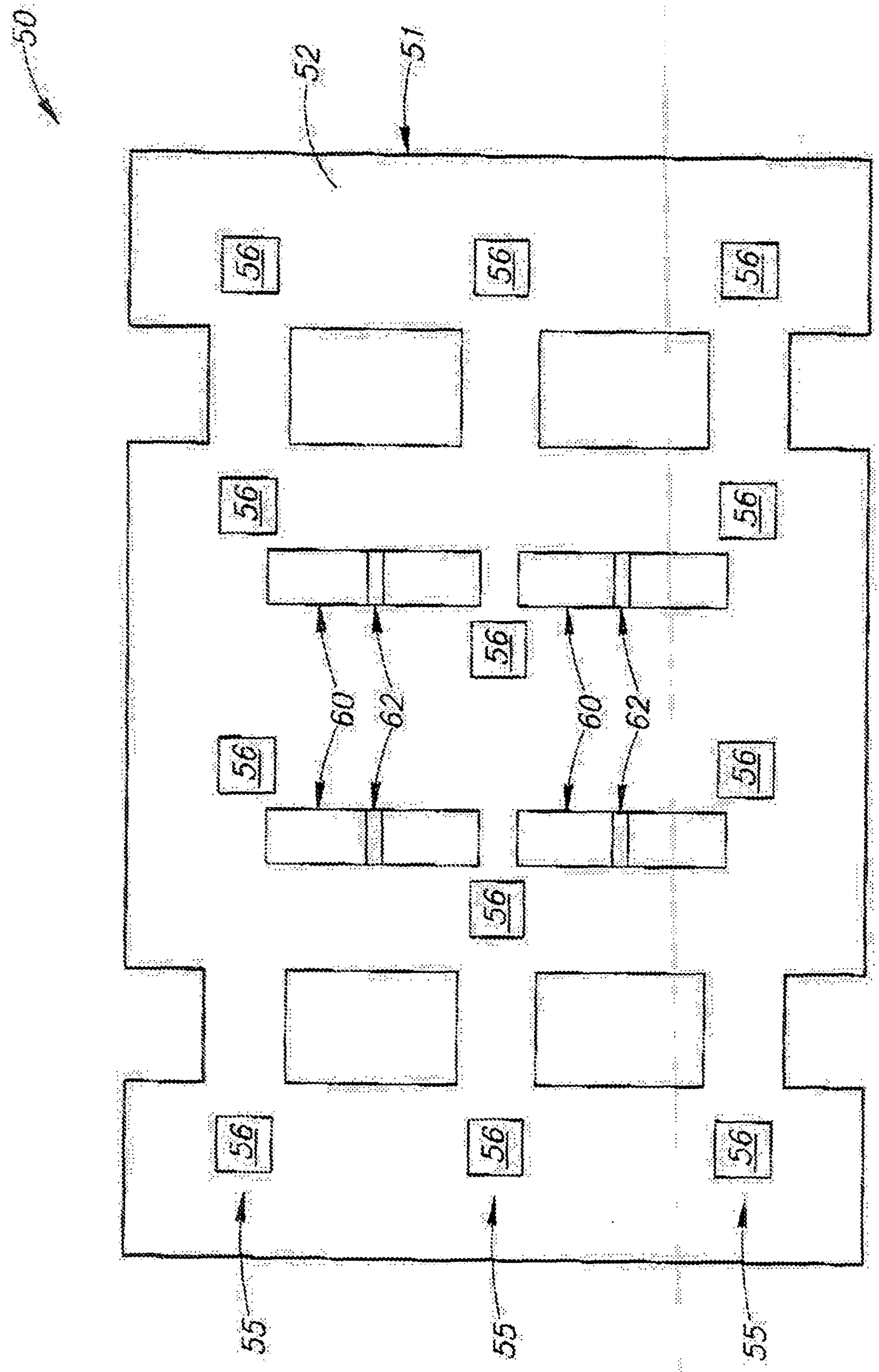


FIG.24