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(54) Title: **ENDLESS TRACK FOR PROPELLING A VEHICLE, WITH EDGE-CUTTING RESISTANCE**

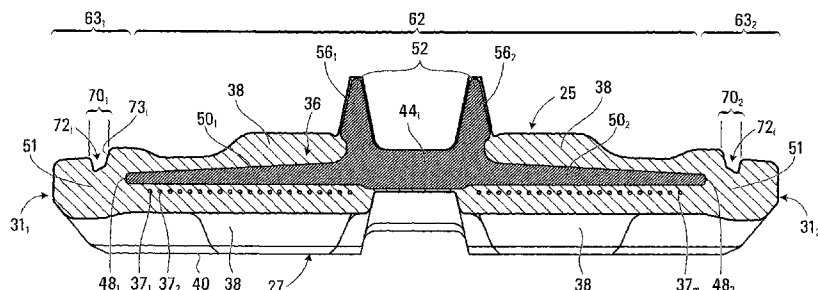


FIG. 4

(57) Abstract: An endless track for providing traction to a vehicle, such as a construction vehicle, an agricultural vehicle or other work vehicle. The endless track has: an inner side for facing a plurality of wheels of the vehicle; a ground-engaging outer side for engaging the ground; a first lateral edge; and a second lateral edge. The endless track comprises an elastomeric body and a plurality of cores at least partially embedded in the elastomeric body. Each core extends transversally to a longitudinal direction of the endless track to provide transverse rigidity to the endless track. The endless track comprises an impact absorber in a lateral edge part of the endless track, the lateral edge part being located between the cores and a given one of the first lateral edge and the second lateral edge. The impact absorber facilitates an elastic deformation of the lateral edge part when the lateral edge part impacts an obstacle on the ground. For example, in some embodiments, the impact absorber may comprise one or more holes which can deform when the lateral edge part impacts an obstacle on the ground.

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ENDLESS TRACK FOR PROPELLING A VEHICLE, WITH EDGE-CUTTING RESISTANCE

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FIELD OF THE INVENTION

The invention relates to endless tracks for propelling vehicles operable off-road, such as tracked work vehicles (e.g., construction vehicles, agricultural vehicles, forestry vehicles, etc.).

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BACKGROUND

Certain off-road vehicles, including work vehicles such as construction vehicles (e.g., loaders, bulldozers, excavators, etc.), agricultural vehicles (e.g., harvesters, combines, tractors, etc.) forestry vehicles (e.g., feller-bunchers, tree chippers, knuckleboom loaders, etc.) and military vehicles (e.g., combat engineering vehicles (CEVs), etc.), are often equipped with endless tracks that enhance their traction and floatation on soft, low friction and/or uneven grounds (e.g., soil, mud, sand, ice, snow, etc.) on which they operate.

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One type of endless track comprises a body including elastomeric material (e.g., rubber) in which are embedded rigid cores (e.g., metallic cores) that extend transversally to impart transverse rigidity to the track and that guide or otherwise interact with wheels of the vehicle which face the track's inner side.

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A problem often encountered with this type of endless track is that, when a lateral edge part of the track impacts an obstacle on the ground (e.g., a curb, a sidewalk, a rock, an abrupt change in ground level, etc.), the track may deform in such a way that some of its elastomeric material in its lateral edge part begins to

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tear. Such tearing of the track's elastomeric material, which is referred to as "edge-cutting", may cause premature deterioration of the track. For example, sand, rocks, water and/or other undesirable matter may infiltrate the track through the tear and prematurely deteriorate the track (e.g., by leading to a progressive loss of adhesion between the elastomeric material and the cores and/or other components of the track). In addition, the tear itself may reach a size that renders the track's performance and/or appearance unacceptable.

For these and other reasons, there is a need to improve wear resistance of endless tracks having embedded cores, particularly resistance to edge-cutting.

SUMMARY OF THE INVENTION

In accordance with a broad aspect, the invention provides an endless track for providing traction to a vehicle. The endless track has: an inner side for facing a plurality of wheels of the vehicle; a ground-engaging outer side for engaging the ground; a first lateral edge; and a second lateral edge. The endless track comprises an elastomeric body and a plurality of cores at least partially embedded in the elastomeric body. Each core extends transversally to a longitudinal direction of the endless track to provide transverse rigidity to the endless track. The endless track comprises an impact absorber in a lateral edge part of the endless track, the lateral edge part being located between the cores and a given one of the first lateral edge and the second lateral edge. The impact absorber facilitates an elastic deformation of the lateral edge part when the lateral edge part impacts an obstacle on the ground.

In accordance with another broad aspect, the invention provides an endless track for providing traction to a vehicle. The endless track has: an inner side for facing a plurality of wheels of the vehicle; a ground-engaging outer side for engaging the ground; a first lateral edge; and a second lateral edge. The endless track

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comprises an elastomeric body and a plurality of cores at least partially embedded in the elastomeric body. Each core extends transversally to a longitudinal direction of the endless track to provide transverse rigidity to the endless track. The endless track comprises a hole in a lateral edge part of the
5 endless track, the lateral edge part being located between the cores and a given one of the first lateral edge and the second lateral edge. The hole is deformable when the lateral edge part impacts an obstacle on the ground.

In accordance with yet another broad aspect, the invention provides an endless
10 track for providing traction to a vehicle. The endless track has: an inner side for facing a plurality of wheels of the vehicle; a ground-engaging outer side for engaging the ground; a first lateral edge; and a second lateral edge. The endless track comprises an elastomeric body and a plurality of cores at least partially
15 embedded in the elastomeric body. Each core extends transversally to a longitudinal direction of the endless track to provide transverse rigidity to the endless track. The endless track comprises a plurality of holes in a first lateral edge part of the endless track, the first lateral edge part being located between the first lateral edge and the cores. The holes of the first lateral edge part extend inwardly from a periphery of the endless track and are distributed along the
20 longitudinal direction of the endless track. The endless track comprises a plurality of holes in a second lateral edge part of the endless track, the second lateral edge part being located between the second lateral edge and the cores. The holes of the second lateral edge part extend inwardly from the periphery of the endless track and are distributed along the longitudinal direction of the endless
25 track.

These and other aspects of the invention will now become apparent to those of ordinary skill in the art upon review of the following description of embodiments of the invention in conjunction with the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of embodiments of the invention is provided below, by way
5 of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a work vehicle in accordance with an embodiment of the
invention;

10 Figure 2 shows a track assembly of the work vehicle;

Figures 3 and 4 respectively show a top view and a cross-sectional view of an
endless track of the track assembly;

15 Figure 5 shows a close-up view of a lateral edge part of the endless track;

Figure 6 shows an example of an elastic deformation of the lateral edge part of
the endless track;

20 Figures 7 and 8 respectively show a top view and a cross-sectional view of an
endless track in accordance with another embodiment of the invention;

Figures 9 and 10 respectively show a top view and a cross-sectional view of an
endless track in accordance with yet another embodiment of the invention;

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Figures 11 and 12 respectively show a top view and a cross-sectional view of an
endless track in accordance with yet another embodiment of the invention;

Figures 13 and 14 respectively show a bottom view and a cross-sectional view of
30 an endless track in accordance with yet another embodiment of the invention;

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Figures 15 and 16 respectively show a bottom view and a cross-sectional view of an endless track in accordance with yet another embodiment of the invention;

Figures 17 and 18 respectively show a top view and a cross-sectional view of an
5 endless track in accordance with yet another embodiment of the invention;

Figures 19 and 20 respectively show a top view and a cross-sectional view of an endless track in accordance with yet another embodiment of the invention;

10 Figures 21 and 22 respectively show a top view and a cross-sectional view of an endless track in accordance with yet another embodiment of the invention; and

Figures 23 and 24 respectively show a top view and a cross-sectional view of an endless track in accordance with yet another embodiment of the invention.

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Figures 25 and 26 respectively show alternative embodiments in which a hole in the lateral edge part contains a filler;

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Figure 27 shows an alternative embodiment in which a hole in the lateral edge part contains a fluid;

Figure 28 shows an alternative embodiment in which the lateral edge part comprises a plurality of slits; and

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Figure 29 shows an alternative embodiment in which the lateral edge part comprises an elastic material different from an elastomeric material in which cores of the endless track are at least partially embedded.

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It is to be expressly understood that the description and drawings are only for the purpose of illustrating certain embodiments of the invention and are an aid for

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understanding. They are not intended to be a definition of the limits of the invention.

5 DETAILED DESCRIPTION OF EMBODIMENTS

Figure 1 shows a work vehicle 10 in accordance with an embodiment of the invention. In this embodiment, the work vehicle 10 is a construction vehicle designed to perform construction work. More specifically, in this example, the
10 construction vehicle 10 is a loader. In other examples, the construction vehicle 10 may be a bulldozer, a backhoe loader, an excavator, or any other type of construction vehicle.

The construction vehicle 10 comprises a frame 12 supporting a prime mover 14,
15 a pair of track assemblies 16₁, 16₂ (which can be referred to as "undercarriages"), and an operator cabin 20, from which an operator can control the construction vehicle 10 to move it on the ground and perform construction work using a working implement 18.

20 The prime mover 14 is a source of motive power to move the construction vehicle 10. For example, the prime mover 14 may comprise an internal combustion engine and/or one or more other types of motors (e.g., electric motors, etc.) for generating motive power to move the construction vehicle 10. The prime mover 14 is in a driving relationship with each of the track assemblies 16₁, 16₂. That is,
25 power derived from the primer mover 14 is transmitted to each of the track assemblies 16₁, 16₂ via a powertrain of the construction vehicle 10.

The working implement 18 is used to perform construction work. In this embodiment where the construction vehicle 10 is a loader, the working
30 implement 18 is a dozer blade that can be used to push objects and shove soil, debris or other material. In other embodiments, depending on the type of

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construction vehicle, the working implement 18 may take on various other forms, such as a backhoe, a bucket, a fork, a grapple, a scraper pan, an auger, a saw, a ripper, a material handling arm, or any other type of construction working implement.

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The operator cabin 20 is where the operator sits and controls the construction vehicle 10. More particularly, the operator cabin 20 comprises a set of controls that allow the operator to steer the construction vehicle 10 on the ground and perform construction work using the working implement 18.

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The track assemblies 16₁, 16₂ are drivable by the prime mover 14 to propel the construction vehicle 10 on the ground. With additional reference to Figure 2, in this embodiment, each track assembly 16_i comprises an endless track 22 disposed around a plurality of wheels, including a drive wheel 24, a front idler wheel 26, a rear idler wheel 29, and a plurality of roller wheels 28₁-28₁₀.

15

The drive wheel 24 is rotatable by power derived from the prime mover 14 for imparting movement of the endless track 22 in order to propel the construction vehicle 10 on the ground. The idler wheels 26, 29 and the roller wheels 28₁-28₁₀ do not convert power supplied by the prime mover 14 to motive force, but rather guide the endless track 22 and/or maintain it under tension as it is driven by the drive wheel 24. As the endless track 22 is driven by the drive wheel 24, the roller wheels 28₁-28₁₀ roll on a bottom run of the endless track 22 to apply it on the ground for traction.

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The endless track 22 provides traction to the construction vehicle 10. With additional reference to Figures 3 to 5, the endless track 22 comprises an inner side 25, a ground-engaging outer side 27, a first lateral edge 31₁, and a second lateral edge 31₂. The inner side 25 faces the wheels 24, 26, 29, 28₁-28₁₀ and defines an inner area of the track assembly 16_i in which these wheels rotate. The

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ground-engaging outer side 27 engages the ground for traction of the construction vehicle 10.

5 The endless track 22 has a length defining a longitudinal axis 45 and a width defined by its lateral edges 31₁, 31₂. The endless track 22 thus has a longitudinal direction (i.e., a direction generally parallel to the longitudinal axis 45) and transversal directions (i.e., directions transverse to the longitudinal axis 45), including a widthwise direction (i.e., a lateral direction generally perpendicular to the longitudinal axis 45). The endless track 22 also has a thickness which defines
10 a thickness direction thereof.

The inner side 25 of the endless track 22 contacts the wheels 24, 26, 29, 28₁-28₁₀ as the track 22 is in motion around these wheels. Motion of the endless track 22 is imparted by the drive wheel 24. More particularly, in this embodiment,
15 the drive wheel 24 is a drive sprocket and the endless track 22 has a plurality of openings 33₁-33_N which cooperate with teeth of the drive wheel 24 in order to drive the endless track 22. As it is driven, the endless track 22 contacts the idler wheels 26, 29 and the roller wheels 28₁-28₁₀ which help guide the track 22 and maintain it under tension. The inner side 25 comprises rolling surfaces 30₁, 30₂
20 on which the roller wheels 28₁-28₁₀ roll to apply the track 22 onto the ground.

The ground-engaging outer side 27 comprises a tread 40 to enhance traction on the ground. The tread 40 comprises a plurality of traction projections 68₁-68_T distributed on the ground-engaging outer side 27 for enhancing traction on the
25 ground. The tread 40 may have any suitable configuration.

The endless track 22 comprises an elastomeric body 36 underlying the inner side 25 and the ground-engaging outer side 27. In view of its underlying nature, the elastomeric body 36 will be referred to as a "carcass". The carcass 36 is
30 elastomeric in that it comprises elastomeric material 38. A plurality of cores 44₁-44_N are at least partially embedded in the elastomeric material 38. Also, in this

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embodiment, a layer of reinforcing cables 37_1-37_M is embedded in the elastomeric material 38. The carcass 36 may comprise one or more additional and/or different components, such as one or more other reinforcements (e.g., one or more layers of reinforcing fabrics), embedded in the elastomeric material 38, in other embodiments.

The elastomeric material 38 allows the carcass 36 to elastically change in shape as the endless track 22 is in motion around the wheels 24, 26, 29, 28_1-28_{10} . The elastomeric material 38 can be any polymeric material with the property of elasticity. In this embodiment, the elastomeric material 38 includes rubber. Various rubber compounds may be used and, in some cases, different rubber compounds may be present in different areas of the carcass 36. In other embodiments, the elastomeric material 38 may include another elastomer in addition to or instead of rubber (e.g., polyurethane elastomer).

The reinforcing cables 37_1-37_M extend generally parallel to one another and in the longitudinal direction of the endless track 22 to enhance strength in tension of the track 22 along its longitudinal direction. In this embodiment, each of the reinforcing cables 37_1-37_M is a cord or wire rope including a plurality of strands or wires. In other embodiments, each of the reinforcing cables 37_1-37_M may be another type of cable and may be made of any suitable material (e.g., metal, plastic, or composite material).

The cores 44_1-44_N are distributed along and extend transversally to the longitudinal direction of the endless track 22 to impart transverse rigidity to the endless track 22. The cores 44_1-44_N also help to guide some of the wheels 24, 26, 29, 28_1-28_{10} as the endless track 22 is driven by the drive wheel 24.

Each core 44_i has a longitudinal axis extending transversally (in this case, perpendicularly) to the longitudinal axis 45 of the endless track 22. The core 44_i has a length which is shorter than the width of the endless track 22 such that it

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has a first longitudinal end 48₁ and a second longitudinal end 48₂ that are spaced apart from the lateral edges 31₁, 31₂ of the endless track 22. That is, the first longitudinal end 48₁ of the core 44_i is spaced apart from the first lateral edge 31₁ of the endless track 22 along the track's widthwise direction, and the second longitudinal end 48₂ of the core 44_i is spaced apart from the second lateral edge 31₂ of the endless track 22 along the track's widthwise direction.

More particularly, in this embodiment, each core 44_i comprises a pair of wings 50₁, 50₂ and a wheel guide 52.

The wings 50₁, 50₂ are elongated along the longitudinal axis of the core 44_i to impart transverse rigidity to the endless track 22. Each of the wings 50₁, 50₂ has a top surface oriented towards the inner side 25 of the endless track 22 and a bottom surface oriented towards the ground-engaging outer side 27 of the endless track 22. In this embodiment, each of the wings 50₁, 50₂ has a tapered shape whereby its top surface converges longitudinally outwardly towards its bottom surface. The wings 50₁, 50₂ may have various other shapes in other embodiments.

The wheel guide 52 serves to guide some of the wheels 24, 26, 29, 28₁-28₁₀ as the endless track 22 is driven by the drive wheel 24. More particularly, in this embodiment, the wheel guide 52 comprises a pair of guide projections 56₁, 56₂ that project on the inner side 25 of the endless track 22. Each guide projection 56_i comprises a top end, a base, and a pair of wheel-facing sides opposite one another and extending from its base to its top end. The wheel guide 52 may be configured in various other ways in other embodiments (e.g., it may comprise only one guide projection or more than two (2) guide projections).

In this embodiment, the core 44_i, including its wings 50₁, 50₂ and wheel guide 52, is made of metal (e.g., steel) formed into shape by casting. The core 44_i may have various other shapes, may comprise various other components, may be

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made of various other rigid materials (e.g., polymers, ceramics, composites, etc.), and/or may be made using various other processes (e.g., forging, welding, fastening, etc.) in other embodiments.

- 5 The endless track 22 comprises a central part 62 between a first lateral edge part 63₁ and a second lateral edge part 63₂. The central part 62 is located between the longitudinal ends 48₁, 48₂ of the cores 44₁-44_N. The first lateral edge part 63₁ is located between the first lateral edge 31₁ and the cores 44₁-44_N (i.e., between the first lateral edge 31₁ and the first longitudinal ends 48₁ of the cores 44₁-44_N).
- 10 The second lateral edge part 63₂ is located between the second lateral edge 31₂ and the cores 44₁-44_N (i.e., between the second lateral edge 31₂ and the second longitudinal ends 48₂ of the cores 44₁-44_N).

- As the construction vehicle 10 moves on the ground, a lateral edge part 63_i of the
- 15 endless track 22 may impact (i.e., make contact with) an obstacle on the ground (e.g., a curb, a sidewalk, a rock, an abrupt change in ground level, etc.). This creates stresses which may lead to premature wear of the endless track 22. More particularly, in this embodiment, this creates stresses in the rubber 38 of the lateral edge part 63_i which, if too large, could lead to "edge-cutting" of the
- 20 edge part 63_i, i.e., a process in which the rubber 38 of the edge part 63_i tears.

- In order to enhance a wear resistance of the endless track 22, and particularly a resistance to edge-cutting, in this embodiment, the first lateral edge part 63₁ comprises a first impact absorber 70₁ and the second lateral edge part 63₂
- 25 comprises a second impact absorber 70₂. The first impact absorber 70₁ will be described in further detail, with an understanding that a similar description applies to the second impact absorber 70₂.

- The impact absorber 70₁ is a shield (i.e., a protective element) that protects the
- 30 lateral edge part 63₁ of the endless track 22 against wear due to an impact with an obstacle on the ground. In particular, in this embodiment, the impact absorber

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70₁ protects the lateral edge part 63₁ of the endless track 22 against edge-cutting. That is, the impact absorber 70₁ makes the lateral edge part 63₁ more resistant (i.e., less susceptible) to edge-cutting than if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical.

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More specifically, the impact absorber 70₁ is located between the lateral edge 31₁ and the cores 44₁-44_N to facilitate an elastic deformation of the lateral edge part 63₁ when the lateral edge part 63₁ impacts an obstacle on the ground. In this case, the impact absorber 70₁ facilitates an elastic deformation of a portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N when the lateral edge part 63₁ impacts an obstacle on the ground. The elastic deformation of the portion 51 of the rubber 38 protects against tearing of the portion 51 of the rubber 38. Thus, the impact absorber 70₁ protects the portion 51 of the rubber 38 against tearing in that it makes the portion 51 of the rubber 38 more resistant (i.e., less susceptible) to tearing when the lateral edge part 63₁ impacts an obstacle on the ground than if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical.

The impact absorber 70₁ can be viewed as constituting an anti-tear zone opposing development of a tear of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N when the lateral edge part 63₁ impacts an obstacle on the ground.

In some cases, the impact absorber 70₁ may oppose development of a tear of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N by preventing such a tear from arising.

In other cases, the impact absorber 70₁ may not necessarily be able to prevent a tear of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N from arising, but nevertheless opposes development of the tear. For example, the impact absorber 70₁ may cause the tear to appear after a longer

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period of time than if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical. As another example, the impact absorber 70₁ may cause a growth rate of the tear to be slower than if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical. As yet another example, the impact absorber 70₁ may cause a size of the tear to be smaller after a given period of time than if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical. To evaluate the effectiveness of the impact absorber 70₁ at opposing development of a tear of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N, testing can be conducted on the endless track 22 and a reference endless track that lacks the impact absorber 70₁ but is otherwise identical to the endless track 22.

The impact absorber 70₁ reduces a level of stress in the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N when the lateral edge part 63₁ impacts an obstacle on the ground. That is, when the lateral edge part 63₁ impacts an obstacle on the ground, the impact absorber 70₁ causes the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N to experience a level of stress lower than that which would be experienced by the portion 51 of the rubber 38 if the endless track 22 lacked the impact absorber 70₁ but was otherwise identical. In that sense, the impact absorber 70₁ can be viewed as a form of stress relief in this case.

The impact absorber 70₁ may be configured in various ways in various embodiments.

For example, in this embodiment, the impact absorber 70₁ comprises a plurality of holes 72₁-72_M distributed along the longitudinal direction of the endless track 22. Each hole 72_i is an internal space unfilled by the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N and delimited by an internal surface 73_i of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. In this case, the hole 72_i is an open cavity (i.e., a cavity open

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at a periphery of the track 22). In other cases, the hole 72_i may be a closed cavity (i.e., a cavity which does not extend to the periphery of the track 22).

5 The holes 72_1-72_M reduces a level of stress in the portion 51 of the rubber 38 between the lateral edge 31_1 and the cores 44_1-44_N when the lateral edge part 63_1 impacts an obstacle on the ground (i.e., the portion 51 of the rubber 38 experiences a level of stress lower than that which it would experience if the endless track 22 lacked the holes 72_1-72_M but was otherwise identical). This opposes development of a tear of the portion 51 of the rubber 38 between the
10 lateral edge 31_1 and the cores 44_1-44_N and therefore helps to protect against edge-cutting.

The holes 72_1-72_M may be configured in various ways in order to provide a tear protection effect.

15

For example, the holes 72_1-72_M may extend in various manners in the lateral edge part 63_1 of the endless track 22. In this embodiment, each hole 72_i extends inwardly from the inner side 25 of the endless track 22. In other embodiments, each hole 72_i may extend inwardly from the ground-engaging outer side 27 of the
20 endless track 22, may extend inwardly from the lateral edge 31_1 of the endless track 22, or may be a closed cavity that does not extend to the periphery of the endless track 22.

The holes 72_1-72_M may have various shapes. In this embodiment, each hole 72_i
25 has a generally triangular shape (when viewed from the inner side 25 of the track 22) that tapers in the thickness direction of the endless track 22. Each hole 72_i may have any other suitable shape in other embodiments. Also, different ones of the holes 72_1-72_M may be shaped differently in some embodiments.

30 The holes 72_1-72_M may have various dimensions. For instance, the hole 72_i has a dimension D_i measured along the thickness direction of the endless track 22

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(in this embodiment, the dimension D_1 is a depth). The dimension D_1 may take on various values. For example, in some embodiments, the dimension D_1 may be at least 5%, in some cases at least 10%, in some cases at least 15%, in some cases at least 20%, in some cases at least 25%, and in some cases at least 30% of a thickness T_e of the lateral edge part 63₁. Also, the hole 72_i has a dimension D_2 measured along the widthwise direction of the endless track 22. The dimension D_2 may take on various values. For example, in some embodiments, the dimension D_2 may be at least 5%, in some cases at least 10%, in some cases at least 15%, in some cases at least 20%, in some cases at least 25%, and in some cases at least 30% of a width W_e of the lateral edge part 63₁.

The holes 72₁-72_M may be distributed in various manners along the longitudinal direction of the endless track 22. In this embodiment, the holes 72₁-72_M are distributed such that there is at least one (1) hole, in this case two (2) holes, aligned with each of the cores 44₁-44_N. In other embodiments, the holes 72₁-72_M may be distributed such that one or more holes are not aligned with any of the cores 44₁-44_N.

The holes 72₁-72_M may be provided in the endless track 22 in various ways. For example, in this embodiment, the holes 72₁-72_M may be molded during molding of the endless track 22. In other embodiments, the holes 72₁-72_M may be machined (e.g., drilled, reamed, carved) into the endless track 22 after it has been molded.

As shown in Figure 6, when the lateral edge part 63₁ of the endless track 22 impacts an obstacle on the ground, each hole 72_i that is located in a segment of the endless track 22 which contacts the obstacle facilitates an elastic deformation of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. Specifically, the hole 72_i is deformable (i.e., changeable in shape), in this case shrinkable, to facilitate the elastic deformation of the portion 51 of the rubber 38. The portion 51 of the rubber 38 thus elastically deforms in such a way

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that it causes the hole 72_i to at least partially close. Basically, in this embodiment, being an open cavity filled with ambient air, the hole 72_i acts as an air cushion to absorb energy when the lateral edge part 63₁ of the endless track 22 impacts an obstacle on the ground.

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The hole 72_i directs the elastic deformation of the portion 51 of the rubber 38. More particularly, the hole 72_i provides a void which offers a path of least resistance to the elastic deformation of the portion 51 of the rubber 38. As such, a part 75 of the rubber 38 between the hole 72_i and the lateral edge 31₁ moves
10 towards a part 76 of the rubber 38 between the hole 72_i and the cores 44₁-44_N. Thus, the hole 72_i collapses as opposing areas of the internal surface 73_i defining the hole 72_i move towards one another.

The hole 72_i reduces the level of stress in the portion 51 of the rubber 38 by
15 facilitating movement of different parts of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. Also, the hole 72_i reduces a likelihood of the part 76 of the rubber 38 between the hole 72_i and the cores 44₁-44_N being sheared against the cores 44₁-44_N. By relieving stress in the portion 51 of the rubber 38, the hole 72_i protects against tearing of the portion 51 of the rubber 38.

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Although they are configured in a particular way in this embodiment, the holes 72₁-72_M may be configured in various other ways in other embodiments, as mentioned above. For instance, Figures 7 to 20 show examples of different configurations of holes such as the holes 72₁-72_M in other embodiments. More
25 particularly:

- Figures 7 and 8 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 172₁-172_P each having an elongate shape that is elongated along the longitudinal direction of the endless track 22;
- Figures 9 and 10 show an embodiment in which the impact absorber 70₁
30 comprises a plurality of holes 272₁-272_P each having an elongate shape that

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is elongated along the longitudinal direction of the endless track 22 and that has longitudinal ends deeper than a central section;

- Figures 11 and 12 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 372₁-372_S which are arranged in two (2) rows spaced apart from one another along the widthwise direction of the endless track 22;
- Figures 13 and 14 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 472₁-472_M each extending inwardly from the ground-engaging side 27 of the endless track 22;
- Figures 15 and 16 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 572₁-572_M each extending through the endless track 22 from its inner side 25 to its ground-engaging side 27;
- Figure 17 and 18 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 672₁-672_M each extending inwardly from the lateral edge 31₁ of the endless track 22; and
- Figures 19 and 20 show an embodiment in which the impact absorber 70₁ comprises a plurality of holes 772₁-772_M each being a closed cavity that does not extend to a periphery of the endless track 22. The holes 772₁-772_M may be provided, for instance, by leaving openings in one or more sheets of rubber that are positioned in a mold in which the endless track 22 is molded such that, after molding, these openings form the holes 772₁-772_M.

While the impact absorber 70₁ has a certain number of holes in embodiments considered above, the impact absorber 70₁ may have any number of holes such as the holes 72₁-72_M. In some cases, the impact absorber 70₁ may have a single hole such as the holes 72₁-72_M. For example, Figures 21 and 22 show an embodiment in which the impact absorber 70₁ has a single hole 1072 configured as a groove which runs along a majority (e.g., an entirety) of the length of the endless track 22. As another example, Figures 23 and 24 shows an embodiment in which the impact absorber 70₁ has a single hole 1172 configured as a closed channel which runs along a majority (e.g., an entirety) of the length of the

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endless track 22. The hole 1172 may be provided, for instance, by leaving an opening in one or more sheets of rubber that are positioned in a mold in which the endless track 22 is molded such that, after molding, this opening forms the hole 1172.

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Although in this embodiment it is empty, in other embodiments, each hole 72_i may contain a filler, which includes something (other than air) that fills all or less than all of the hole 72_i and that facilitates the elastic deformation of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N when the lateral edge part 63₁ impacts an obstacle on the ground.

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For example, in some embodiments, as shown in Figures 25 and 26, a hole 872_i, 972_i may contain a filler 80 which is a solid material (i.e., material neither liquid nor gaseous). The filler 80 may include an elastomer (e.g., a foam rubber or another soft rubber, a polyurethane foam, etc.) or some other elastic material and may fill all or less than all of the hole 872_i, 972_i. The filler 80 may be provided in the endless track 22 in various ways. For instance, in some cases, the filler 80 may be provided by molding it in the hole 872_i, 972_i during molding of the endless track 22. In other cases, the filler 80 may be provided by affixing it in the hole 872_i, 972_i using a suitable adhesive.

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The filler 80 may be more elastic (i.e., have a greater elasticity) than the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. In other words, the filler 80 may have a modulus of elasticity lower than a modulus of elasticity of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. For example, in some embodiments, the filler 80 may have a modulus of elasticity that is at least 10%, in some cases at least 20%, in some cases at least 30%, in some cases at least 40%, and in some cases at least 50% lower than that of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. Thus, in some embodiments, a ratio of the modulus of elasticity of the filler 80 to the modulus of elasticity of the rubber 38 between the

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lateral edge 31₁ and the cores 44₁-44_N may be no more than 0.9, in some cases no more than 0.8, in some cases no more than 0.7, in some cases no more than 0.6, and in some cases no more than 0.5. In embodiments in which the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N contains different rubber compounds with different moduli of elasticity, the modulus of elasticity of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N can be taken as an average of these different moduli of elasticity (e.g., a weighted average of these different moduli of elasticity based on the weight of each rubber compound and the total weight of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N). Similarly, in embodiments in which the filler 80 contains different compounds with different moduli of elasticity, the modulus of elasticity of the filler 80 can be taken as an average of these different moduli of elasticity (e.g., a weighted average of these different moduli of elasticity based on the weight of each compound and the total weight of the filler 80).

Alternatively or additionally, the filler 80 may have a hardness (e.g., a durometer or other suitable hardness measure) lower than a hardness of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. For instance, in some embodiments, the filler 80 may have a hardness (e.g., a durometer) that is at least 10%, in some cases at least 20%, in some cases at least 30%, in some cases at least 40%, and in some cases at least 50% lower than that of the portion 51 of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N. Thus, in some embodiments, a ratio of the hardness of the filler 80 to the hardness of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N may be no more than 0.9, in some cases no more than 0.8, in some cases no more than 0.7, in some cases no more than 0.6, and in some cases no more than 0.5. In embodiments in which the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N contains different rubber compounds with different hardness values, the hardness of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N can be taken as an average of these different hardness values (e.g., a weighted average of these hardness values based on the weight of each

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rubber compound and the total weight of the rubber 38 between the lateral edge 31₁ and the cores 44₁-44_N). Similarly, in embodiments in which the filler 80 contains different compounds with different hardness values, the modulus of elasticity of the filler 80 can be taken as an average of these different hardness values (e.g., a weighted average of these different hardness values based on the weight of each compound and the total weight of the filler 80).

As another example, in some embodiments, as shown in Figure 27, a hole 1272_i may contain a filler 81 which is a fluid (i.e., a liquid or gas). The filler 81 may include a gas (e.g., air or another gas) or a liquid (e.g., water, oil or another liquid) and may fill all or less than all of the hole 1272_i. The filler 80 may be provided in the endless track 22 in various ways. For instance, in some cases, the filler 81 may be contained in a capsule, pouch or other container that is provided in the track 22 by placing it, before molding of the track 22, between layers of the rubber 38 where the hole 1272_i is to be formed. In other cases, the filler 80 may be provided in the track 22 by injecting it into the hole 1272_i during or after molding of the track 22.

The filler 80 is confined in the endless track 22 in that it cannot flow out of its confines within the hole 1272_i. This is in contrast to embodiments discussed above in which ambient air can freely flow in and out of open cavities such as the holes 72₁-72_M. The filler 80 may be confined in the endless track 22 in various ways. For instance, in this embodiment, the hole 1272_i which contains the filler 81 is a closed cavity. In other embodiments, a hole containing the filler 81 may be an open cavity (e.g., the hole 872_i) in which case the filler 81 is sealed in the open cavity (e.g., by being contained in a capsule, pouch or other container affixed to the open cavity's internal surface using a suitable adhesive, or by closing off the open cavity's opening with a membrane or other suitable closure).

While in this embodiment the impact absorber 70₁ comprises one or more holes such as the holes 72₁-72_M, in other embodiments, the impact absorber 70₁ may

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not comprise any hole but still facilitate an elastic deformation of the lateral edge part 63₁ of the endless track 22 when the lateral edge part 63₁ impacts an obstacle on the ground.

5 For example, in some embodiments, as shown in Figure 28, the impact absorber 70₁ may comprise a plurality of slits 85₁-85₃ formed during manufacturing of the endless track 22 (e.g., by cutting). In this case, the slits 85₁-85₃ extend inwardly from the inner side 25 of the track 22. In other cases, the slits 85₁-85₃ may extend inwardly from the ground-engaging outer side 27 of the track 22 or from
10 the lateral edge 31₁ of the track 22. Although in this example the impact absorber 70₁ comprises three slits 85₁-85₃, in other examples, the impact absorber 70₁ may comprise any number of slits (e.g., a single slit, two slits, or more than three slits) such as the slits 85₁-85₃.

15 As another example, in some embodiments, as shown in Figure 29, the impact absorber 70₁ may comprise an elastic material 89 which is different from the rubber 38 of the central part 62 of the endless track 22 in which the cores 44₁-44_N are embedded. The elastic material 89 may include an elastomer (e.g., a foam rubber or another rubber, a polyurethane foam) or some other elastic
20 substance. The elastic material 89 may be provided in the endless track 22 in various ways. For instance, in some cases, the elastic material 89 may be provided by molding it with the rubber 38 of the track 22 during molding of the track 22. In other cases, the elastic material 89 may be provided by affixing it to the rubber 38 of the track 22 using a suitable adhesive.

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In some cases, the elastic material 89 may be more elastic (i.e., have a greater elasticity) than the rubber 38 of the central part 62 of the endless track 22. In other words, the elastic material 89 may have a modulus of elasticity lower than a modulus of elasticity of the rubber 38 of the central part 62 of the endless track
30 22. For instance, in some embodiments, the elastic material 89 may have a modulus of elasticity that is at least 10%, in some cases at least 20%, in some

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cases at least 30%, in some cases at least 40%, and in some cases at least 50% lower than that of the rubber 38 of the central part 62 of the endless track 22. Thus, in some embodiments, a ratio of the modulus of elasticity of the elastic material 89 to the modulus of elasticity of the rubber 38 of the central part 62 of the endless track 22 may be no more than 0.9, in some cases no more than 0.8, in some cases no more than 0.7, in some cases no more than 0.6, and in some cases no more than 0.5. In embodiments in which the rubber 38 of the central part 62 of the endless track 22 contains different rubber compounds with different moduli of elasticity, the modulus of elasticity of the rubber 38 of the central part 62 of the endless track 22 can be taken as an average of these different moduli of elasticity (e.g., a weighted average of these different moduli of elasticity based on the weight of each rubber compound and the total weight of the rubber 38 of the central part 62 of the endless track 22). Similarly, in embodiments in which the elastic material 89 contains different compounds with different moduli of elasticity, the modulus of elasticity of the elastic material 89 can be taken as an average of these different moduli of elasticity (e.g., a weighted average of these different moduli of elasticity based on the weight of each compound and the total weight of the elastic material 89).

Alternatively or additionally, in some cases, the elastic material 89 may have a hardness (e.g., a durometer or other suitable hardness measure) lower than a hardness of the rubber 38 of the central part 62 of the endless track 22. For instance, in some embodiments, the elastic material 89 may have a hardness (e.g., a durometer) that is at least 10%, in some cases at least 20%, in some cases at least 30%, in some cases at least 40%, and in some cases at least 50% lower than that of the rubber 38 of the central part 62 of the endless track 22. Thus, in some embodiments, a ratio of the hardness of the elastic material 89 to the hardness of the rubber 38 of the central part 62 of the endless track 22 may be no more than 0.9, in some cases no more than 0.8, in some cases no more than 0.7, in some cases no more than 0.6, and in some cases no more than 0.5. In embodiments in which the rubber 38 of the central part 62 of the endless track

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22 contains different rubber compounds with different hardness values, the hardness of the rubber 38 of the central part 62 of the endless track 22 can be taken as an average of these different hardness values (e.g., a weighted average of these hardness values based on the weight of each rubber compound and the total weight of the rubber 38 of the central part 62 of the endless track 22). Similarly, in embodiments in which the elastic material 89 contains different compounds with different hardness values, the modulus of elasticity of the elastic material 89 can be taken as an average of these different hardness values (e.g., a weighted average of these different hardness values based on the weight of each compound and the total weight of the elastic material 89).

In this embodiment, the elastic material 89 extends inwardly from the lateral edge 31₁ for a certain portion (e.g., about 80%) of the width W_e of the lateral edge part 63₁ and from the inner side 25 for a certain portion (e.g., about 75%) of the thickness T_e of the lateral edge part 63₁. In other embodiments, the elastic material 89 may extend inwardly from the lateral edge 31₁ for another portion (e.g., about 40%, 50% or 60%) or all of the width W_e of the lateral edge part 63₁ and/or from the inner side 25 for another portion (e.g., about 40%, 50% or 60%) or all of the thickness T_e of the lateral edge part 63₁. The elastic material 89 may be provided in the endless track 22 during molding of the endless track 22, or after molding of the endless track (e.g., by affixing it using a suitable adhesive).

While in this embodiment the endless track 22 comprises the impact absorber 70₁ in its first lateral edge part 63₁ and the impact absorber 70₂ in its second lateral edge part 63₂, in other embodiments, the endless track 22 may comprise only one of these impact absorber 70₁, 70₂, for instance, on a given one of its lateral edge parts 63₁, 63₂ that is more susceptible to impact an obstacle on the ground during use (e.g., the lateral edge part furthest away from a center of the vehicle 10).

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Although it is configured in a certain way in this embodiment, each track assembly 16_i of the construction vehicle 10, including its endless track 22, may be configured in various other ways in other embodiments.

- 5 For example, the endless track 22 may interact with the drive wheel 24 in other ways in other embodiments in order to be moved. For instance, in some embodiments, the inner side 25 of the endless track 22 may comprise a plurality of drive lugs that interact with the drive wheel 24 in order to cause the endless track 22 to be driven (i.e., the track assembly 16_i may implement a “positive
10 drive” system), or may frictionally engage the drive wheel 24 to cause the endless track 22 to be driven (i.e., the track assembly 16_i may implement a “friction drive” system).

- Each track assembly 16_i may comprise different and/or additional components in
15 other embodiments. For example, in some embodiments, the track assembly 16_i may comprise a front drive wheel (e.g., the idler wheel 26 may be replaced by a drive wheel) instead of or in addition to the drive wheel 24. As another example, in some embodiments, the track assembly 16_i may comprise more or less roller wheels such as the roller wheels 28₁-28₁₀. As yet another example, rather than
20 have a generally triangular configuration as in this embodiment, in other embodiments, the track assembly 16_i may have various other configurations (e.g., a generally linear configuration).

- While in embodiments considered above the off-road vehicle 10 is a construction
25 vehicle for performing construction work, in other embodiments, the off-road vehicle 10 may be an agricultural vehicle (e.g., a tractor, a combine harvester, another type of harvester, etc.) for performing agricultural work, a forestry vehicle (e.g., a feller-buncher, a tree chipper, a knuckleboom loader, etc.) for performing forestry work, a military vehicle (e.g., a combat engineering vehicle (CEV), etc.)
30 for performing work in a military application, a transporter vehicle (e.g., a heavy hauler, a flatbed truck, a trailer, a carrier, etc.) for transporting equipment,

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materials, cargo or other objects, or any other vehicle operable off paved roads. Although operable off paved roads, an off-road vehicle may also be operable on paved roads in some cases. Also, while in embodiments considered above the off-road vehicle 10 is driven by a human operator in the vehicle 10, in other
5 embodiments, the off-road vehicle 10 may be an unmanned ground vehicle (e.g., a tele-operated or autonomous unmanned ground vehicle).

Although various embodiments and examples have been presented, this was for the purpose of describing, but not limiting, the invention. Various modifications
10 and enhancements will become apparent to those of ordinary skill in the art and are within the scope of the invention, which is defined by the appended claims.

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CLAIMS

1. An endless track for providing traction to a vehicle, the endless track having:
an inner side for facing a plurality of wheels of the vehicle; a ground-
engaging outer side for engaging the ground; a first lateral edge; and a
second lateral edge, the endless track comprising:
 - an elastomeric body;
 - a plurality of cores at least partially embedded in the elastomeric body,
each core extending transversally to a longitudinal direction of the
endless track to provide transverse rigidity to the endless track; and
 - an impact absorber in a lateral edge part of the endless track, the
lateral edge part being located between the cores and a given one of
the first lateral edge and the second lateral edge, the impact absorber
facilitating an elastic deformation of the lateral edge part when the
lateral edge part impacts an obstacle on the ground.
2. The endless track claimed in claim 1, wherein the impact absorber
comprises at least one hole, each of the at least one hole being deformable
to facilitate the elastic deformation of the lateral edge part.
3. The endless track claimed in claim 2, wherein each of the at least one hole
is shrinkable to facilitate the elastic deformation of the lateral edge part.
4. The endless track claimed in claim 2, wherein each of the at least one hole
is configured to direct the elastic deformation of the lateral edge part.
5. The endless track claimed in claim 2, wherein each of the at least one hole
extends inwardly from the inner side.
6. The endless track claimed in claim 2, wherein each of the at least one hole
extends inwardly from the ground-engaging outer side.

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7. The endless track claimed in claim 2, wherein each of the at least one hole extends inwardly from the given one of the first lateral edge and the second lateral edge.
- 5
8. The endless track claimed in claim 2, wherein each of the at least one hole is a closed cavity.
9. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a thickness direction of the endless track that is at least 5% of a thickness of the lateral edge part.
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10. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a thickness direction of the endless track that is at least 10% of a thickness of the lateral edge part.
- 15
11. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a thickness direction of the endless track that is at least 15% of a thickness of the lateral edge part.
- 20
12. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a widthwise direction of the endless track that is at least 5% of a width of the lateral edge part.
- 25
13. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a widthwise direction of the endless track that is at least 10% of a width of the lateral edge part.
- 30
14. The endless track claimed in claim 2, wherein each of the at least one hole has a dimension measured along a widthwise direction of the endless track that is at least 15% of a width of the lateral edge part.

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5 15. The endless track claimed in claim 2, wherein each of the at least one hole is delimited by elastomeric material of the lateral edge part, each of the at least one hole containing a filler different from the elastomeric material of the lateral edge part.

10 16. The endless track claimed in claim 15, wherein the filler has a modulus of elasticity lower than a modulus of elasticity of the elastomeric material of the lateral edge part.

17. The endless track claimed in claim 16, wherein the filler includes an elastomer.

15 18. The endless track claimed in claim 15, wherein the filler has a hardness lower than a hardness of the elastomeric material of the lateral edge part.

19. The endless track claimed in claim 18, wherein the filler comprises an elastomer.

20 20. The endless track claimed in claim 15, wherein the filler includes a fluid confined in the endless track.

25 21. The endless track claimed in claim 2, wherein the at least one hole comprises a plurality of holes distributed along the longitudinal direction of the endless track.

30 22. The endless track claimed in claim 21, wherein at least two of the holes are spaced apart from one another along a widthwise direction of the endless track.

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23. The endless track claimed in claim 21, wherein respective ones of the holes are aligned with corresponding ones of the cores.

5 24. The endless track claimed in claim 1, wherein the elastomeric body comprises elastomeric material in which the cores are at least partially embedded, the impact absorber comprising elastic material different from the elastomeric material in which the cores are at least partially embedded.

10 25. The endless track claimed in claim 24, wherein the elastic material of the impact absorber has a modulus of elasticity lower than a modulus of elasticity of the elastomeric material in which the cores are at least partially embedded.

15 26. The endless track claimed in claim 25, wherein the elastic material comprises an elastomer.

20 27. The endless track claimed in claim 24, wherein the elastic material of the impact absorber has a hardness lower than a hardness of the elastomeric material in which the cores are at least partially embedded.

28. The endless track claimed in claim 27, wherein the elastic material comprises an elastomer.

25 29. The endless track claimed in claim 1, wherein the impact absorber is a first impact absorber, the lateral edge part is a first lateral edge part, and the given one of the first lateral edge and the second lateral edge is the first lateral edge, the endless track comprising a second impact absorber in a second lateral edge part of the endless track, the second lateral edge part being located between the cores and the second lateral edge, the second
30 impact absorber facilitating an elastic deformation of the second lateral edge part when the second lateral edge part impacts an obstacle on the ground.

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30. The endless track claimed in claim 29, wherein the first impact absorber comprises at least one hole, each of the at least one hole of the first impact absorber being deformable to facilitate the elastic deformation of the first lateral edge part, the second impact absorber comprising at least one hole, each of the at least one hole of the second impact absorber being deformable to facilitate the elastic deformation of the second lateral edge part.
31. The endless track claimed in claim 30, wherein the at least one hole of the first impact absorber comprises a plurality of holes distributed along the longitudinal direction of the endless track and the at least one hole of the second impact absorber comprises a plurality of holes distributed along the longitudinal direction of the endless track.
32. The endless track claimed in claim 1, wherein each core comprises a pair of wings and a wheel guide, the wheel guide comprising at least one projection on the inner side.
33. The endless track claimed in claim 1, wherein the elastomeric body comprises rubber.
34. An endless track for providing traction to a vehicle, the endless track having: an inner side for facing a plurality of wheels of the vehicle; a ground-engaging outer side for engaging the ground; a first lateral edge; and a second lateral edge, the endless track comprising:
- an elastomeric body;
 - a plurality of cores at least partially embedded in the elastomeric body, each core extending transversally to a longitudinal direction of the endless track to provide transverse rigidity to the endless track; and

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- a hole in a lateral edge part of the endless track, the lateral edge part being located between the cores and a given one of the first lateral edge and the second lateral edge, the hole being deformable when the lateral edge part impacts an obstacle on the ground.

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35. The endless track claimed in claim 34, wherein the hole is shrinkable when the lateral edge part impacts the obstacle on the ground.

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36. The endless track claimed in claim 34, wherein the hole is configured to direct an elastic deformation of the lateral edge part when the lateral edge part impacts the obstacle on the ground.

37. The endless track claimed in claim 34, wherein the hole extends inwardly from the inner side.

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38. The endless track claimed in claim 34, wherein the hole extends inwardly from the ground-engaging outer side.

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39. The endless track claimed in claim 34, wherein the hole extends inwardly from the given one of the first lateral edge and the second lateral edge.

40. The endless track claimed in claim 34, wherein the hole is a closed cavity.

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41. The endless track claimed in claim 34, wherein the hole has a dimension measured along a thickness direction of the endless track that is at least 5% of a thickness of the lateral edge part.

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42. The endless track claimed in claim 34, wherein the hole has a dimension measured along a thickness direction of the endless track that is at least 10% of a thickness of the lateral edge part.

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43. The endless track claimed in claim 34, wherein the hole has a dimension measured along a thickness direction of the endless track that is at least 15% of a thickness of the lateral edge part.

5 44. The endless track claimed in claim 34, wherein the hole has a dimension measured along a widthwise direction of the endless track that is at least 5% of a width of the lateral edge part.

10 45. The endless track claimed in claim 34, wherein the hole has a dimension measured along a widthwise direction of the endless track that is at least 10% of a width of the lateral edge part.

15 46. The endless track claimed in claim 34, wherein the hole has a dimension measured along a widthwise direction of the endless track that is at least 15% of a width of the lateral edge part.

20 47. The endless track claimed in claim 34, wherein the hole is delimited by elastomeric material of the lateral edge part, the hole containing a filler different from the elastomeric material of the lateral edge part.

48. The endless track claimed in claim 47, wherein the filler has a modulus of elasticity lower than a modulus of elasticity of the elastomeric material of the lateral edge part.

25 49. The endless track claimed in claim 48, wherein the filler includes an elastomer.

50. The endless track claimed in claim 47, wherein the filler has a hardness lower than a hardness of the elastomeric material of the lateral edge part.

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51. The endless track claimed in claim 50, wherein the filler includes an elastomer.

52. The endless track claimed in claim 47, wherein the filler includes a fluid confined in the endless track.

53. The endless track claimed in claim 34, wherein the hole is one of a plurality of holes of the lateral edge part, the holes being distributed along the longitudinal direction of the endless track.

54. The endless track claimed in claim 53, wherein at least two of the holes are spaced apart from one another along a widthwise direction of the endless track.

55. The endless track claimed in claim 53, wherein respective ones of the holes are aligned with corresponding ones of the cores.

56. The endless track claimed in claim 34, wherein the lateral edge part is a first lateral edge part and the given one of the first lateral edge and the second lateral edge is the first lateral edge, the endless track comprising a hole in a second lateral edge part of the endless track, the second lateral edge part being located between the cores and the second lateral edge, the hole of the second lateral edge part being deformable when the second lateral edge part impacts an obstacle on the ground.

57. The endless track claimed in claim 56, wherein the hole of the first lateral edge part is one of a plurality of holes of the first lateral edge part, the holes of the first lateral edge part being distributed along the longitudinal direction of the endless track, the hole of the second lateral edge part being one of a plurality of holes of the second lateral edge part, the holes of the second

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lateral edge part being distributed along the longitudinal direction of the endless track.

58. The endless track claimed in claim 34, wherein each core comprises a pair
5 of wings and a wheel guide, the wheel guide comprising at least one projection on the inner side.

59. The endless track claimed in claim 34, wherein the elastomeric body
10 comprises rubber.

60. An endless track for providing traction to a vehicle, the endless track having:
an inner side for facing a plurality of wheels of the vehicle; a ground-
engaging outer side for engaging the ground; a first lateral edge; and a
second lateral edge, the endless track comprising:

- 15 - an elastomeric body;
- a plurality of cores at least partially embedded in the elastomeric body,
each core extending transversally to a longitudinal direction of the
endless track to provide transverse rigidity to the endless track;
- 20 - a plurality of holes in a first lateral edge part of the endless track, the
first lateral edge part being located between the first lateral edge and
the cores, the holes of the first lateral edge part extending inwardly
from a periphery of the endless track and being distributed along the
longitudinal direction of the endless track; and
- 25 - a plurality of holes in a second lateral edge part of the endless track,
the second lateral edge part being located between the second lateral
edge and the cores, the holes of the second lateral edge part
extending inwardly from the periphery of the endless track and being
distributed along the longitudinal direction of the endless track.

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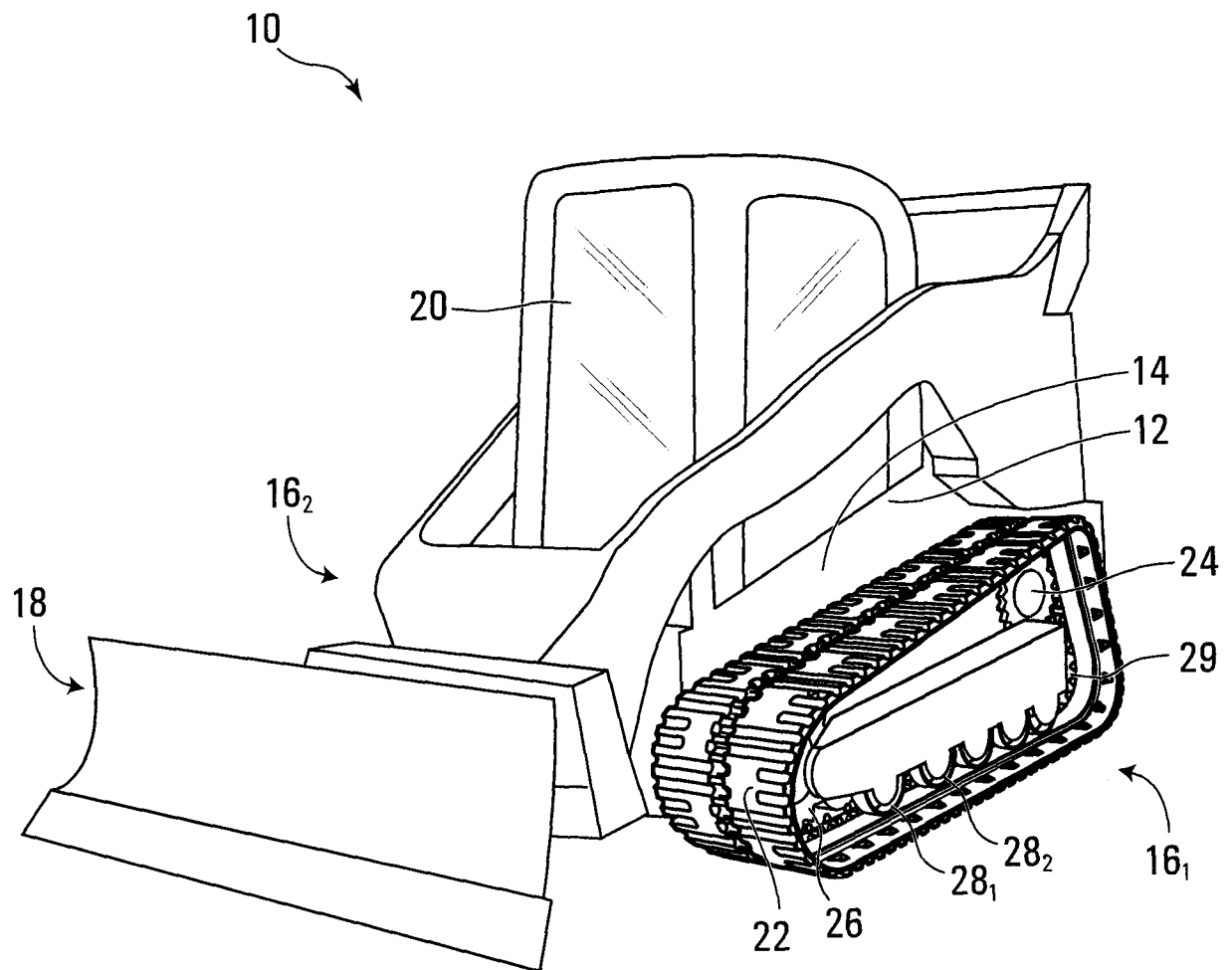


FIG. 1

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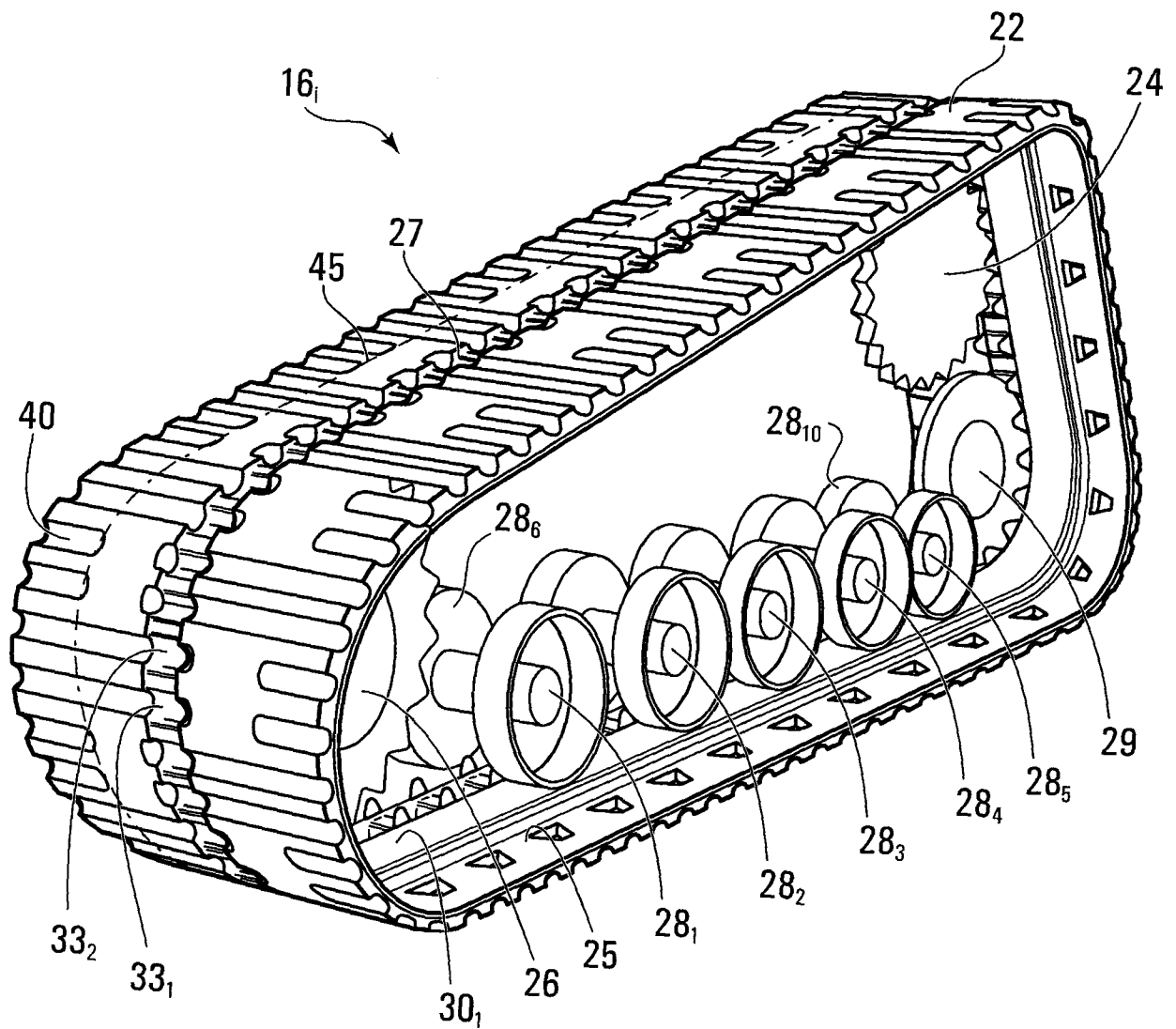


FIG. 2

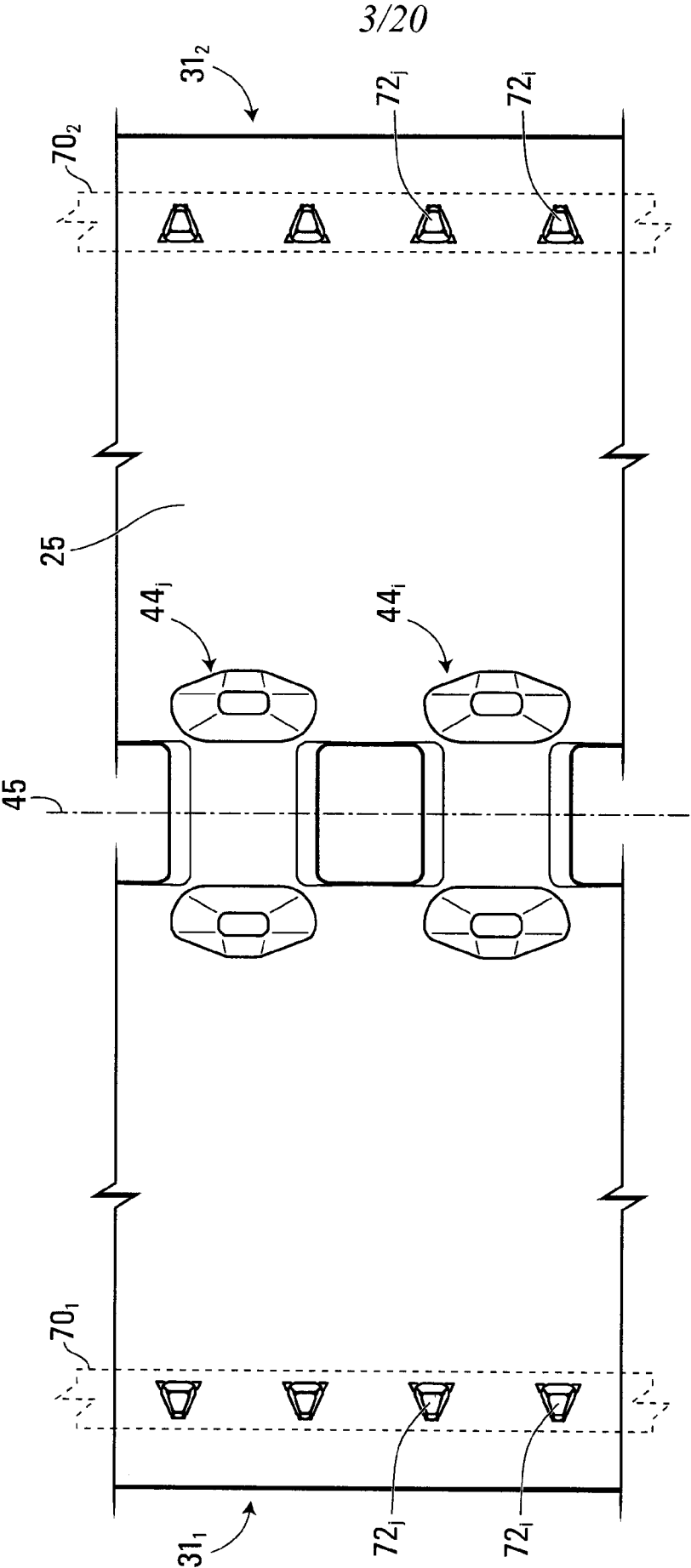


FIG. 3

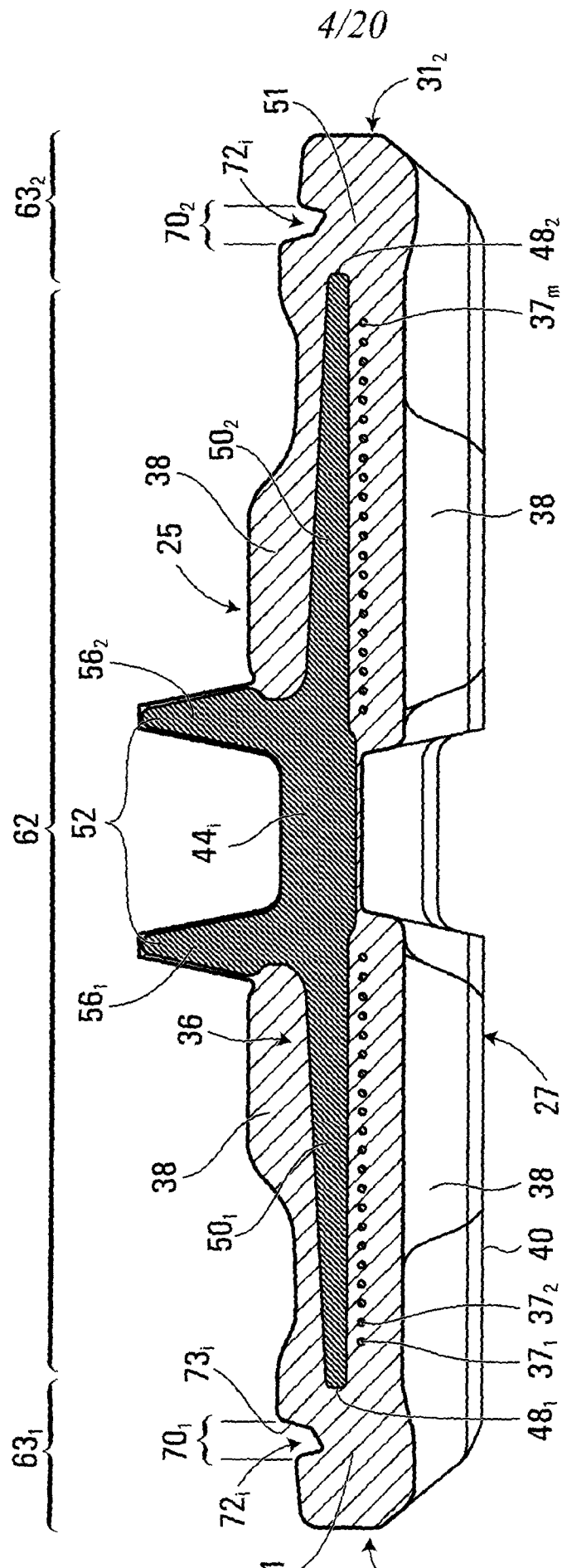


FIG. 4

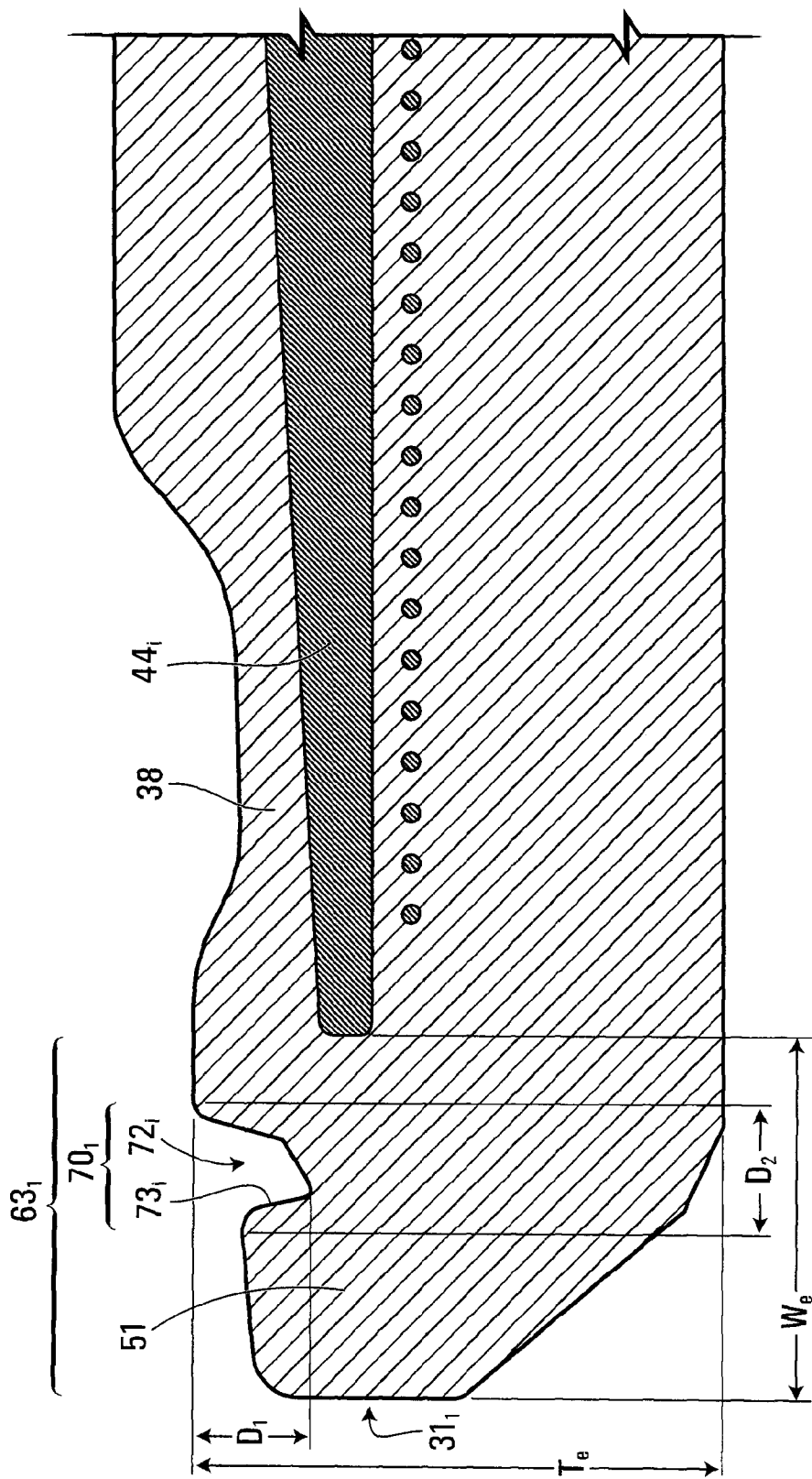


FIG. 5

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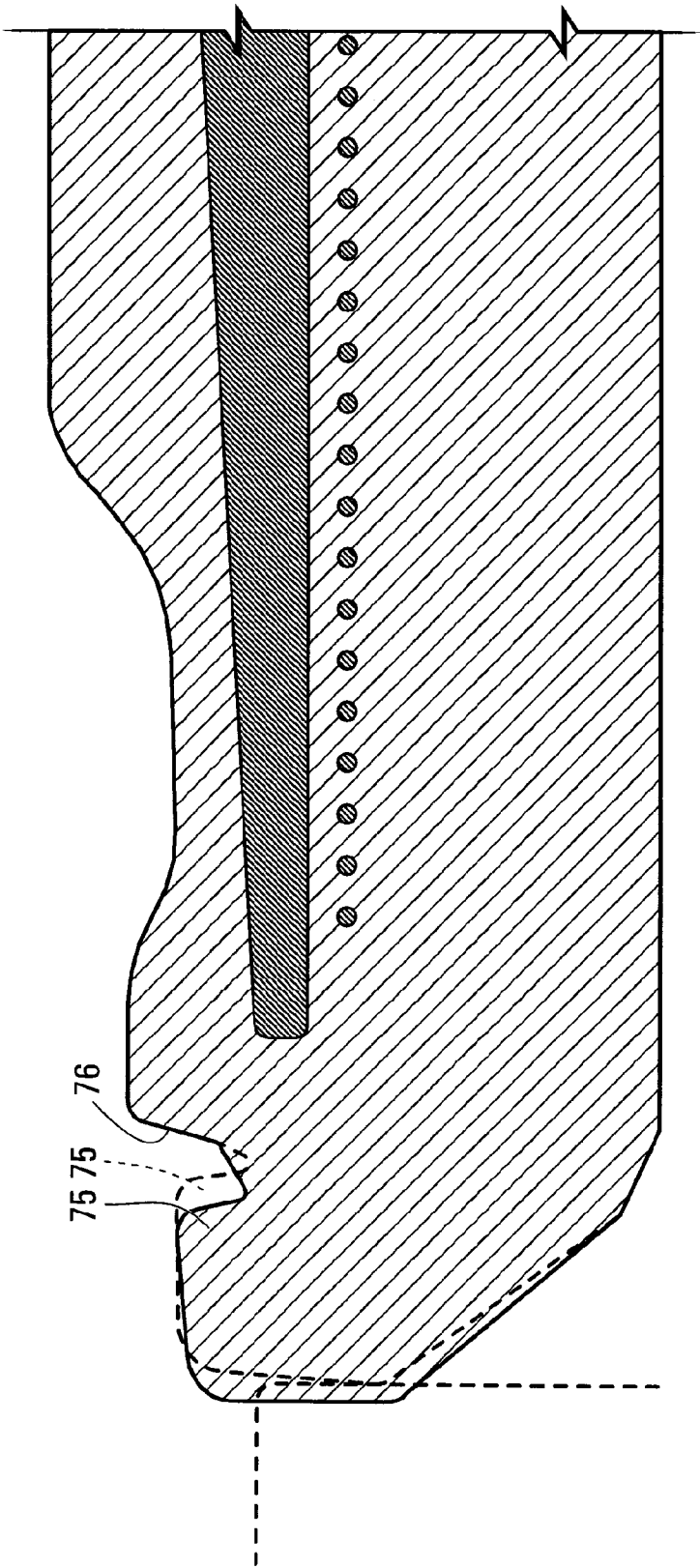
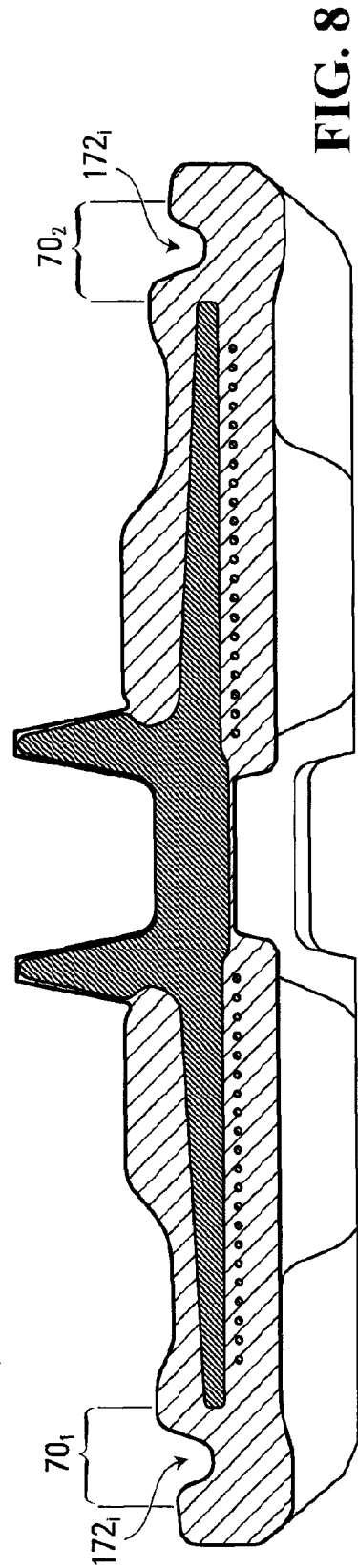
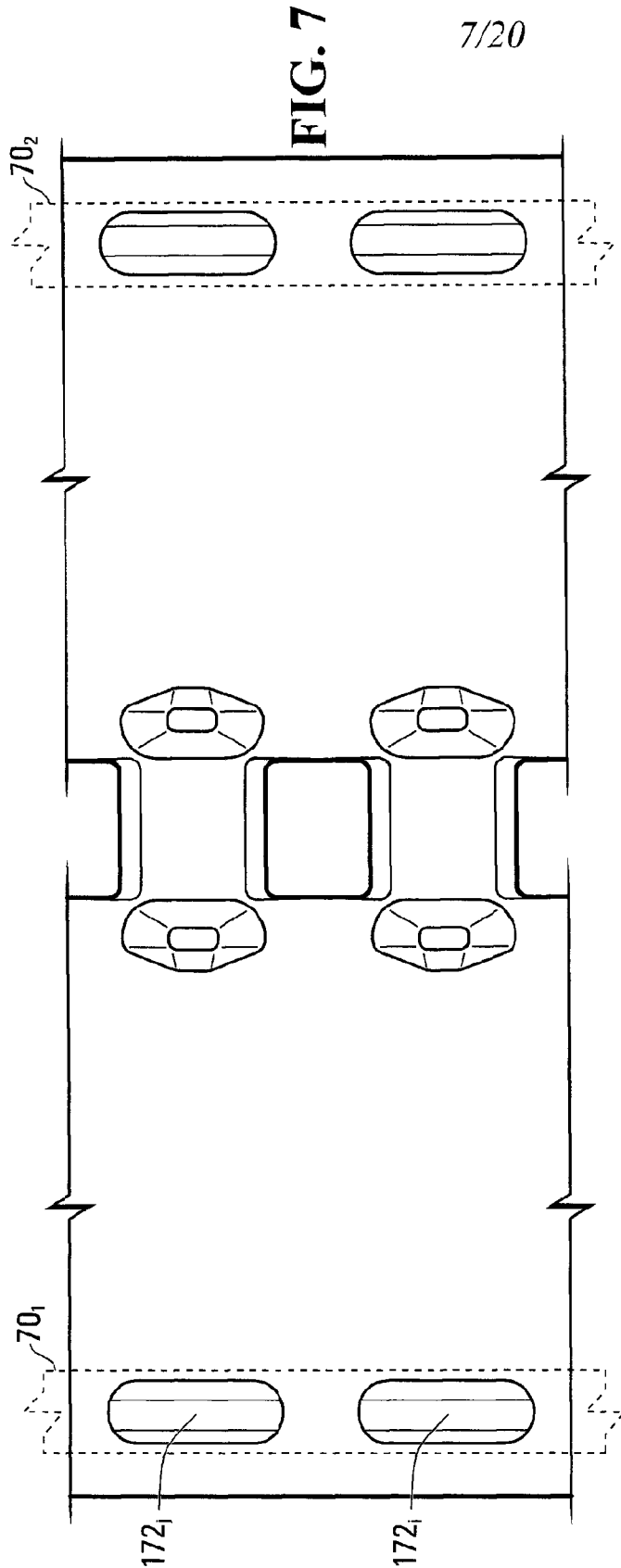
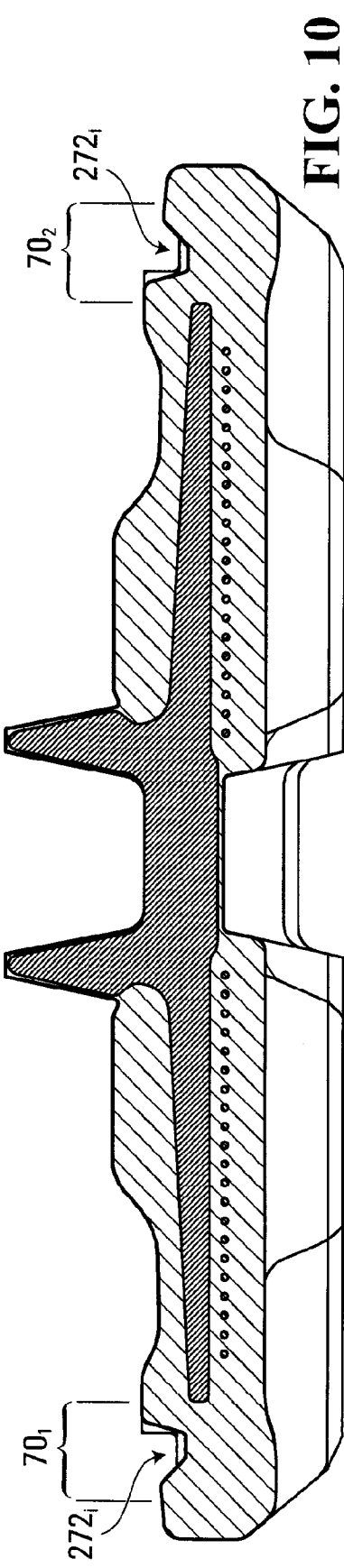
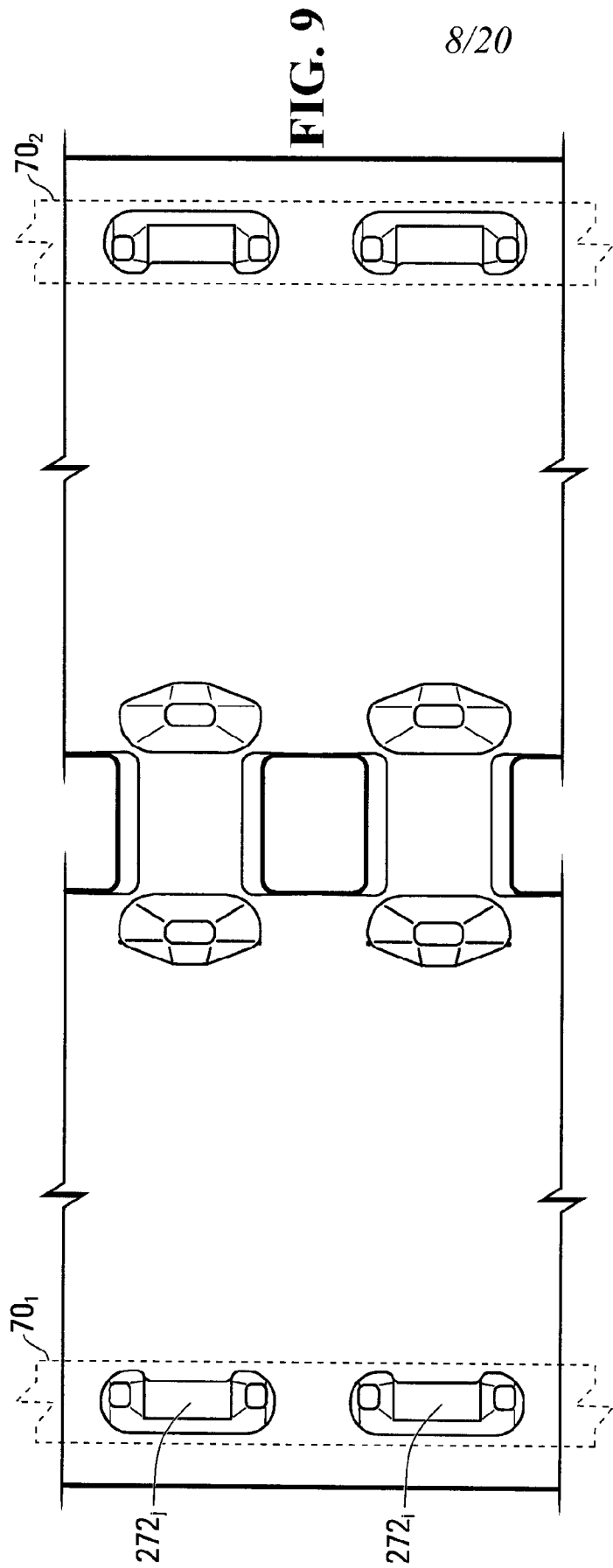


FIG. 6





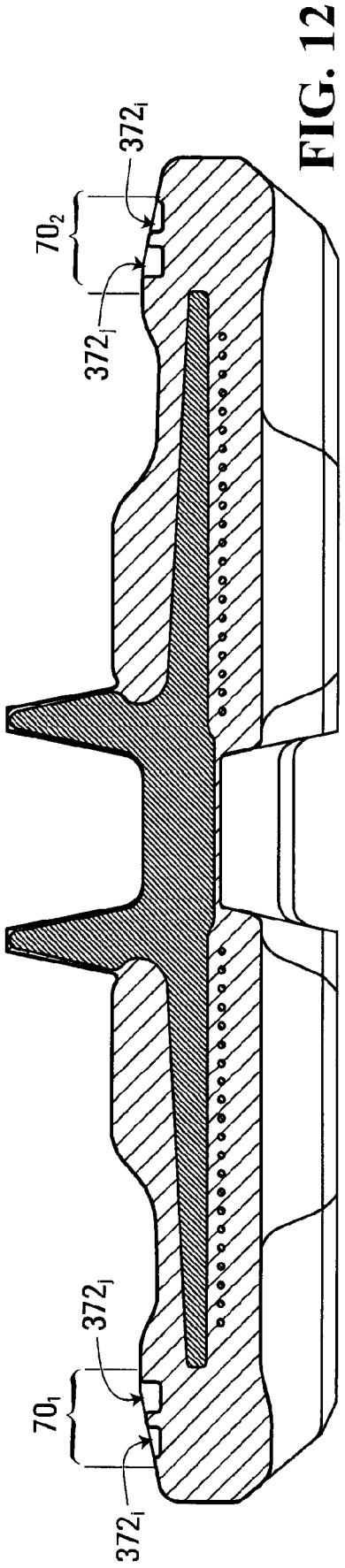
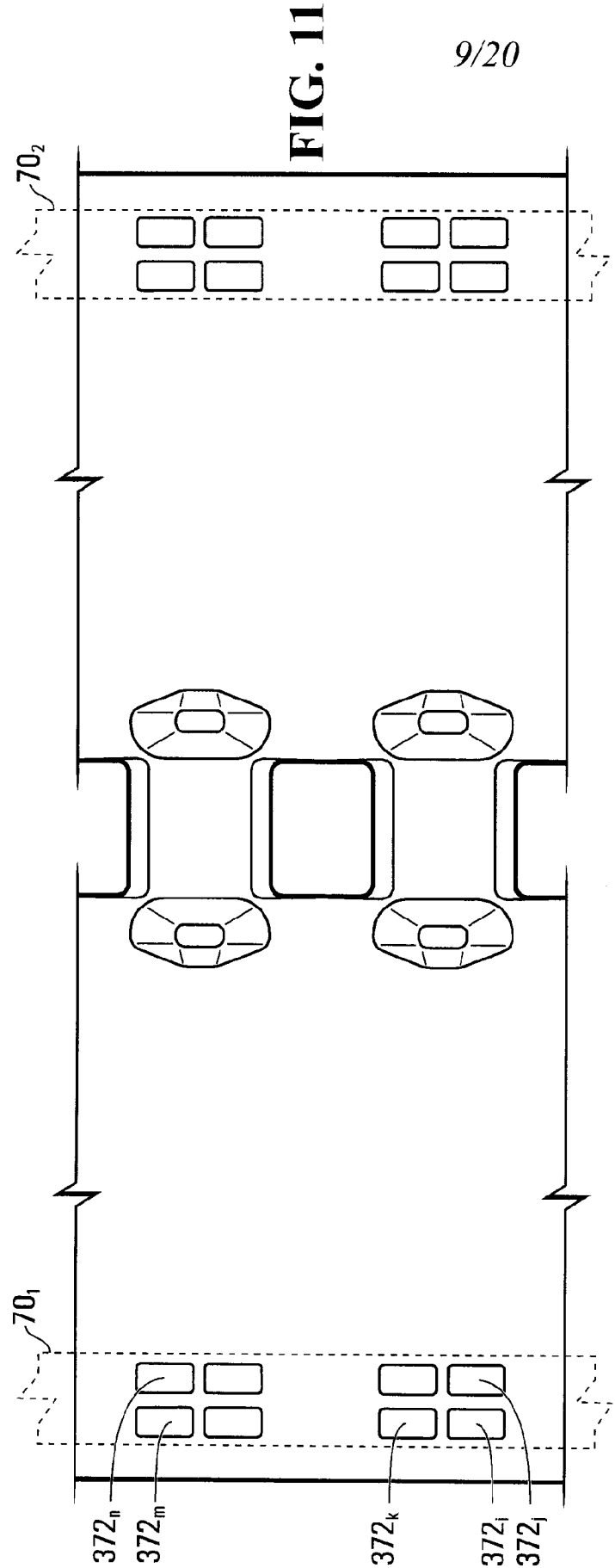


FIG. 14

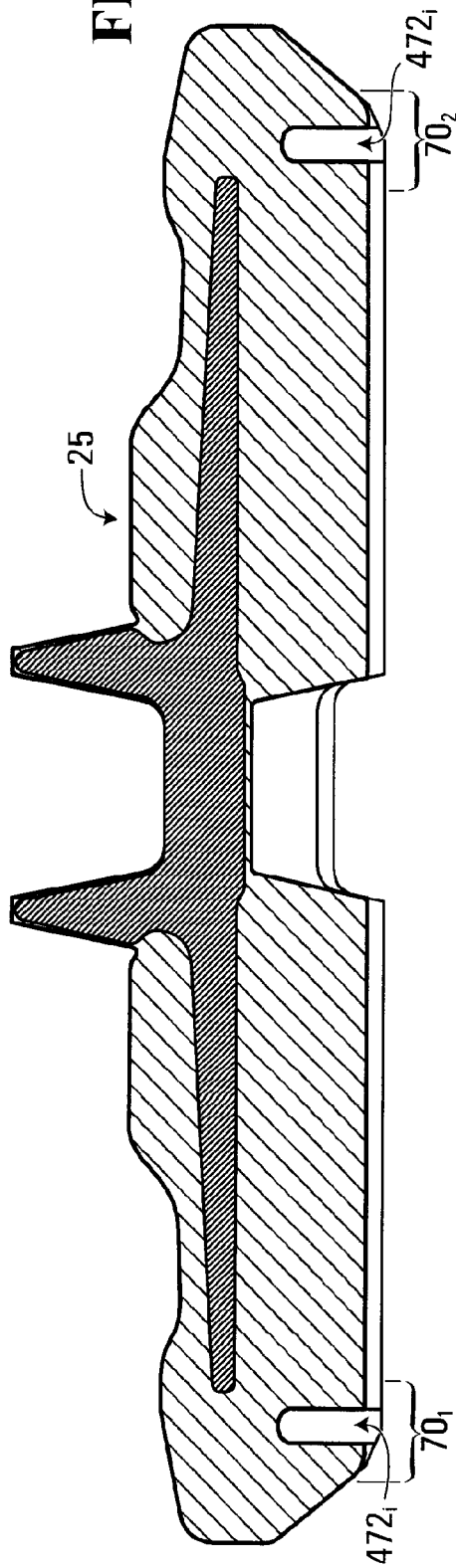
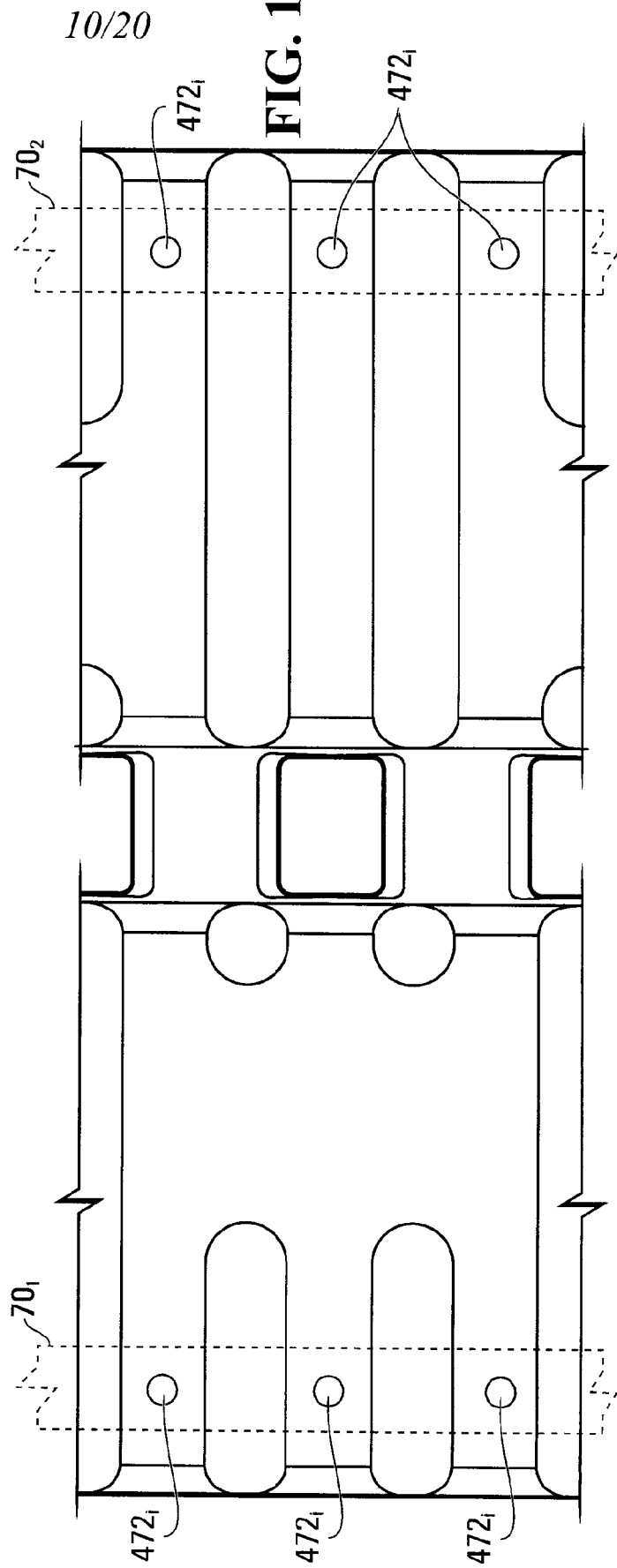
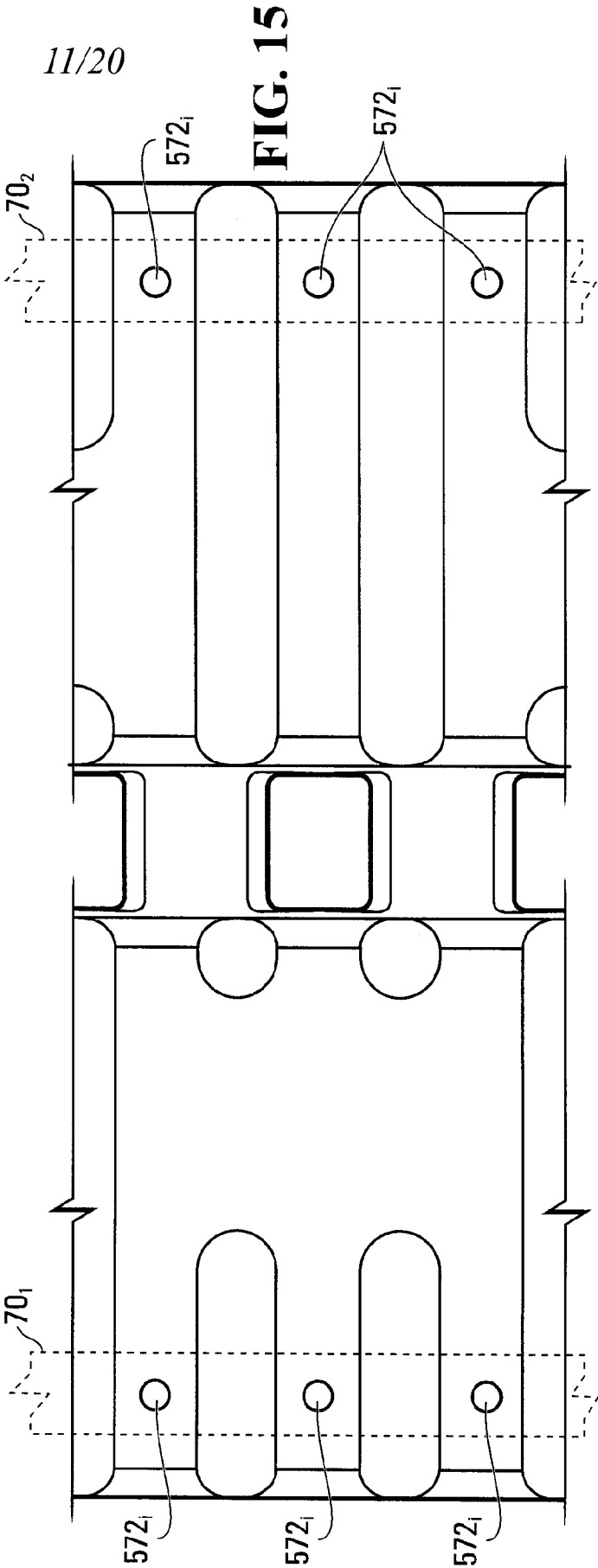
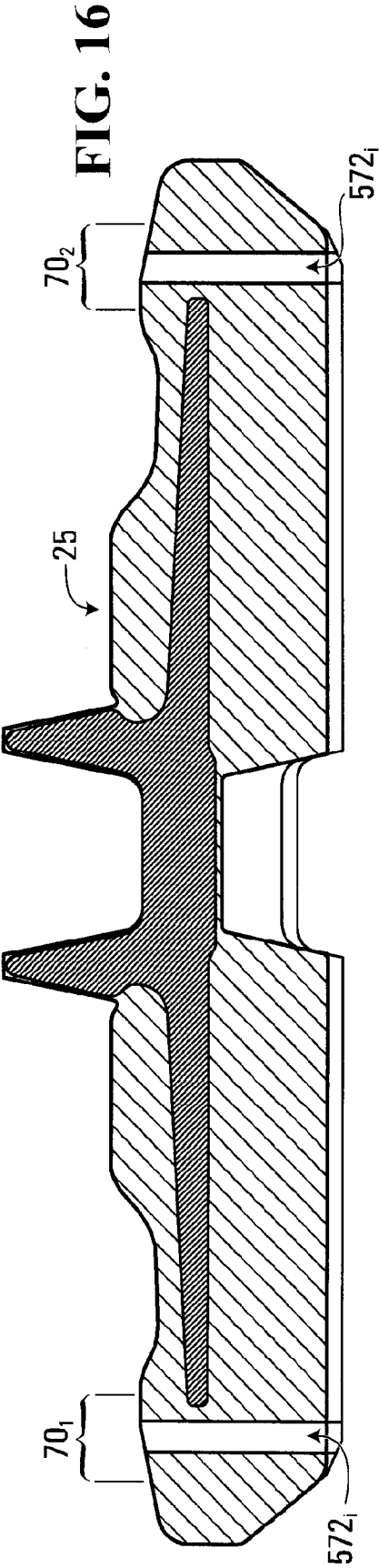
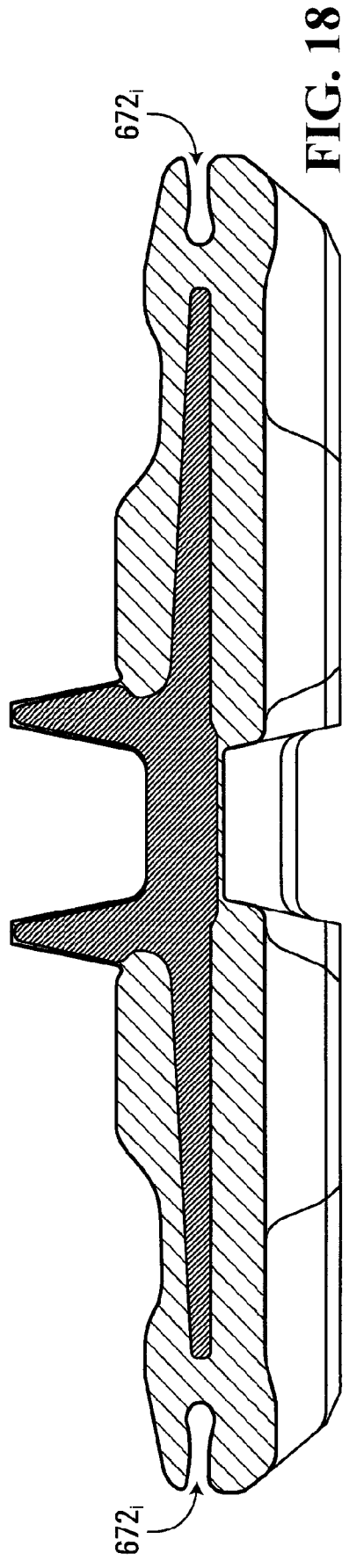
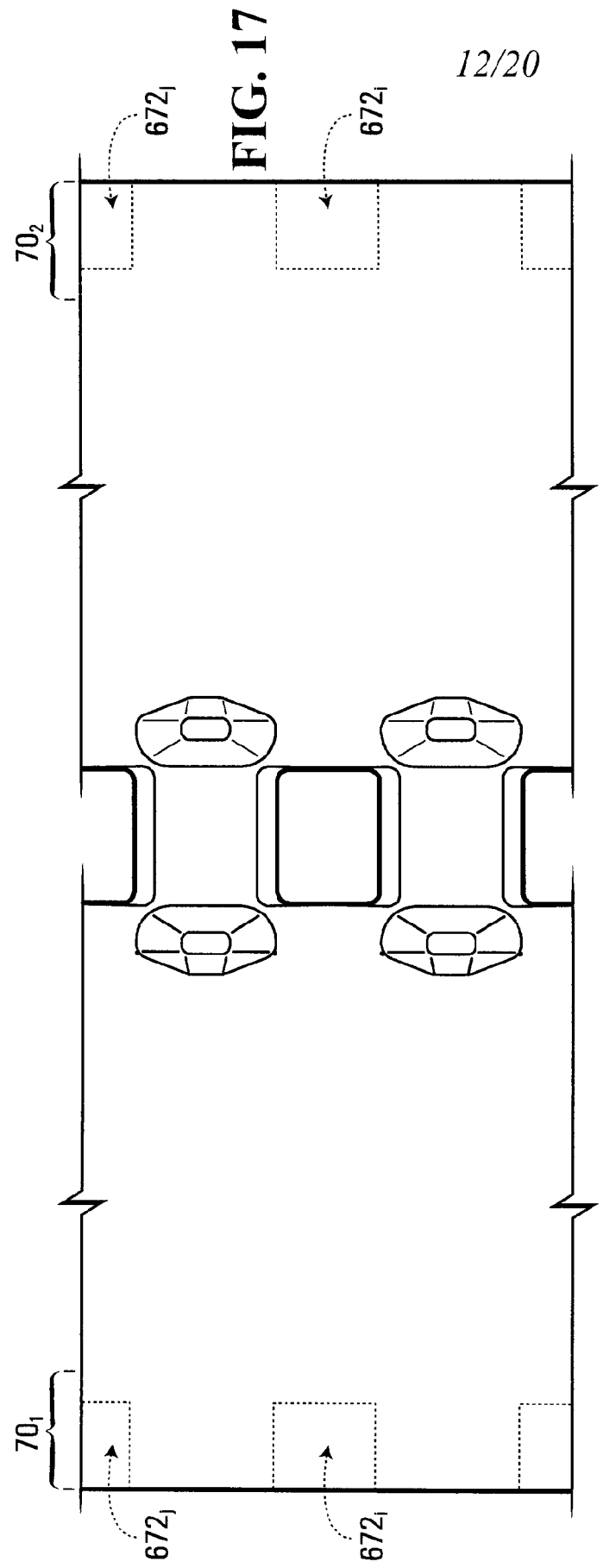
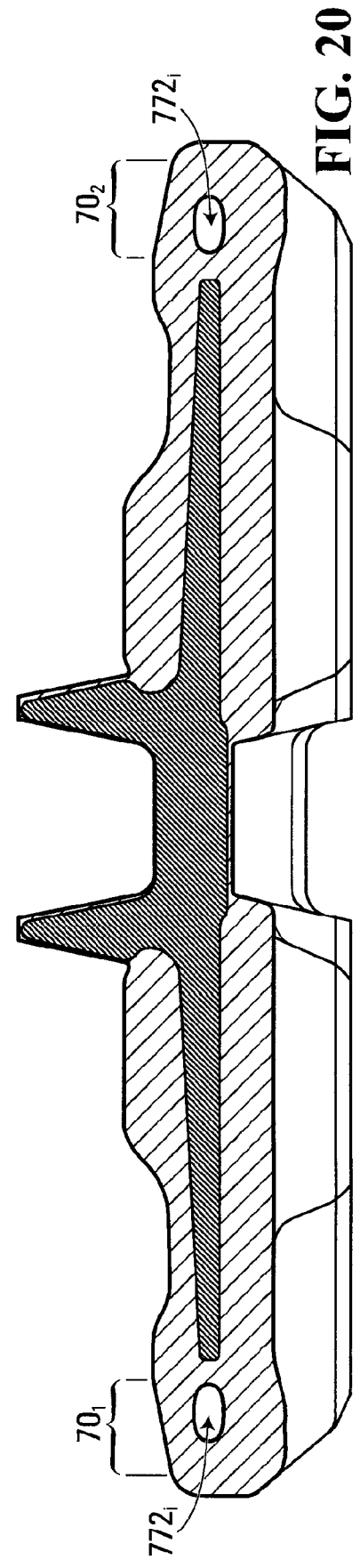
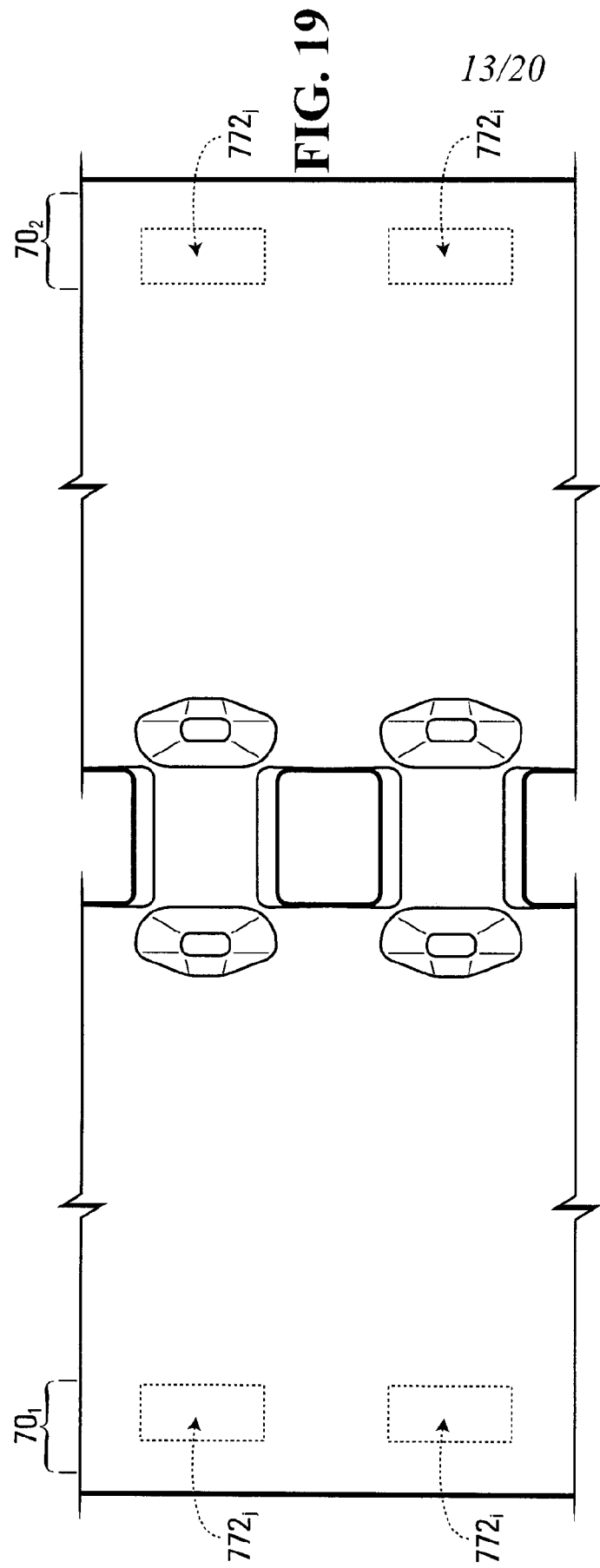


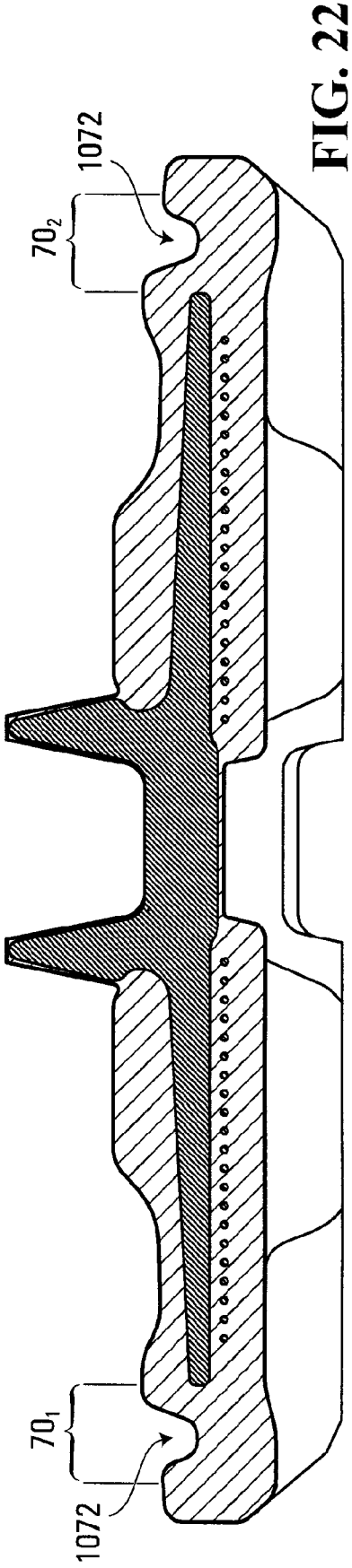
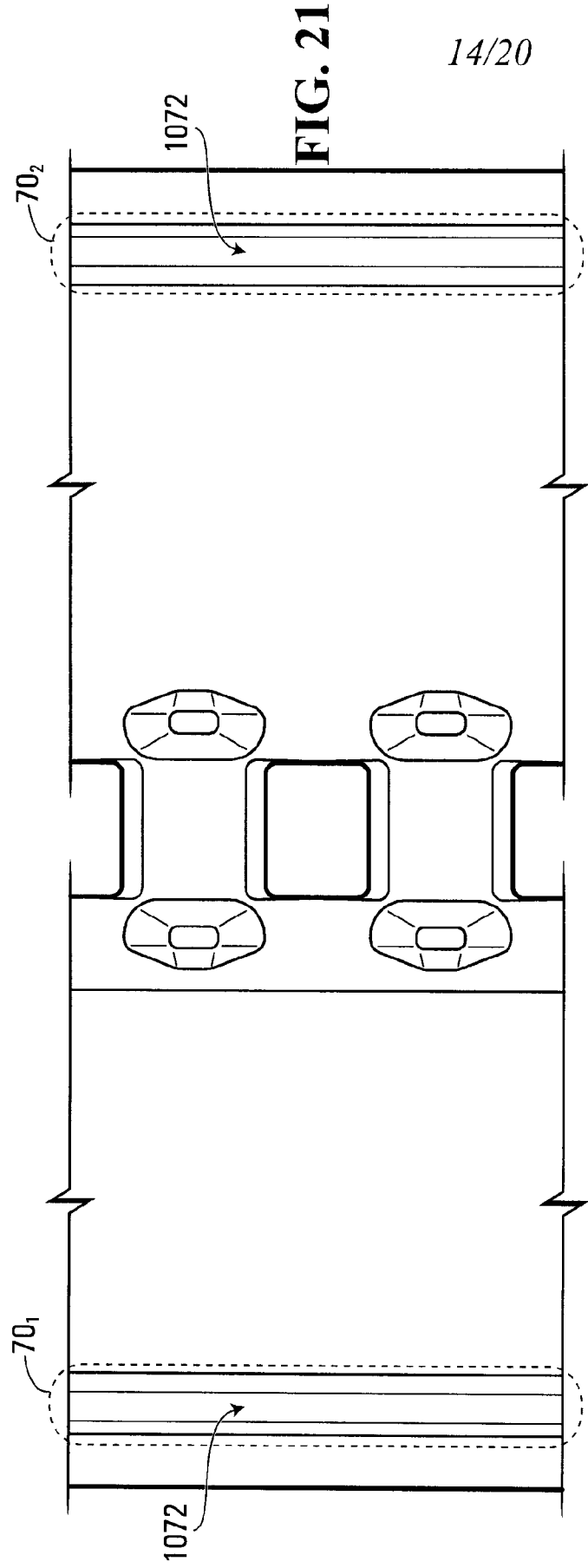
FIG. 13

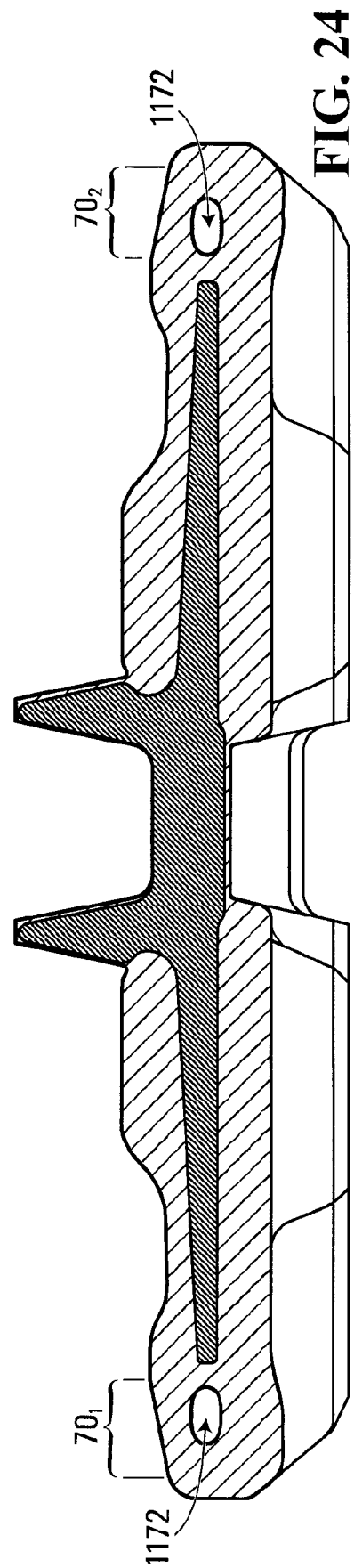
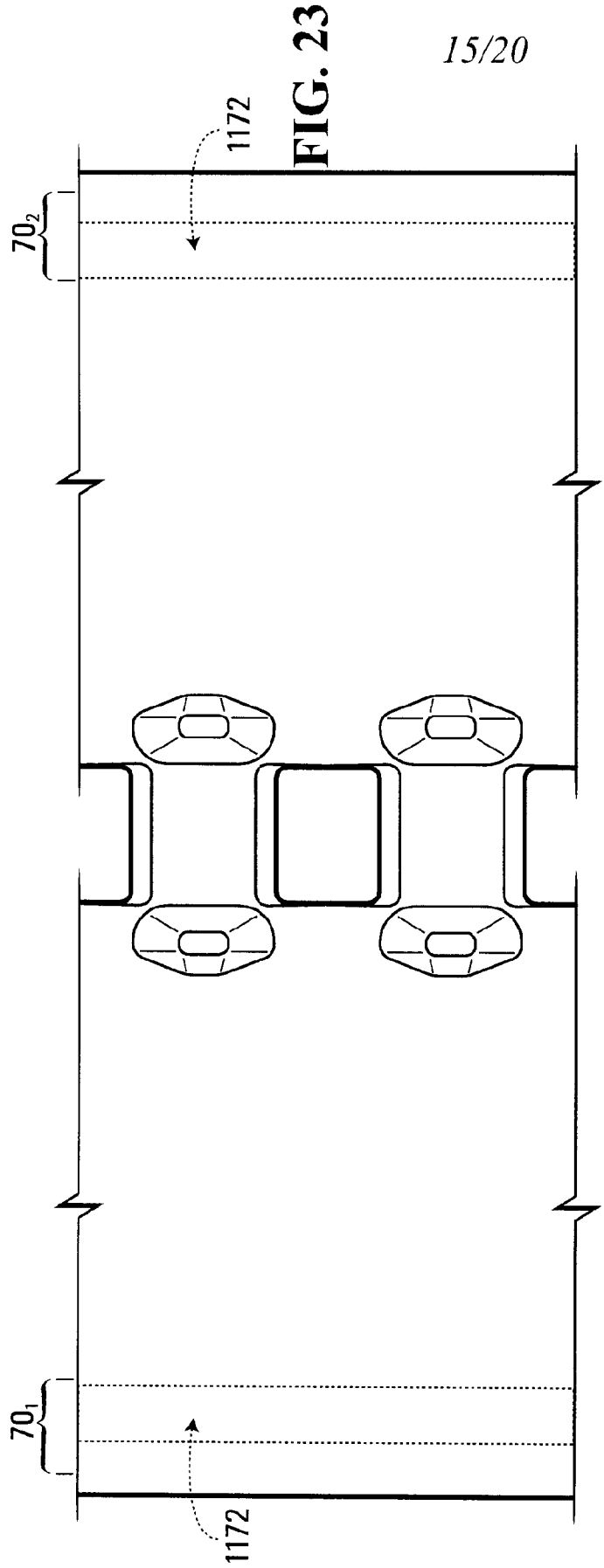












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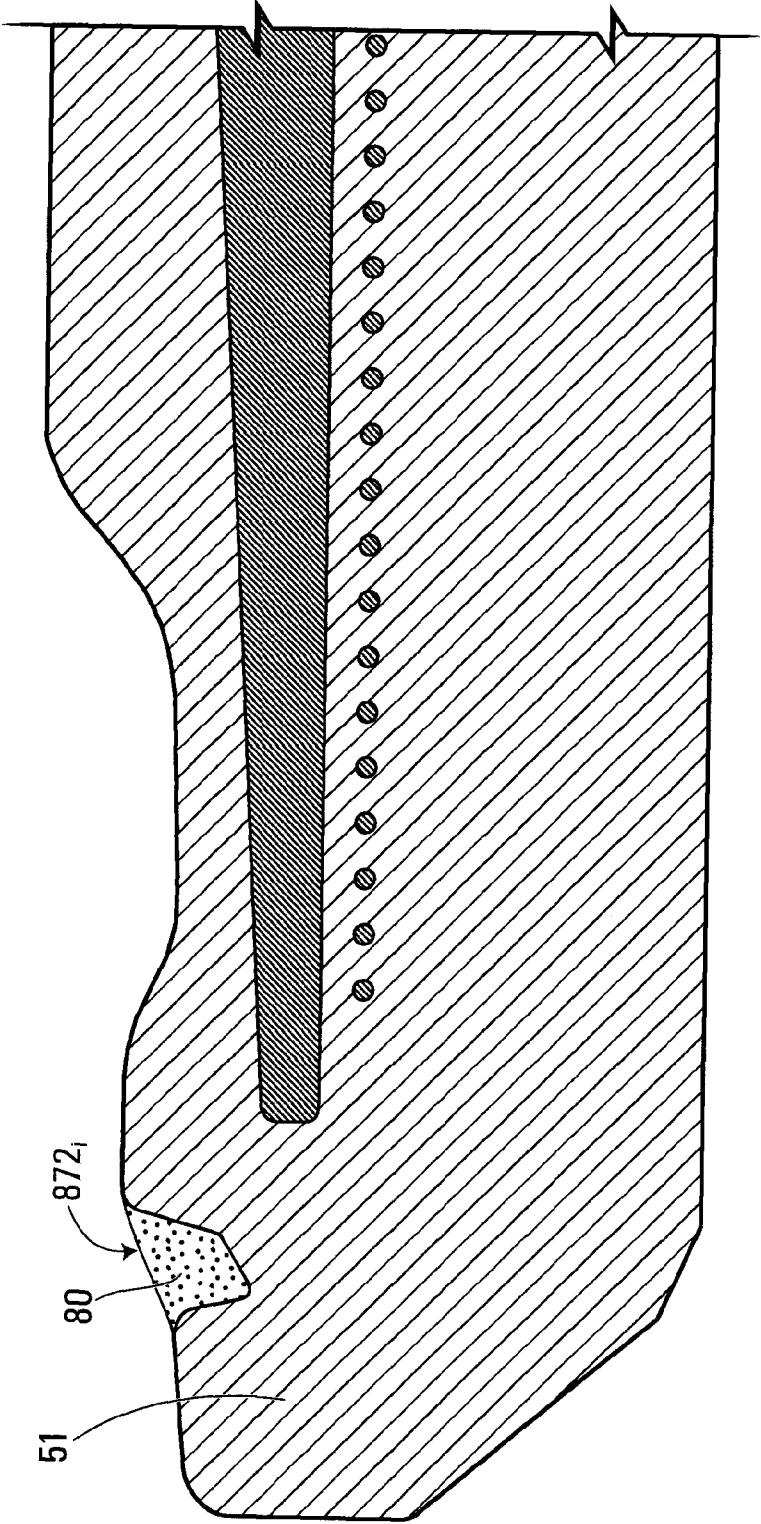


FIG. 25

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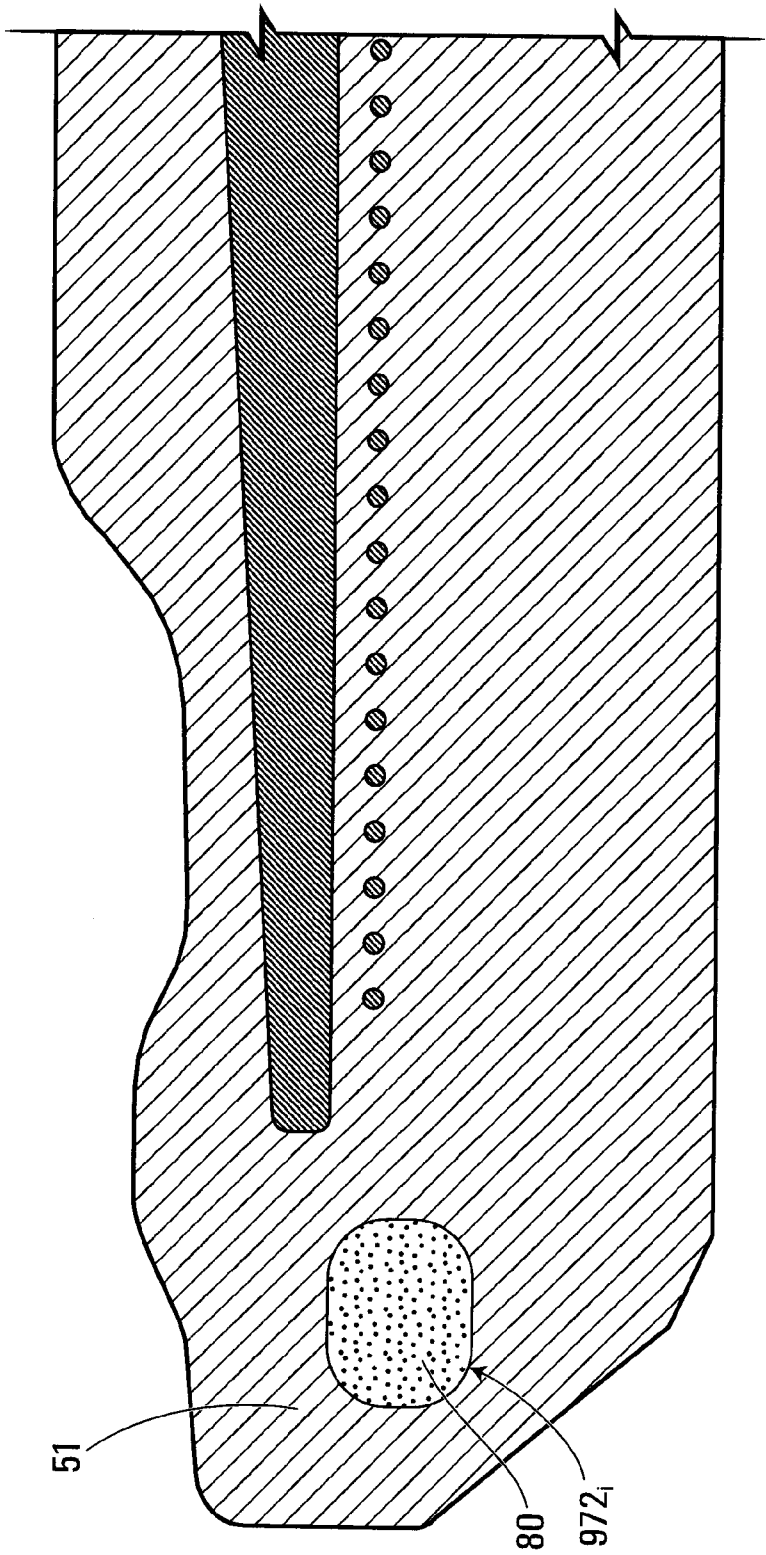


FIG. 26

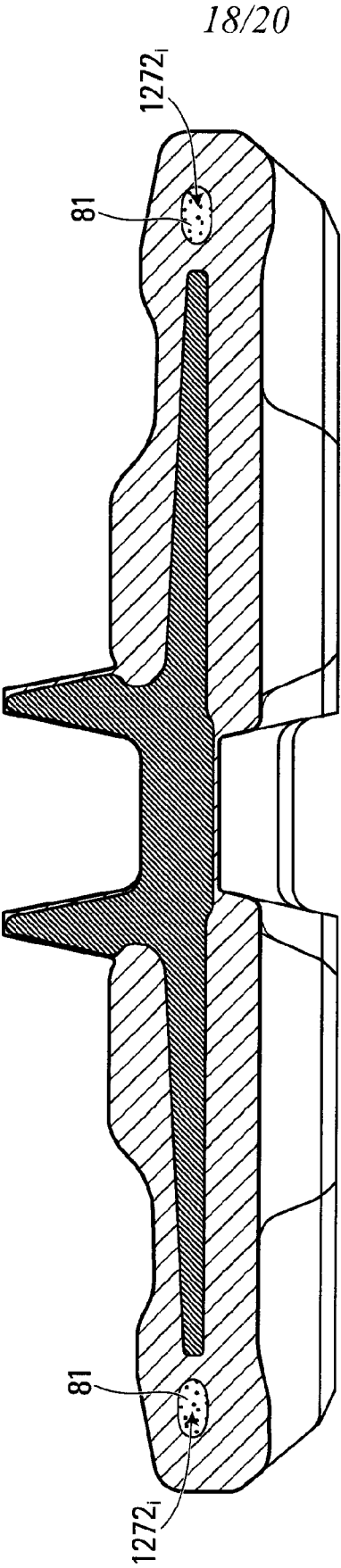


FIG. 27

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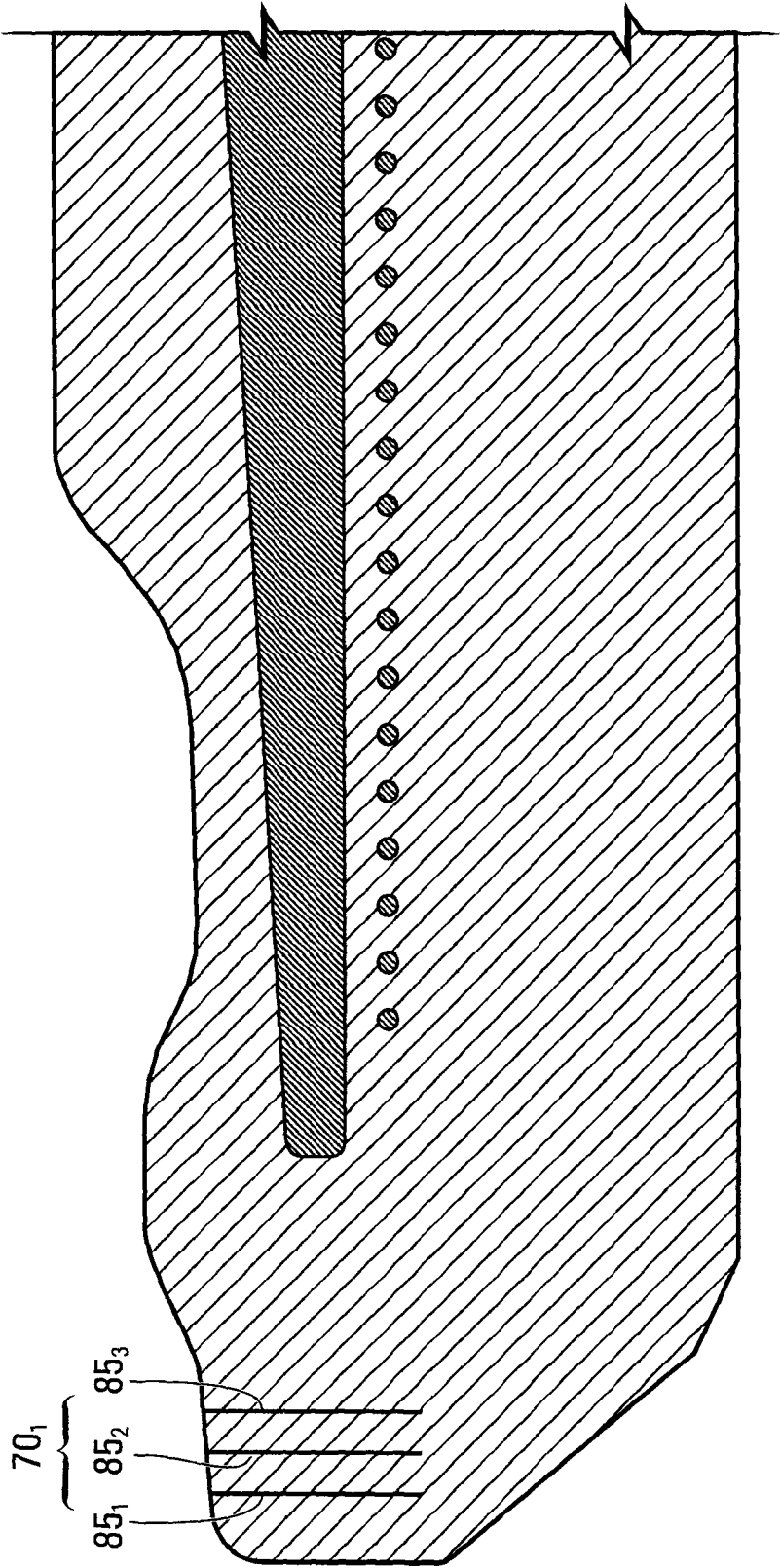


FIG. 28

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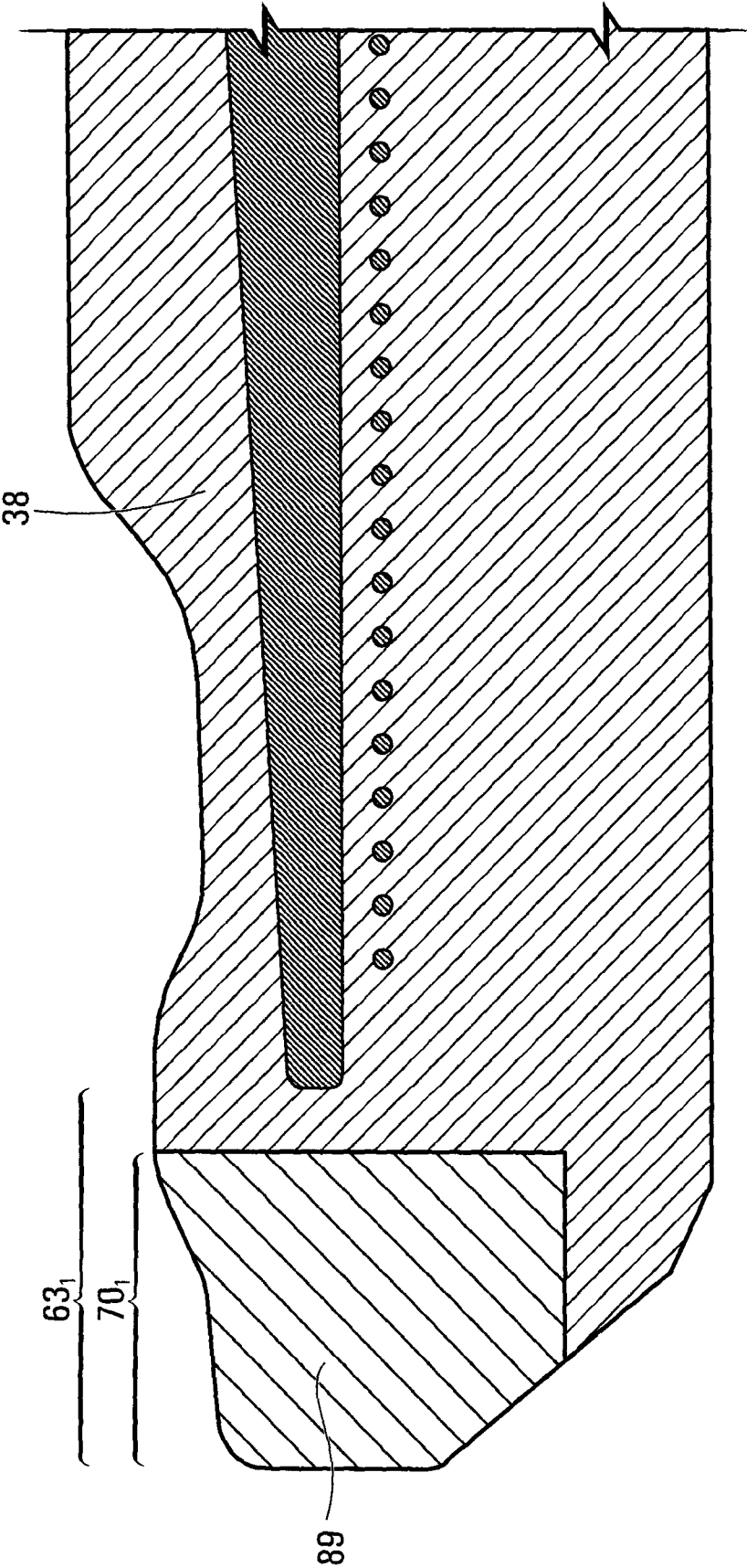


FIG. 29

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2010/000632

A. CLASSIFICATION OF SUBJECT MATTER IPC: B62D 55/24 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC																				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(2006.01): B62D55/24 UCLA: 305/185, 305/157 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) Databases: Canadian Patent Database (CPD), EPOQUE (X-Full, Epodoc) Keywords: impact, absorb, elastic, hole, notch, stress, strain, edge, cutting																				
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>JP2003089366A (YOSHIDA, T.) 25 March 2003 (25-03-2003) *Abstract; Fig 3*</td> <td>1, 32 and 33</td> </tr> <tr> <td>Y</td> <td>US7367637B2 (GLEASMAN, K. E.) 06 May 2008 (06-05-2008) *Col. 6, Lines 18 - 31; Figs 5 and 6*</td> <td>1, 32 and 33</td> </tr> <tr> <td>A</td> <td>US6406106B1 (MOSS, A. E.) 18 June 2002 (18-06-2002) *the whole document*</td> <td>1 - 60</td> </tr> <tr> <td>A</td> <td>US6568769B1 (WATANABE, H. et al.) 27 May 2003 (27-05-2003) *the whole document*</td> <td>1 - 60</td> </tr> <tr> <td>A</td> <td>JP4194599B2 (UENO, Y.) 10 December 2008 (10-12-2008) *the whole document*</td> <td>1 - 60</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	JP2003089366A (YOSHIDA, T.) 25 March 2003 (25-03-2003) *Abstract; Fig 3*	1, 32 and 33	Y	US7367637B2 (GLEASMAN, K. E.) 06 May 2008 (06-05-2008) *Col. 6, Lines 18 - 31; Figs 5 and 6*	1, 32 and 33	A	US6406106B1 (MOSS, A. E.) 18 June 2002 (18-06-2002) *the whole document*	1 - 60	A	US6568769B1 (WATANABE, H. et al.) 27 May 2003 (27-05-2003) *the whole document*	1 - 60	A	JP4194599B2 (UENO, Y.) 10 December 2008 (10-12-2008) *the whole document*	1 - 60
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Y	JP2003089366A (YOSHIDA, T.) 25 March 2003 (25-03-2003) *Abstract; Fig 3*	1, 32 and 33																		
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A	JP4194599B2 (UENO, Y.) 10 December 2008 (10-12-2008) *the whole document*	1 - 60																		
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Date of the actual completion of the international search 12 July 2010 (12-07-2010)		Date of mailing of the international search report 21 July 2010 (21-07-2010)																		
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476		Authorized officer Adeeb Zarifa (819) 934-2692																		

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2010/000632

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
JP2003089366	25-03-2003	NONE	
US7367637B2	06-05-2008	US2006284484A1	21-12-2006
US6406106B1	18-06-2002	CA2356126A1	27-05-2002
US6568769B1	27-05-2003	EP1008509A1 EP1008509A4 EP1008509B1 EP1647471A1 ES2252836T3 JP3077064B2 KR20050117591A KR100604972B1 KR20060036070A US2003107268A1 US6984006B2 US2003102715A1 US7014279B2 WO9912799A1	14-06-2000 30-06-2004 23-11-2005 19-04-2006 16-05-2006 14-08-2000 14-12-2005 28-07-2006 27-04-2006 12-06-2003 10-01-2006 05-06-2003 21-03-2006 18-03-1999
JP4194599B2	10-12-2008	JP2007176208	12-07-2007