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|------|-----------|---------------------------------------------|
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| [32] | Priority  | Mar. 16, 1968                               |
| [33] |           | Germany                                     |
| [31] |           | P 16 80 325.1                               |

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**[54] TRACK FOR TRACKLAYING VEHICLES**  
12 Claims, 6 Drawing Figs.

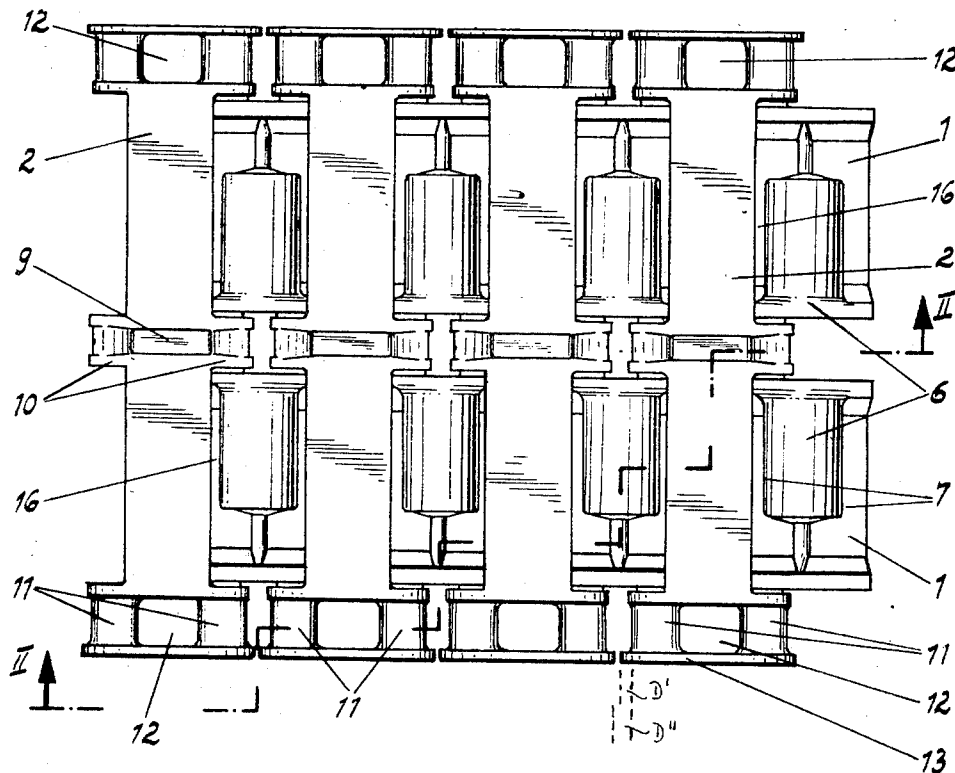
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| [52] | U.S. Cl.        | 305/36,<br>305/59     |
| [51] | Int. Cl.        | B62d 55/20            |
| [50] | Field of Search | 305/36, 58,<br>59, 42 |

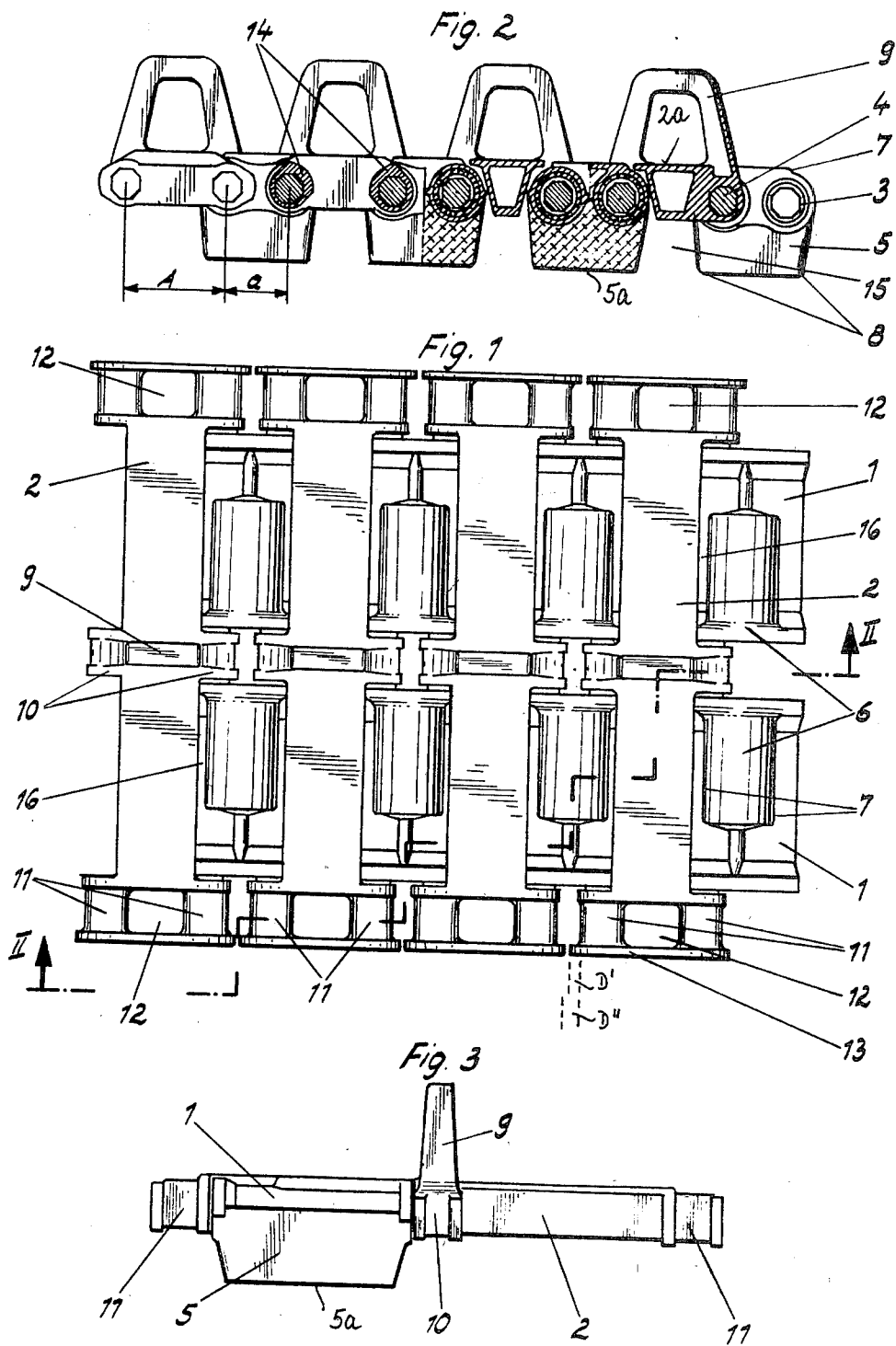
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**ABSTRACT:** A track for tracklaying vehicles has a plurality of track links adjacent ones of which define with one another gaps which extend transversely of the travel of the track. Each track link has a ground-contacting surface and a wheel-contacting surface which both extend transversely of the travel of the track and which both are bounded by lateral edges. The lateral edges of the wheel-contacting surface are inwardly offset with reference to those of the ground-contacting surface. Connecting means pivotally connects the links for pivotal movement about pivot axis extending in direction transversely of the travel of the track and which are inwardly offset with reference to the lateral edges of the ground-contacting surfaces. A plurality of bridging members are respectively located in the gaps between adjacent links and pivotably connected to the latter. The bridging members each have a wheel-contacting face bridging the gap between the respective wheel-contacting surfaces of the associated adjacent links and in effect constituting extensions of these wheel-contacting surfaces.





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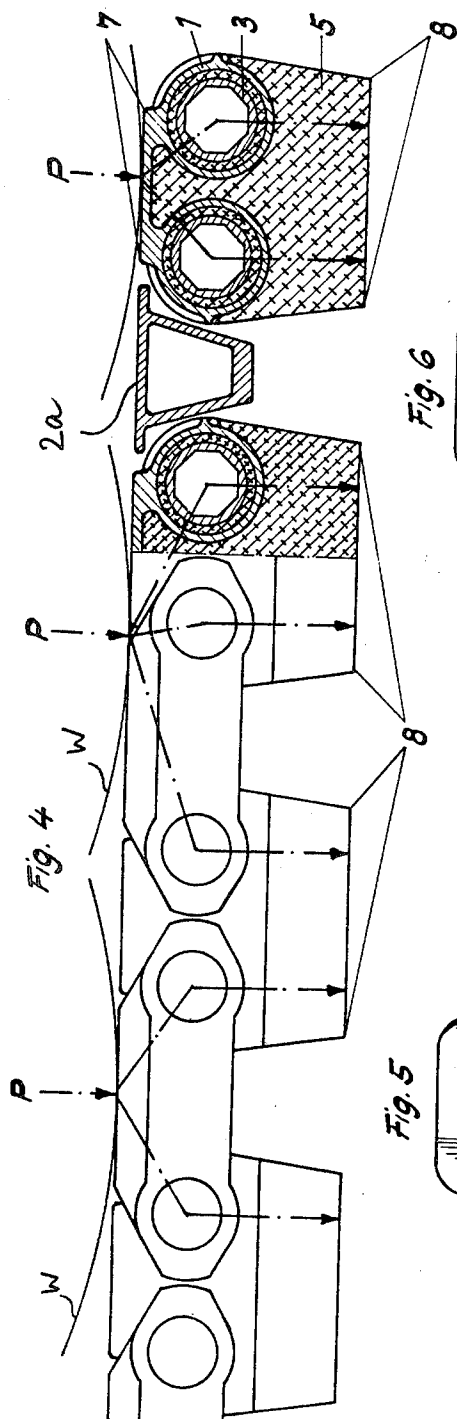


Fig. 4

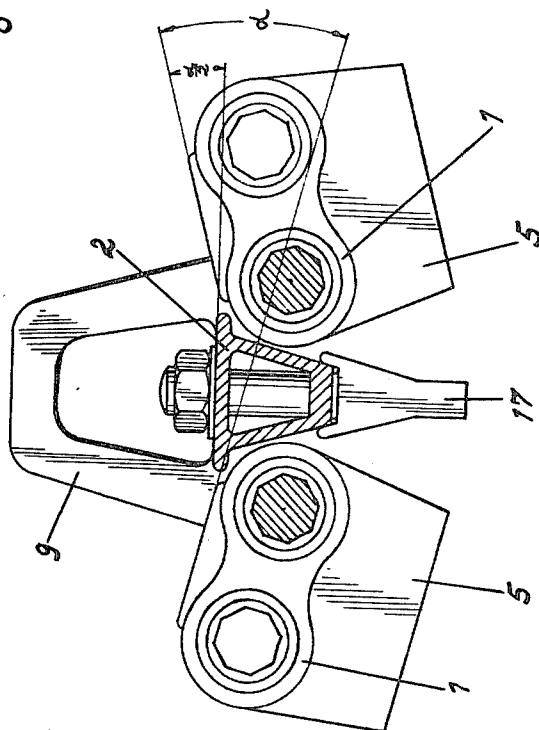


Fig. 6

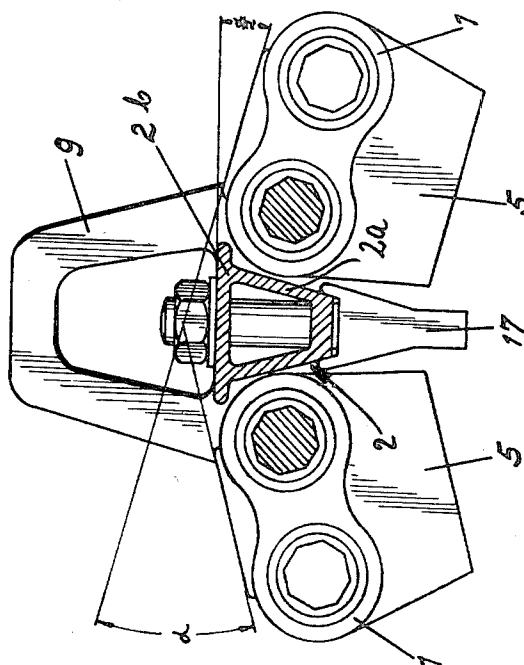


Fig. 5

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## TRACK FOR TRACKLAYING VEHICLES

### BACKGROUND OF THE INVENTION

The present invention relates to tracks for tracklaying vehicles, and more particularly to tracks for tracklaying combat vehicles.

Tracks for tracklaying vehicles consist of a plurality of pivotally connected links. It is well known that the travel and handling characteristics of tracklaying vehicles are adversely influenced by the fact that gaps exist between the adjacent links. When the wheels on which the vehicle advances over the inner wheel-contacting surface of the track, contact the edges of the links which bound these gaps, they impact against these edges and/or into the gap itself with a force which depends upon the size of the gap, the surface characteristics of the wheels and the surface characteristics of the wheel-contacting inner surface of the track. This, in turn, coupled with the shifting of the vehicle weight to these areas of impact, forces each link to perform a tilting movement about the edges of its ground-contacting surface. This, again, is propagated along the track from gap to gap and results in the development of vibrations in the vehicle which, according to tests which have been carried out, result in material fatigue and destruction of thus-fatigued vehicle parts, and which on the other hand quickly tire or even incapacitate the passengers of the vehicle, a phenomenon which has been particularly observed in modern tracklaying combat vehicles capable of relatively high speeds.

Attempts to overcome these problems by redesign of the tracks have been made, but have not been satisfactory. In fact, such attempts have not only failed to eliminate the existing problems but have added the further problem of limiting the pivoting movement of adjacent track links with reference to one another.

### SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to overcome the aforementioned disadvantages.

A more particular object of the present invention is to provide an improved track for tracklaying vehicles.

An additional object of the invention is to provide such track wherein the development of vibrations in the vehicle provided with the track is largely suppressed.

A concomitant object of the invention is to provide track of the type under discussion wherein adjacent links of the track have increased freedom of pivoting movement with reference to one another.

Yet another object of the invention is to provide such track which is not as subject to wear as the tracks which have been known heretofore.

In accordance with the above objects, and others which will become apparent hereafter, one feature of my invention resides in the provision of a track for tracklaying vehicles wherein I provide a plurality of longitudinally arrayed track links adjacent ones of which define with one another gaps extending in direction transversely of the travel of the track. Each of the track links has opposite end faces which face in the aforementioned direction, a ground-contacting surface and a wheel-contacting surface each of which is provided with lateral edges extending between the aforementioned end faces. According to the invention the lateral edges of the wheel-contacting surface are inwardly offset with reference to those of the ground-contacting surface of the same link.

Connecting means connects adjacent ones of the links for pivotal movement about pivot axes which extend in the aforementioned direction and which are inwardly offset with reference to the lateral edges of the ground-contacting surface of the respective link.

Additionally, my novel track comprises a plurality of bridging members which are respectively located in the gaps between adjacent ones of the links and are pivotably con-

nected to the adjacent links. These bridging members each have a wheel-contacting face which bridges the gap between the respective wheel-contacting surfaces of the associated adjacent links and which substantially constitutes an extension of these wheel-contacting surfaces.

By resorting to my novel invention I substantially eliminate the gaps between the adjacent links as factors contributing to the development of vibrations in the moving vehicle, because the bridging members themselves do not contact the ground and, in conjunction with the offsetting of the lateral edges and axes as set forth above, avoid the undesired tilting of the links about the edges of their ground-contacting surfaces. Thus, forces acting upon the track in direction normal thereto and to the ground are always transmitted—regardless of where they act upon the links—into the ground in the area intermediate the lateral edges of the ground-contacting surfaces of one or two adjacent links. A vehicle utilizing such a track will be free from vibrations to an extent heretofore unobtainable.

According to my invention it is particularly advantageous to so construct the bridging members that they extend across the entire width of the track, this dimension referring to the direction normal to the travel of the track, and resist both bending and twisting stresses. Furthermore, it is advantageous that substantially midway intermediate the opposite lateral sides of the track the bridging members are provided with upwardly extending guide projections and that they be further provided with projections at their opposite ends via which they are pivotally connected with the respective adjacent links. In fact, such tracks usually consist of pairs or groups of links each including two links arranged in end-to-end relationship across the width of the track. It is then particularly advantageous if each bridging member is also pivotally connected to the two links of each group intermediate their juxtaposed ends. With this construction the wear on the track is still further reduced.

In order to obtain maximum bending and twisting resistance from my bridging members by making them as light as possible, they are advantageously constructed as close box-shaped profiled members. To assure that adjacent links are freely and readily pivotable with reference to one another despite the presence of a bridging member between them, the bridging members are constructed with side faces or sidewalls which converge in direction towards the ground-contacting surfaces of the links. The upper wheel-contacting face of each bridging member is extended laterally beyond the respective side faces as close as possible to the lateral edges of the ground-contacting surfaces of the links located at opposite sides of the bridging member, so that the space between these lateral edges and the wheel-contacting face of the bridging member is as small as possible.

The provision of a bridging member according to my invention between each pair of adjacent links makes it possible to have the distance between the pivoting axis of each link—of which there are two parallel pivoting axes—be greater than the proximal pivoting axis of two adjacent links. This increases the traction of the track and maintains the traction high even as the ground-contacting surface—which is usually provided on separate members of elastomeric material constituting a part of the link—is gradually worn away. This measure further makes it possible to secure at the underside of each bridging member—that is the side facing the respective ground-contacting surfaces—traction-increasing studs or snow and mud grippers without thereby decreasing the ability of the adjacent links to pivot with respect to one another. Such studs or grippers may extend over the entire width of the track, or only over a part of the width, and because this can be selected at will the traction of the track is vastly increased, particularly in difficult terrain.

Furthermore, and as still to be described, I may so construct my novel track that its edge faces are substantially continuous without any significant spaces between adjacent links. This is in contrast to known link constructions where the relatively significant spaces at the edge faces of the track always bring

with them the danger that during movement of the vehicle through a wire entanglement the wire may become tangled in these spaces and may actually block the vehicle from further movement.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

#### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary top plan view of a track according to my invention;

FIG. 2 is a partly sectioned side elevation on the line II-II of FIG. 1;

FIG. 3 is a detail view of a single pair of track links with an associated bridging member, as seen in the direction of travel of the track;

FIG. 4 is a view similar to FIG. 2 but on an enlarged scale and illustrating the transmission of forces through the track into the ground;

FIG. 5 is a somewhat diagrammatic partly sectioned side elevation on an enlarged scale of two adjacent track links illustrated in one position of angular displacement relative to one another; and

FIG. 6 is a view similar to FIG. 5 illustrating an opposite position of angular displacement of the links relative to one another.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail it will be seen that, as shown in FIG. 1, each track link is identified with reference numeral 1 and has substantially half the width of the entire track. The direction of travel of the track in FIG. 1 is either towards the left or towards the right of the Figure. In direction transversely of the travel two links 1 are always arranged in end-to-end relationship. Each of the links 1 is of dual tubular configuration. Adjacent pairs of end-to-end links 1 define with one another gaps 15 (see FIG. 2) and in each such gap there is located a bridging member 2 extending transversely of the direction of travel of the track. These bridging members 2 are resistant to bending and twisting forces, as will be discussed in more detail.

As shown in FIGS. 2 and 4 particularly, the opposite end faces of the links 1 are provided with bores each of which accommodates a bushing sleeve 3 which is embedded in elastomeric material as illustrated, and which accommodates a portion of a known link pin 4. As shown, the link pins are of polygonal cross section, and this cross-sectional configuration is the same over the entire length of the link pins 4.

The wheel-contacting surfaces of the links 1, that is the surfaces over which the wheels of the vehicle will roll, as illustrated by the diagrammatic illustration of wheels W in FIG. 4, and the ground-contacting surfaces of the links 1 are identified with reference numeral 5a and provided on ground-contacting bodies 5 which are here constructed of elastomeric material and which constitute a part of the respective links 1.

In accordance with the present invention the lateral edges 7 bounding the wheel-contacting surfaces 6 of each link, as well as the bushings 3 defining the pivoting axis of the links, are inwardly offset with reference to the corresponding lateral edges 8 of the ground-contacting surfaces 5a of the respective links 1. In other words, the distance between the edges 7 and the centers of the bushings 3—as seen in the direction of travel of the track—is smaller than the distance between the edges 8 in the same direction. This is particularly clearly shown in FIG. 4.

As shown in the drawing, especially in FIGS. 2 and 3, each of the bridging members 2 is provided with a wheel-contacting face 2a which bridges the gap 15 between the adjacent wheel-

contacting surfaces 6 of the adjacent links 1, and which in effect constitutes an extension of these wheel-contacting surfaces 6. Intermediate its opposite ends each of the bridging members 2 is provided with an upwardly extending guide projection 9 which is located between the facing ends of the links 1 of each transversely aligned pair or group of links. Intermediate the two links of each such group each of the members 2 is further provided with connecting portions 10 serving to connect the links of each pair as well as to connect the adjacent pairs of links, and additional connecting portions 11 are provided at the opposite ends of the respective members 2, serving the same function at the outer lateral edges of the track. Intermediate the two projections or connecting portions 11 at each end of each bridging member 2, there remains a space 12 into which the teeth of a driving sprocket can extend. The outer lateral edge at each lateral side of the track carries the cover plates 13 which in each case bridge the open space 12 at the lateral edges and extend beyond the respective connecting portion 11 of one bridging member 2 towards the proximal connecting portion 11 of the next adjacent bridging member 2 by a distance D'. This is clearly shown in FIG. 1 from where it will be evident that with this construction the cover plates 13 of adjacent ones of the members 2 both extend into the space between the adjacent or proximal connecting portions 11 and thus almost close the distance D' between them. Thus, each outer lateral edge of the track in effect is provided with an almost continuous surface which precludes or makes much more difficult the entanglement of wire or the like in the track. The connection between the connecting portions 11 and the links 1 is effected via link pins 4 in known manner, and the link pins may be prevented from undersired separation also in known manner, for instance by upsetting of requisite portions or retaining members provided for this purpose.

Because of the entry of sprocket teeth into the spaces 12, and contact of the teeth with the connecting portions 11, I construct the wall portions 14 of the connecting portions 11 which come in contact with the sprocket teeth, of greater thickness than the remaining wall portions. This is illustrated in FIG. 2. FIG. 2 also shows, as mentioned before, that the distance A between the axis of each link 1 is greater than the distance a between the proximal axis of adjacent ones of the links 1. This makes it possible to obtain a relatively large gap 15 between the adjacent links 1 and their ground-contacting bodies 5.

As visible in FIG. 2, and particularly in FIG. 4, the side faces of the bridging members 2, which are preferably constructed of closed box-shaped profile configuration, as illustrated, converge in direction towards the ground-contacting surfaces 5a so as not to interfere with free tilting movement of adjacent links 1 relative to one another. The wheel-contacting face 2a of each member 2 is provided on the upper wall 2b of the respective member and this upper wall 2b extends laterally of the side faces or sidewalls 2a to such an extent as to almost complete close the gap between the adjacent links 1, as clearly visible in all of FIGS. 1, 2 and 4—6. Thus, only a small space 16 (see FIG. 1) remains between the wheel-contacting surface 2a and the lateral edges 7 of the adjacent links 1, and impacting of the vehicle wheels into these small spaces is thus no longer possible.

As shown in FIG. 4, the force transmitted through the wheels W into the track is indicated by the broken-line arrows P. Furthermore, the path in which these forces are transmitted through the links into the ground is similarly indicated by the broken-line arrows and it will be seen that regardless of where the forces P act upon the track, all forces acting in direction normal to the track and to the ground will be transmitted into the ground in the region between the edges 8 of the ground-contacting surface or surfaces 5a of one or of two adjacent ones of the links 1. This reliably precludes tilting of the respective links 1 about the edges 8.

Coming to FIG. 5 it will be seen that connected adjacent links 1 can be tilted with respect to one another towards the

ground freely, just as FIG. 6 shows that they can be tilted away from the ground and towards the wheels. The tilting angle is identified with  $\alpha$  and amounts to approximately  $30^\circ$ . However, because of the provision of the bridging members 2, there occurs a negative tilting angle  $\alpha/2$  between the wheel-contacting surfaces 6 of the adjacent links 1 and the wheel-contacting face 2a of the associated member 2—in the case of FIG. 5—and a similar but positive angle  $\alpha/2$  in the case of FIG. 6. Because of this much smaller angle the gap between the face 2a and the edges 7 of the surfaces 6 is very small.

I wish to point out that despite the provision of the bridging members 2 my novel track provides for considerable freedom of the links angularly with reference to one another. As shown in FIGS. 5 and 6 this freedom is not in any way inhibited even if the underside of the respective bridging members 2 is provided with traction studs 17 for ice, snow or mud. These studs may extend over part or over the entire width of the track and may be secured to the members 2 in suitable manner, for instance by the bolts shown in FIGS. 5 and 6 or in any other suitable way, such as self-locking cones. Of course, the members 17, which may also be configured differently from what has been illustrated, may be removed when they are not needed. In this context it should be pointed out that the entire track does not require any screw-threaded connections at all for the assembly of the various elements to one another.

It will be self-evident that modifications are possible over the illustrated exemplary embodiments. Thus, the links 1 could be differently constructed and/or the bodies 5 of elastomeric material could be replaced with bodies of steel or the like which might or might not be provided with vibration-damping pads of elastomeric material. Such a construction would be particularly useful if the track is to be used on combat vehicles. Similarly, elastomeric material could be provided on the wheel-contacting surfaces 6 and the wheel-contacting faces 2a of the members 1 and 2. The members 2 could be constructed differently, and could consist of two or more sections, just as it could be connected with the links in different manner. What is important in all embodiments, however, is the concept that certain parts constituting together with others the track, and excepting loads transmitted by the wheels W (see FIG. 4) are supported not directly on the ground but rather indirectly via two adjacent other parts of the track.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a track for tracklaying vehicles, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

What I claim as new and desire to be protected by Letters Patent is set forth in the following claims:

1. A track for tracklaying vehicles comprising in combination a plurality of longitudinally arrayed track links adjacent ones of which define with one another gaps extending in direction transversely of the travel of said track, each of said track links having opposite end faces facing in said direction a ground-contacting surface and a wheel-contacting surface each having lateral edges extending between said end faces with the lateral edges of said wheel-contacting surface being inwardly offset with reference to those of said ground-contacting surface; connecting means connecting adjacent ones of said links for pivotal movement about pivot axes which extend in said direction and are inwardly offset with reference to said lateral edges of the ground-contacting surface of the respective link; a plurality of bridging members respectively located in the gaps between adjacent links and pivotally connected to the latter, said bridging members each having a wheel-contacting face bridging the gap between the respective wheel-contacting surface of the associated adjacent links and substantially constituting an extension of said respective wheel-

contacting surfaces, said bridging members further having opposite ends located at opposite lateral sides of said track and being provided at each with two end connector portions pivotally connecting the adjacent links and spaced from one another in direction of travel of the track so that the teeth of a driving sprocket can engage between the thus-spaced end connector portions; and cover plates extending across the spaces between the respective end connector portions and substantially halfway across the distance between adjacent bridging members so that said track has substantially continuous side edges.

2. A track as defined in claim 1, said end connector portions being tubular and configured for receiving respective link pins, and wherein wall sections of said end connector portions which are adapted to be contacted by the teeth of a driving sprocket have a wall thickness which is greater than that of the remainder of said end connector portions.

3. A track for tracklaying vehicles, comprising in combination, a plurality of longitudinally arrayed track links adjacent ones of which define with one another gaps extending in a direction transversely of the travel of said track, each of said track links having opposite end faces facing in said direction, a ground-contacting surface and a wheel-contacting surface each having lateral edges extending between said end faces with the lateral edges of said wheel-contacting surface being inwardly offset with reference to those of said ground-contacting surface; connecting means connecting adjacent ones of said links for pivotal angular movement about parallel pivot axes which extend in said direction and are inwardly offset in the direction of travel of said track with reference to said lateral edges of the ground-contacting surface of the respective link, while maintaining said axes parallel and at a predetermined distance from each other; and a plurality of bridging members respectively located in the gaps between adjacent links and pivotally connected to the latter, said bridging members each having a wheel-contact face bridging the gaps between the respective wheel-contacting surfaces of the associated adjacent links and at least substantially coplanar with said wheel-contacting surfaces when the respective bridging member and associated adjacent links are in horizontal alignment with one another.

4. A track as defined in claim 3, each of said links being connected to the respectively adjacent links for pivoting movement about two parallel pivot axes spaced from one another in direction of travel of said track; and wherein the distance between said two pivot axes of each link is greater than the distance between the proximal pivot axes of adjacent connected links.

5. A track as defined in claim 4, wherein said bridging members are rigid and resist twisting and bending stresses.

6. A track as defined in claim 5, wherein said track has a predetermined width, and wherein said bridging members extend over the entire width of said track.

7. A track as defined in claim 5, said track having a predetermined width and said track links being arranged in groups each comprising two links positioned in end-to-end relationship transversely of the travel of said track across said predetermined width and being connected for joint pivotal movement about said pivot axes; said bridging members each having a length corresponding at least substantially to said predetermined width and being pivotally connected to the respectively adjacent groups of links at opposite sides of said track as well as intermediate the two links of each group, said bridging members each being further provided intermediate the facing end faces of the links of adjacent groups with a guide projection projecting from the respective wheel-contacting face.

8. A track for tracklaying vehicles, comprising in combination, a plurality of longitudinally arrayed track links adjacent ones of which define with one another gaps extending in a direction transversely of the travel of said track, each of said track links having opposite end faces facing in said direction, a ground-contacting surface and a wheel-contacting surface

each having lateral edges extending between said end faces with the lateral edges of said wheel-contacting surface being inwardly offset with reference to those of said ground-contacting surface; connecting means connecting adjacent ones of said links for pivotal angular movement about parallel pivot axes which extend in said direction and are inwardly offset with reference to said lateral edges of the ground-contacting surface of the respective link, while maintaining said axes parallel and at a predetermined distance from each other; and a plurality of bridging members having the form of closed box-shaped profiles and being respectively located in the gaps between adjacent links and pivotably connected to the latter, said bridging members each having lateral walls which extend in said direction and converge towards the respective ground-contacting surfaces of the associated links and a wheel-contacting face bridging the gaps between the respective wheel-contacting surfaces of the associated adjacent links and substantially constituting an extension of said respective wheel-contacting surfaces.

9. A track as defined in claim 8, said bridging members each having an upper wall connecting said lateral walls and extending outwardly therebetween and transversely of the respective gap, said upper wall being provided with said wheel-contacting face.

10. A track for tracklaying vehicles, comprising in combination, a plurality of longitudinally arrayed track links adjacent ones of which define with one another gaps extending in a direction transversely of the travel of said track, each of said track links having opposite end faces facing in said direction, a

ground-contacting surface and a wheel-contacting surface each having lateral edges extending between said end faces with the lateral edges of said wheel-contacting surface being inwardly offset with reference to those of said ground-contacting surface; connecting means connecting adjacent ones of said links for pivotal angular movement about parallel pivot axes which extend in said direction and are inwardly offset with reference to said lateral edges of the ground-contacting surface of the respective link, while maintaining said axes parallel and at a predetermined distance from each other; a plurality of bridging members respectively located in the gaps between adjacent links and pivotably connected to the latter, said bridging members each having a wheel-contacting face bridging the gaps between the respective wheel-contacting surfaces of the associated adjacent links and substantially constituting an extension of said respective wheel-contacting surfaces; link pins connecting said links and said bridging members for movement about said pivot axes; and journal bushings provided on said links and bridging members respectively coaxial with one of said pivot axes and each being adapted to receive a portion of one of said link pins.

11. A track as defined in claim 10, wherein said link pins and the associated bushings are of polygonal outer and inner cross section, respectively.

12. A track as defined in claim 11 wherein said bridging members are each provided with plurality of bores, and wherein said link pins are in part received in the respective bores.

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