

Articulated Vehicle Track Components

The present invention relates to articulated vehicle tracks and to components thereof, and in particular to
5 the ground contacting components of such articulated vehicle tracks.

Conventional tracks generally comprise a series of track links. Each track link will typically comprise a link
10 plate divided into two sections separated by a spine, each of which sections receives a ground contacting component. Each side of the track link is bored through to allow the passage of elongate track pins. End connectors are used to join individual track links
15 together, thereby to form the links into a track, by clamping together the ends of adjacent track pins. For smaller, lighter weight vehicles, the track link may be in a single section with a single ground contacting component. Adjacent track links may be joined to a
20 common track pin, so that there is, overall, one track pin per track link and the end connectors are not then required.

Contact between the track and the ground is established
25 by means of replaceable ground contacting components. These components must be periodically replaced because of

wear and it will often be necessary to exchange one type of ground contacting component for another type in accordance with the ground conditions.

- 5 There are two principal types of ground contacting component, that is, road pads and components variously known as grousers, crampons, mud-grips or ice-rakes. Road pads are mainly used when the vehicle is travelling over hard surfaces such as ordinary roads and where there
- 10 is adequate grip in normal conditions. Contact with the ground is via a pad of rubber or other elastomeric material. Where the ground conditions are soft or where there is a lack of adhesion with the ground, such as in mud, snow, ice, sand and the like, grousers may be used.
- 15 In grousers, the pad of elastomeric material is absent and gripping surfaces made of metal or other suitable hard material are provided. The gripping surfaces may be covered by a layer of elastomer.
- 20 It is readily apparent that under battlefield conditions, it is essential that road pads and grousers must be easily and quickly replaced or exchanged, especially as the necessary work may also need to be done in dark and/or cold conditions.

Various means of retaining ground contacting components in articulated vehicle track links are known. In our International patent application no WO 97/07011 a road pad is described which includes upstanding projections at either side of the pad, each including a through bore. The pad is retained on the track link by insertion of roll-pins through the respective bores, which roll-pins also engage bores in the track link.

Another type of construction is described in our International patent application no W096/29234 in which the pad includes laterally extending wings which engage grooves provided in the track link in order to retain the pad on the track link. A resilient member formed at the inner side of the pad acts as a latch contacting an abutment towards one end of the track link to prevent the pad from sliding out when engaged in the grooves.

Although generally successful, ground contacting components which are retained in track links by laterally extending wings which fit into grooves formed in the track link do have certain disadvantages. Firstly, there can be a considerable frictional resistance to the insertion or removal of the component, due to the friction between the laterally extending wings and the

surfaces of the grooves which they engage. Further, considerable stress is generated in the pad at the point at which it begins to contact the ground. As the components moves on the track, the initial point of
5 contact with the ground is along the lateral leading edge of the component so that all the forces resulting from contact with the ground are transmitted through this lateral edge. In some cases, the distortion of the component caused by these forces can be sufficient to
10 allow the wings to become disengaged from their retaining grooves so that the component becomes separated from the track. Clearly, loss of a ground contacting component is disadvantageous to the efficient operation of the vehicle. More especially, when the vehicle is
15 travelling at speed, the ground contacting component can fly off at high speed and cause serious injury to any nearby personnel.

The present invention seeks to alleviate or overcome
20 these disadvantages.

We have now designed a further improved ground contacting component which facilitates removal or exchange by reducing the distance which the pad must be moved under
25 load during removal or exchange. In particular, each

ground contacting component includes one or more laterally projecting wings at each side which are adapted to engage corresponding grooves in the track link and thereby to retain the pad in the track link. In order to
5 reduce the distance which the component must travel while under load during fitting or removal, the length of the wings at each side is less than the length of that side of the component. The component further includes a projection such as a tongue or a tang extending from the
10 leading edge (with respect to the insertion direction) which engages a corresponding hole, slot or recess in the track link.

Accordingly, a first aspect of the present invention
15 provides a ground contacting component for use in a track link of an articulated vehicle track, the component comprising a base portion and a ground contacting portion wherein the component includes at respective sides thereof at least one laterally projecting wing adapted to
20 be received in a corresponding groove of a track link and a projecting tongue extending from an end thereof and adapted to be at least partially received in a corresponding recess of the track link, and wherein the wing or wings at each respective side of the pad have an

overall length which is less than the length of the ground contacting component.

In a particularly preferred embodiment, the ground
5 contacting component includes a single wing at each side. Preferably, the length of each wing is not more than half the length of the ground contacting component and most preferably the wings are formed at the rear half of the ground contacting component, with respect to the
10 insertion direction.

In another form of the invention, the wings are formed integrally with the base portion. Alternatively, the wings may be formed integrally with an intermediate
15 plate, which plate is disposed over the base portion. The intermediate plate most preferably takes the form of generally rectangular frame such that, where the ground contacting component is a grouser, the frame surrounds the ground contacting portion.

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It is particularly preferred that a layer of elastomeric material is provided between the base portion and the intermediate plate in order to provide resilient cushioning between the intermediate plate and the base
25 portion.

In an alternative preferred embodiment, the intermediate plate is fixedly attached to the base portion, the fixing being such that the intermediate plate is spaced apart from the base portion. In this way, some resilience is provided by means of the inherent resilience of the intermediate plate.

In another preferred embodiment of the invention, at least a leading part (with respect to the insertion direction) of the projecting tongue is curved raked or bent away from the ground contacting portion. This construction facilitates insertion of the tongue into the corresponding recess of the track link as the ground contacting component is inserted into the track link. The projecting tongue may be formed integrally with the base portion of the ground contacting component, or as an integral part of an intermediate plate.

In a second aspect of the invention there is provided a track link of an articulated vehicle track comprising a base portion, a drive receiving portion and means for articulately joining the track link to adjacent track links wherein the base portion includes a ground contacting component receiving portion defined by opposed

side walls and an end wall, each of which opposed side walls includes a groove extending along at least part of the length thereof for receiving laterally projecting wings of the ground contacting component and a recess
5 formed in said end wall for receiving the projecting tongue of the ground contacting component.

Preferably, the grooves extend over not more than half the length of the respective side wall and most
10 preferably are formed in the portion of the side wall distant from the end wall.

A third aspect of the invention provides an articulated vehicle track including ground contacting components
15 according to the first aspect of the invention and track links according to the second aspect of the invention.

For a better understanding of the invention and to show how the same may be carried into effect, reference will
20 be made, by way of example only, to the following drawings, in which:

Figure 1 shows a perspective view from above of a track link according to the invention;

Figure 2 shows the track link of Figure 1 from below;

Figure 3 shows a road pad according to the invention,
with the road contacting surface uppermost;

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Figure 4 shows the pad of Figure 3 viewed from the other
side;

Figure 5 shows a grouser according to the invention with
10 the ground contacting part uppermost; and

Figure 6 shows the grouser of Figure 5 viewed from the
other side.

15 Referring now to the drawings, a track link 10 includes
sections 11 and 12 separated by a spine 13 which includes
a shoulder 14 which provides lateral location of the
track on the vehicle. Drive is transmitted to the track
from a vehicle drive means (e.g. a sprocket wheel) which,
20 according to the particular design, may act on the track
at one of a number of points, such as the track pins or
the end connectors.

The track link 10 further includes parallel bores 15
25 which receive track pins (not illustrated). The track

pins project beyond each end 16, 17 of the track link and the track pins of adjacent track links are connected together to form an articulated track. The ground contacting components are fitted in ground contacting component receiving portions indicated generally at 18 and 19.

It will be appreciated that the present invention is equally applicable to track and track component designs having only one track pin per track link and no end connectors.

As can most clearly be seen from Figure 2, the regions 18, 19 which receive the ground contacting components are bounded by side walls 20, 21, and end wall 22 with an open face at track link ends 16, 17 through which the ground contacting components are received. The side walls 20 include a lip 23 which, together with the side walls 20, defines channels or grooves 24 which receive and retain the wings of the ground contacting component. The end walls 22 each include a recess 25 which may take the form of a slot or hole and which receives the tongue of the ground contacting component.

The side walls 20, 21 do not occupy the whole length of the respective ground contacting component receiving portions 18, 19 and spaces 26 are defined therebetween. Each side of the ground contacting component receiving portion may include more than one wall section 20 and/or 21 with or without spaces 26 therebetween, depending on the construction of the ground contacting component. For example, where the ground contacting component includes only a single wing at each side, defined at its rear end (with respect to the insertion direction) the space 26 may be absent such that the wall 20 is continuous with the wall 21. An alternative construction of the ground contacting component may, for example, provide two wings at each side disposed respectively toward the front and rear of the component. In this case, a space 26 which is at least as long as the length of the forward wings will be desirable to facilitate insertion of the ground contacting component. In this construction, the walls 21 may be replaced in the corresponding location by further walls 20.

The ground contacting components fall generally into two types, that is, road pads as illustrated in Figures 3 and 4 and grousers as illustrated in Figures 5 and 6. Road pads 50 comprise a body 51 of elastomeric material having

an outer surface 52 which contacts the ground, side walls 53 and end walls 54, 55. The elastomeric material is attached to a base portion 56 by means known in the art. The base portion 56 may preferably be made from metal or
5 other suitably robust material. Laterally projecting wings 57 extend outwardly from the sides 53 of the road pad. The wings 57 may be formed integrally with the base portion 56 or may, for example, be formed as the extremities of an intermediate plate disposed between the
10 base portion 56 and the body 51 of elastomeric material. The wings 57 are preferably made of metal, but other suitably robust materials may be considered.

The leading end 54 (with respect to the direction in
15 which the pad is inserted into the track link 10) of the road pad 50 includes a formation 58 which projects outwardly in the form of a tongue, tang, finger or the like. The formation 58 is preferably formed integrally with the base portion 56, or with the intermediate plate,
20 if present. As can be seen in Figures 3 and 4, the leading edge of the formation 58 is directed away from the ground contacting surface 52. This assists in locating the formation in the recess 25 during insertion of the pad.

The road pad 50 further includes a resilient latching tongue 59 which assists in retaining the road pad 50 in the track link 10.

5 In use, the road pad 50 is inserted into the pad receiving portion 18, 19 with the pad surface 52 facing outwardly and such that the wings 57 slide within the grooves or channels 24. The pad is made to slide generally in the direction of arrow I until the end wall
10 54 is proximate or abuts the inner face of wall 22. In this way, the formation 58 is received in the recess 25 which assists in the accurate location and retention of the pad. It will be appreciated that in contrast to the prior art where the wall of type 20 including channel-
15 forming lip 23 extends for the whole length of the pad receiving portion, it is necessary only to slide the pad over a distance L corresponding to the length of a wall 20 (Fig 2). Not only is the distance which the pad must slide reduced, but the frictional resistance to sliding
20 can also be lessened. In this way, insertion and removal of the pad is facilitated.

The formation 58 is effective in ensuring that the pad is retained in the track link. In comparison to a pad
25 retained only by laterally projecting wings, the pad of

the present invention has fewer degrees of freedom. Thus, even if distortion of the pad occurs under the stress of operation such that the wings at one side of the pad become dislodged from the corresponding groove, 5 the formation 58 serves to retain the pad in the track link.

In order to prevent the road pad 50 from becoming displaced in use of the vehicle from the track 10 by movement in the direction of arrow R, the road pad 50 includes the resilient tongue 59. During insertion of the pad, the tongue 59 is depressed by the wall 27 of the track link 10 until such time as the road pad 50 is fully inserted. At this point, the tongue 59 resiliently 15 returns to its original position such that its end face 60 abuts the face 28 of wall 27, thereby preventing movement of the pad in the direction of arrow R. In order to remove the pad, the tongue 59 is depressed by known means until it no longer latches against face 28.

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One particular advantage which flows from the invention is that, where the road pad includes only one pair of wings 57 disposed towards the rear, the width of the pad may be increased at the leading end, such as in regions

61 in Figure 3. In this way, the overall surface area of the pad can be increased, leading to a reduction in wear.

With reference to figures 5 and 6 which illustrate the construction of a grouser 70, it will be noted that the features (including the wings 57 and formation 58) by means of which the grouser 70 is retained in the track link are generally similar to those of road pad 50 and function in the same manner and so will not be described again in detail. In general, the grouser comprises a base portion 71 from which depend ground contacting structures 72. Preferably the base portion 71 and the structures 72 are made of metal, but other suitably robust materials may be employed. The shape, size and number of the structures 72 is merely illustrative and may be varied considerably in accordance with design and use requirements.

**Claims:**

1. A ground contacting component for use in a track link of an articulated vehicle track, the component comprising a base portion and a ground contacting portion wherein the component includes at respective sides thereof at least one laterally projecting wing adapted to be received in a corresponding groove of a track link and a projecting tongue extending from an end thereof and adapted to be at least partially received in a corresponding recess of the track link, and wherein the wing or wings at each respective side of the pad have an overall length which is less than the length of the ground contacting component.
2. A component as claimed in claim 1 wherein the ground contacting component includes a single wing at each side.
3. A component as claimed in claim 2 wherein the length of each wing is not more than half the length of the ground engaging component.
4. A component as claimed in claim 3 wherein the wings are formed towards the end of the ground contacting component, distant from the projecting tongue.
5. A component as claimed in any preceding claim wherein the wings are formed integrally with the base portion.
6. A component as claimed in any of claims 1-4 further comprising an intermediate plate disposed over the base portion, and wherein the wings are formed integrally with said intermediate plate.



7. A component as claimed in claim 6 further comprising a layer of elastomeric material between the base portion and the intermediate plate.
- 5 8. A component as claimed in claim 6 wherein the intermediate plate is fixedly attached to the base portion and is spaced apart from the base portion by means of fixings.
- 10 9. A component as claimed in any of claims 1-5 wherein the projecting tongue is formed integrally with the base portion.
10. A component as claimed in claim 6, 7 or 8 wherein the projecting tongue is formed integrally with the intermediate plate.
- 15 11. A component as claimed in any preceding claim wherein at least the leading part (with respect to the insertion direction) of the projecting tongue is curved, bent or raked away from the ground contacting portion.
- 20 12. A track link of an articulated vehicle track comprising a base portion, a drive receiving portion and means for articulatedly joining the track link to adjacent track links wherein the base portion includes a ground contacting component receiving portion defined by opposed side walls and an end wall, each of which opposed side walls includes a
- 25 groove extending along at least part of the length thereof for receiving laterally projecting wings of the ground contacting component and a recess formed in said end wall for receiving the projecting tongue
- 30 of the ground contacting component.



13. A track link as claimed in claim 11 wherein said grooves extend over not more than half the length of the respective side wall.
- 5 14. A ground engaging component substantially as hereinbefore described with reference to any of Figures 3 to 6.
15. A track link as hereinbefore described with reference to Figure 1 and/or Figure 2.
- 10 16. An articulated vehicle track including ground contacting components according to any of claims 1 to 10 and track links according to claim 11 or 12.