



(86) Date de dépôt PCT/PCT Filing Date: 2002/07/05
(87) Date publication PCT/PCT Publication Date: 2003/01/16
(45) Date de délivrance/Issue Date: 2010/01/19
(85) Entrée phase nationale/National Entry: 2003/12/23
(86) N° demande PCT/PCT Application No.: AU 2002/000901
(87) N° publication PCT/PCT Publication No.: 2003/004336
(30) Priorité/Priority: 2001/07/06 (AU PR 6164)

(51) Cl.Int./Int.Cl. *B62D 55/20* (2006.01)

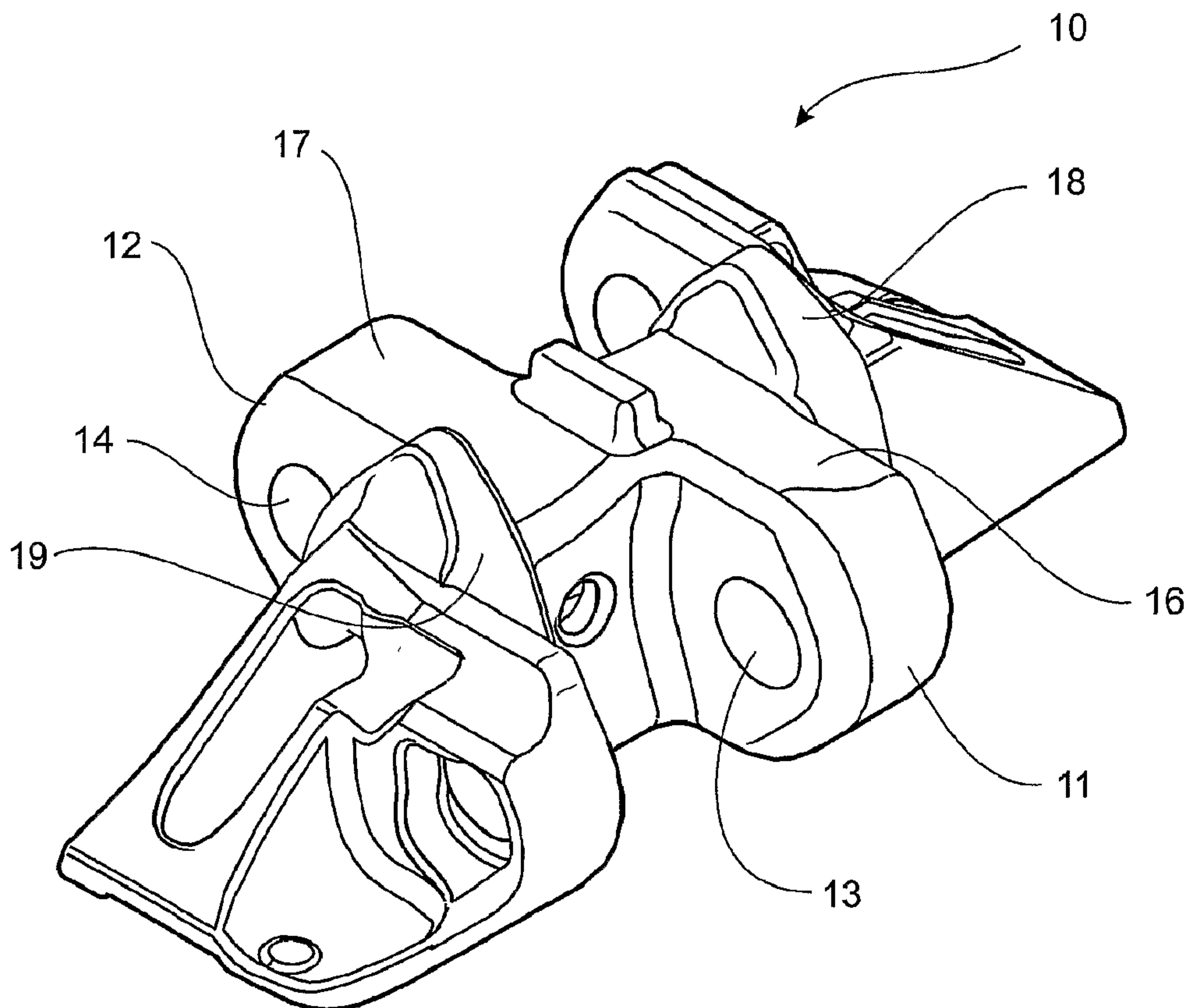
(72) Inventeurs/Inventors:
HANNAN, KEITH, AU;
WORRALL, PHILLIP, AU

(73) Propriétaire/Owner:
BRADKEN PTY LIMITED, AU

(74) Agent: GOUDREAU GAGE DUBUC

(54) Titre : PATIN DE CHENILLE D'ENGIN A CHENILLES PRESENTANT PLUSIEURS CHEMINS DE GALETS ET PLUSIEURS SAILLIES D'ENTRAINEMENT

(54) Title: CRAWLER TRACK SHOE WITH MULTIPLE ROLLER PATHS AND MULTIPLE DRIVE LUGS



(57) Abrégé/Abstract:

A shoe (10) for a crawler track has two roller paths (16, 17) thereon, upon which a dual rim roller travels in use. The roller paths (16, 17) are aligned with leading and trailing lugs (11, 12) respectively, of the shoe (10). Drive lugs (18, 19) are provided on the

(57) **Abrégé(suite)/Abstract(continued):**

outside of the roller paths (16, 17). In use, the drive lugs (18, 19) are engaged by sprocket teeth to drive the crawler track. The drive lugs (18, 19) stand proud of the roller paths (16, 17), but may also be recessed below the roller paths.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
16 January 2003 (16.01.2003)

PCT

(10) International Publication Number
WO 03/004336 A1

(51) International Patent Classification⁷: **B62D 55/20**

(74) Agent: **CULLEN & CO**; Level 26, 239 George Street, Brisbane, Queensland 4000 (AU).

(21) International Application Number: PCT/AU02/00901

(22) International Filing Date: 5 July 2002 (05.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PR 6164 6 July 2001 (06.07.2001) AU

(71) Applicant (for all designated States except US): **BRADKEN RESOURCES PTY LIMITED** [AU/AU]; 2 Maud Street, Mayfield West, New South Wales 2304 (AU).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HANNAN, Keith** [AU/AU]; Bradken Resources Pty Ltd, 76 Nathan Road, Runcorn, Queensland 4113 (AU). **WORRALL, Phillip** [AU/AU]; Bradken Resources Pty Ltd, 76 Nathan Road, Runcorn, Queensland 4113 (AU).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

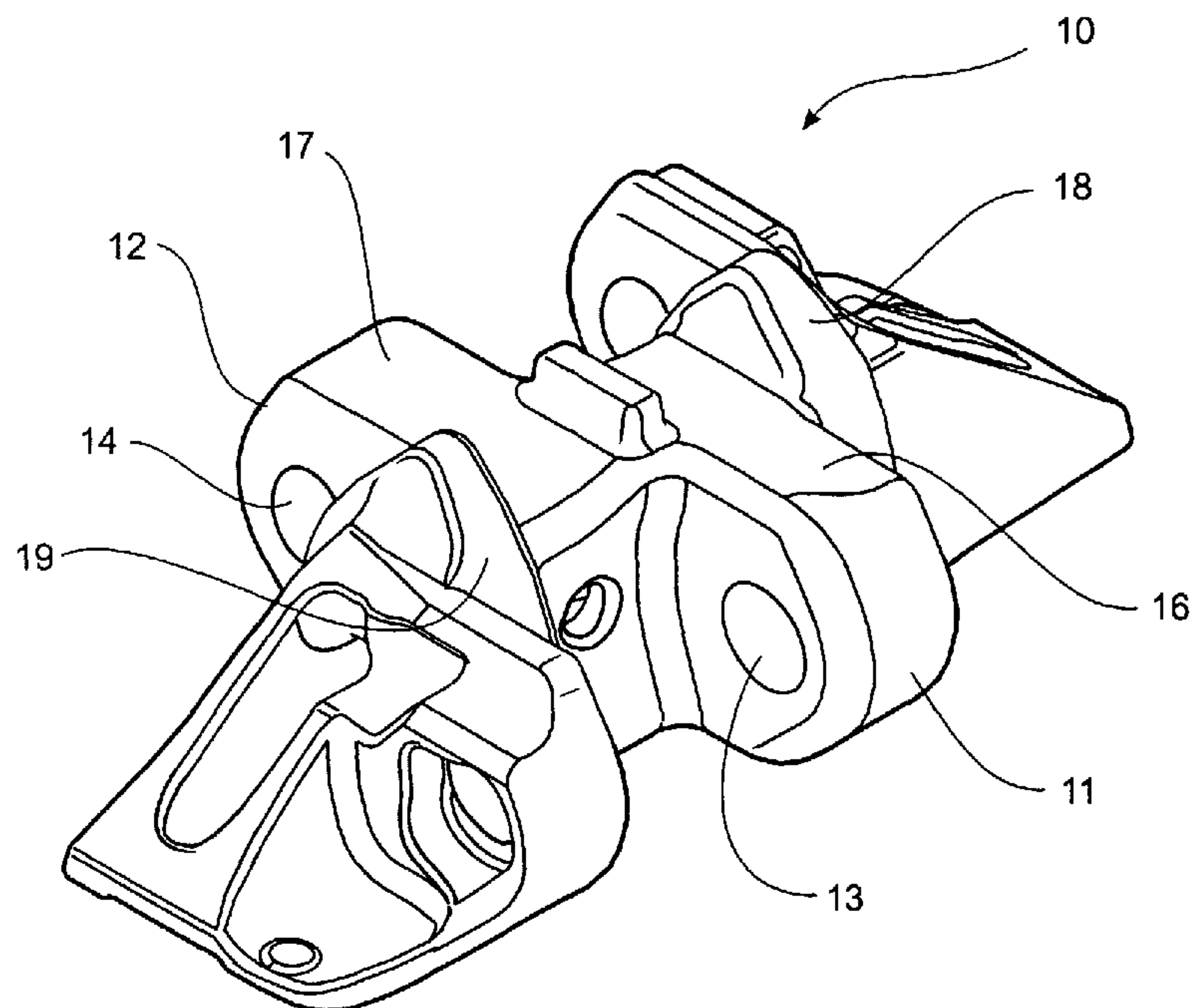
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- with amended claims

[Continued on next page]

(54) Title: CRAWLER TRACK SHOE WITH MULTIPLE ROLLER PATHS AND MULTIPLE DRIVE LUGS



(57) Abstract: A shoe (10) for a crawler track has two roller paths (16, 17) thereon, upon which a dual rim roller travels in use. The roller paths (16, 17) are aligned with leading and trailing lugs (11, 12) respectively, of the shoe (10). Drive lugs (18, 19) are provided on the outside of the roller paths (16, 17). In use, the drive lugs (18, 19) are engaged by sprocket teeth to drive the crawler track. The drive lugs (18, 19) stand proud of the roller paths (16, 17), but may also be recessed below the roller paths.



WO 03/004336 A1

WO 03/004336 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

CRAWLER TRACK SHOE WITH MULTIPLE ROLLER PATHS AND MULTIPLE DRIVE LUGS

This invention relates to an improved shoe for a crawler track. In particular, the invention is directed to a crawler track shoe having dual roller
5 paths and dual drive lugs.

BACKGROUND ART

Some items of large mining machinery, such as mining shovels and electric or hydraulic excavators, are fitted with crawler tracks for locomotion. The individual links in the crawler tracks are known as "shoes".
10 These track shoes, also known as "crawler shoes", are linked together by pivot pins to form an endless articulated track, each track being mounted on a row of support rollers. Drive sprockets at either end of the row of support rollers engage lugs on the crawler shoes to drive the track. The rollers roll
15 upon the ground-engaging track shoes of the track as the track is driven by the sprockets. Each roller may be provided with dual rims.

The weight of the machinery is borne by the particular track shoe(s) upon which the rollers bear. As the rollers move from one track shoe to another, the weight of the machinery is transferred between shoes. In view
20 of the large weight being carried, any point loads or concentrated loads must be avoided, as such loads may crack or distort a track shoe, or otherwise cause excessive wear.

There are various known crawler shoe designs. Fig. 1 illustrates crawler shoes of a first known type. As can be seen in that drawing, each shoe has a pair of roller paths "A" (shown cross-hatched) along which dual
25 rollers travel, and a single drive lug "B" which is engaged by a sprocket in use. One disadvantage of dual roller path/single drive lug shoes is that the drive lug often wears out before the roller paths.

The known track shoes shown in Fig. 1 have a longitudinal split
30 "C" in each roller path. The aim of the longitudinal split is to transfer approximately half of the load from one shoe to the next. In theory, the load is split evenly between two shoes on either side of the longitudinal split. As

the roller moves from one shoe to the next, half the load is initially transferred across the longitudinal split to the next roller, followed shortly thereafter by the other half of the load. The load transfers in the two roller paths occur simultaneously.

5 However, it has been found in practice that the longitudinal split in each roller path causes accelerated wear and metal flow in the crawler shoes. As the machinery may be operating on sloping or undulating ground, or over rocks, and since the wear characteristics of adjacent crawler shoes are not identical, the high contact pressure applied by a roller on a roller path
10 is not distributed evenly across the longitudinal split. The effect of concentrating the weight on a shoe on one side only of the longitudinal split, and particularly on the edge portion of the shoe near the longitudinal split, is to cause premature metal flow or "toe nailing" of the track shoes along the roller path. This in turn causes the track shoes to bind with mating shoes,
15 which can result in cracking and failure of the track shoe.

Another type of crawler shoe design can be found in international patent application no. PCT/AU99/00156. The track shoe illustrated in that patent application has a single roller path and dual drive lugs located on opposite sides of the roller path. A disadvantage of dual drive
20 lug/single roller path designs is that the roller path often wears out before the drive lugs. Further, the maximum propel speed of the machine is limited due to the rough transition of load rollers between shoes.

It is an object of this invention to provide an improved crawler shoe which overcomes or ameliorates the abovedescribed disadvantages, or
25 which at least provides the consumer with a useful choice.

SUMMARY OF THE INVENTION

In one broad form, the invention provides a shoe for a crawler track, the shoe having multiple roller paths thereon and multiple drive lugs.

30 Preferably, the shoe has two or dual roller paths, and two or dual drive lugs, the drive lugs being located on the outside of the respective roller paths.

Each roller path is suitably defined by a flat or curved surface on the shoe. The drive lugs may have a recessed contact portion, allowing the drive sprocket teeth to contact above and below the roller path. Alternatively, the drive lugs may be proud allowing the drive sprocket teeth to contact above
5 the roller path only.

Additionally, the drive lugs may be replaceable, as described in our co-pending Australian patent application no. PR6878.

The combination of the dual roller paths and the dual drive lugs enables the shoe life to be increased, i.e. by reducing wear on the drive lugs
10 and roller path, and the drive sprocket teeth.

In the preferred embodiment, the crawler shoe has a leading lug portion, and a trailing lug portion laterally offset from the leading lug portion such that when two like shoes are linked in a track, the leading lug of one is laterally aligned with the trailing lug of the other. There are two roller path
15 surfaces on the crawler shoe aligned longitudinally with the leading and trailing lug, respectively, such that when like shoes are linked together in a track, the transitions between adjacent crawler shoes in one roller path are longitudinally offset from transitions between the same adjacent crawler shoes in the other roller path. In this manner, the roller is continuously
20 supported across a complete roller path on at least one crawler shoe.

That is, at any particular time, the roller will be supported across the full width of a roller path on a crawler shoe (although the particular track shoe will change as the roller moves along the track).

In use, a dual rim roller travels upon and along the two roller
25 paths on each crawler shoe. As the transitions between shoes in the two paths are staggered or spaced in the direction of travel, when one rim of the dual roller is making the transition from one crawler shoe to the next, the other rim of the dual roller will be fully supported on its roller path.

The "continuous" roller path crawler shoe of this invention
30 enables smoother roller transition from one shoe to the next. The smoother roller transition under load from one crawler shoe to the next reduces wear and metal flow commonly associated with known track shoe designs.

The offset transitions also allow smoother and faster propelling of the machine over ground.

In another form, the invention provides an articulated crawler track having a plurality of shoes as described above, linked together to form
5 an endless track.

In order that the invention may be more fully understood and put into practice, a preferred embodiment thereof will now be described by way of example, with reference to the accompanying drawings

10 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view of a pair of known track shoes.

Fig. 2 is a perspective view from above of a track shoe according to one embodiment of the invention.

Fig. 3 is a plan view of a linked series of track shoes of the type
15 shown in Fig. 2, forming part of a crawler track.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown in Fig. 2, a crawler shoe 10 comprises a body having a leading lug 11 as well as a trailing lug 12. The lugs 11,12 are provided for
20 connection to adjacent shoes in a track. The trailing lug 12 is spaced laterally (i.e. transverse to the direction of travel) from the leading lug 11 such that when like shoes 10 are arranged in a track as shown in Fig. 3, a pinhole 13 in the leading lug 11 of one shoe aligns laterally with a pin hole 14 in the trailing lug 12 of an adjacent shoe. Pivot pins (not shown) are inserted in the aligned
25 holes to link the shoes and thereby form an endless crawler track.

The bottom of each track shoe 10 may suitably be provided with cleats (not shown) for increased traction.

The illustrated crawler shoe is designed for use with a dual rim or dual track roller (not shown), and is provided with a pair of roller path
30 surfaces 16, 17 on the upper side thereof, each aligned with a respective leading/trailing lug 11, 12. The roller paths 16, 17 are formed by flat or slightly curved surfaces on the shoe, of approximately the same width as the

respective leading or trailing connection lugs with which they are aligned.

As can be better appreciated by reference to Fig. 3, when a dual rim roller is situated approximately half way along a shoe 10 (position W), the weight of the roller will be borne on both roller paths 16, 17 of shoe 10. When
5 the roller is making a transition along one roller path 17 from shoe 10 to its adjacent shoe 10' (position X), the bulk of the weight will now be supported on the other roller path 16 of shoe 10.

After the transition has been made in roller path 17, the weight will again be borne on both roller paths, but on different track shoes 10, 10'
10 (position Y).

The next transition will occur on roller path 16 (position Z), during which the bulk of the weight will be borne by the full roller path 17 on track shoe 10'.

At any particular time therefore, the bulk of the weight of the
15 machinery will be borne on at least one full roller path. This minimises wear of the crawler shoes and provides for a smoother transition of the dual rim rollers from one crawler shoe to the next.

Advantageously, the crawler shoe 10 also has a pair of drive lugs 18, 19 located outside the respective drive paths 16, 17, as can be seen
20 in Fig. 2. In use, the drive lugs 18, 19 are engaged by the respective teeth on opposite sides of a double sprocket (not shown). The drive lugs are recessed to form sunken V-shaped recesses between them, allowing the drive sprocket teeth to contact above and below the roller path as shown in Fig. 2. Alternatively, the drive lugs may stand proud of the shoe as shown in Fig. 1,
25 so that the drive sprocket teeth contact above the roller path only.

By utilising dual drive lugs in combination with dual roller paths, the wear life of the crawler shoe is maximised.

The abovedescribed crawler shoe combines an improved dual drive lug propel system with a "continuous roller path" or offset dual roller path
30 design to minimise wear on both the drive lugs and the roller paths, and the drive sprocket teeth.

The foregoing describes only one embodiment of the invention,

and modifications which are obvious to those skilled in the art may be made thereto without departing from the scope of the invention as defined in the following claims. For example, more than one trailing and leading lug may be provided on each shoe.

AMENDED CLAIMS

[received by the International Bureau on 27 September 2002 (27.09.02);
original claims 1-10 replaced by new claims 1-11; (2 pages)]

CLAIMS:

1. A shoe for a crawler track, the shoe comprising a body having multiple roller paths thereon, and multiple drive lugs, at least one leading lug and at least one trailing lug for articulated connection to respective shoes in the track adjacent opposite sides of the body, each of the roller paths being aligned with and extending along the top of a respective one of the leading and trailing lugs, and wherein at each side of the shoe the roller paths have ends which are offset relative to each other in the direction of the roller paths.
2. A shoe as claimed in claim 1, wherein each of the drive lugs has a sprocket tooth contact portion which is recessed below the roller paths.
3. A shoe as claimed in claim 2, wherein each of the drive lugs also has a sprocket tooth contact portion extending above the roller paths.
4. A shoe as claimed in claim 1, wherein the shoe has two roller paths.
5. A shoe as claimed in claim 4, wherein the shoe has two drive lugs.
6. A shoe as claimed in claim 5, wherein the drive lugs are located on the outside of the respective roller paths.
7. A shoe as claimed in claim 1, wherein each path is approximately the same width as the respective leading or trailing connection lug with which it is aligned.
8. A crawler track comprising a plurality of shoes linked together to form an endless track, each shoe being as claimed in claim 1, and wherein each transition from one shoe to the next shoe in the track along one roller path is spaced in the direction of travel relative to the transition between the same shoes in the other roller path(s).
9. A crawler track shoe as claimed in claim 8 wherein each drive lug has a sprocket tooth contact portion extending above and below the roller paths.

10. A crawler track shoe comprising a body having
a pair of parallel roller paths on an upper surface thereof upon
which respective roller rims travel in use,
a pair of drive lugs operatively engaged by sprocket teeth, each
5 drive lug being located outside a respective roller path,
a leading connection lug located on one side of the body for
articulated connection to a shoe adjacent said one side of the
body,
a trailing connection lug located on the opposite side of the body
10 for articulated connection to another shoe adjacent said
opposite side of the body,
each roller path being aligned with, and extending along the top
of, a respective connection lug and being of similar width
thereto,
15 wherein at each side of the body, the roller paths have ends
which are offset relative to each other, such that the transition from one shoe
to an adjacent shoe in the track along one roller path is offset in the direction
of the roller paths relative to the transition between the same shoes in the
other roller path.
- 20 11. A crawler track shoe as claimed in claim 10 wherein each drive
lug has a sprocket tooth contact portion extending above and below the roller
paths.

1/2

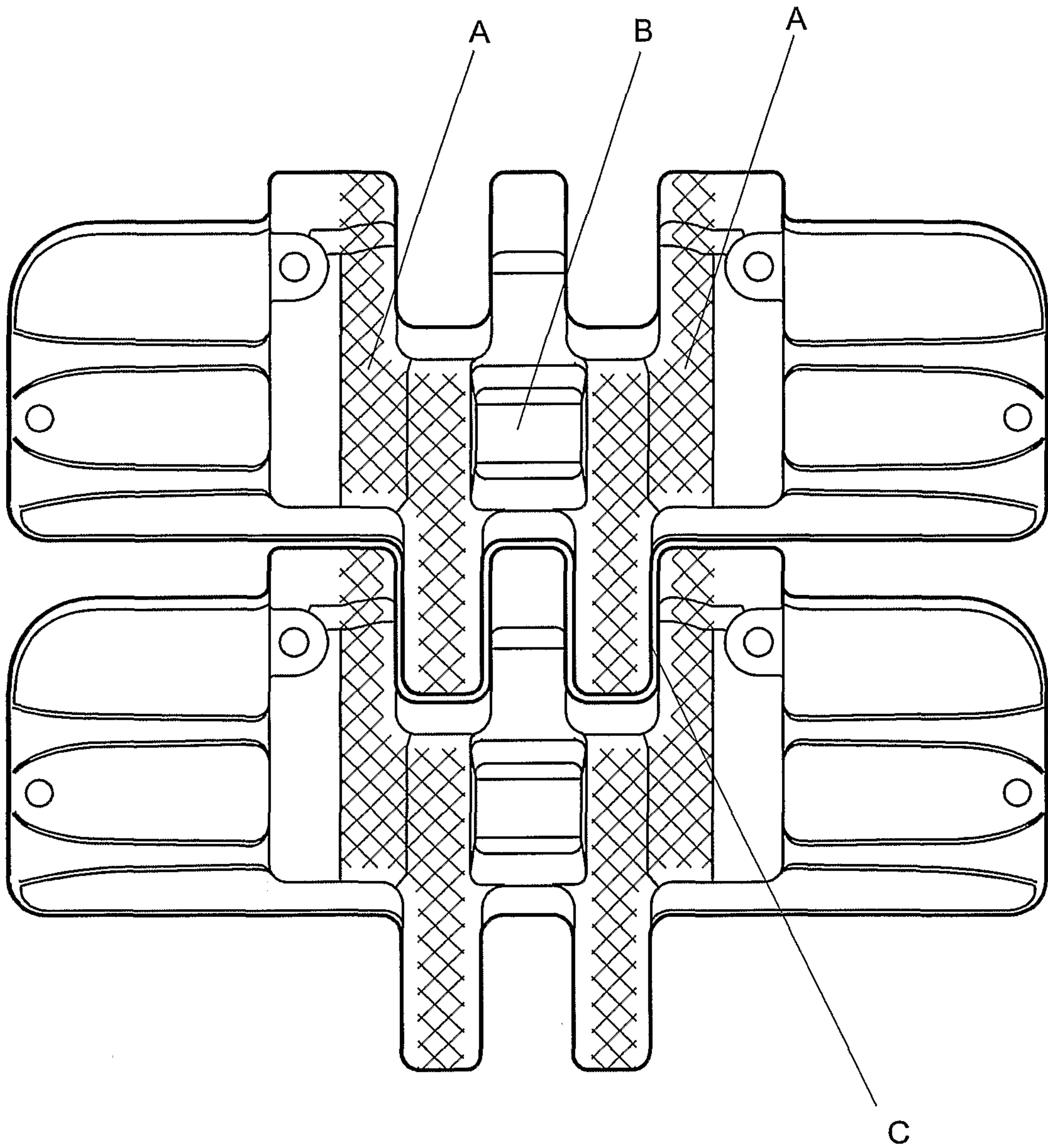


Fig. 1
(Prior Art)

2/2

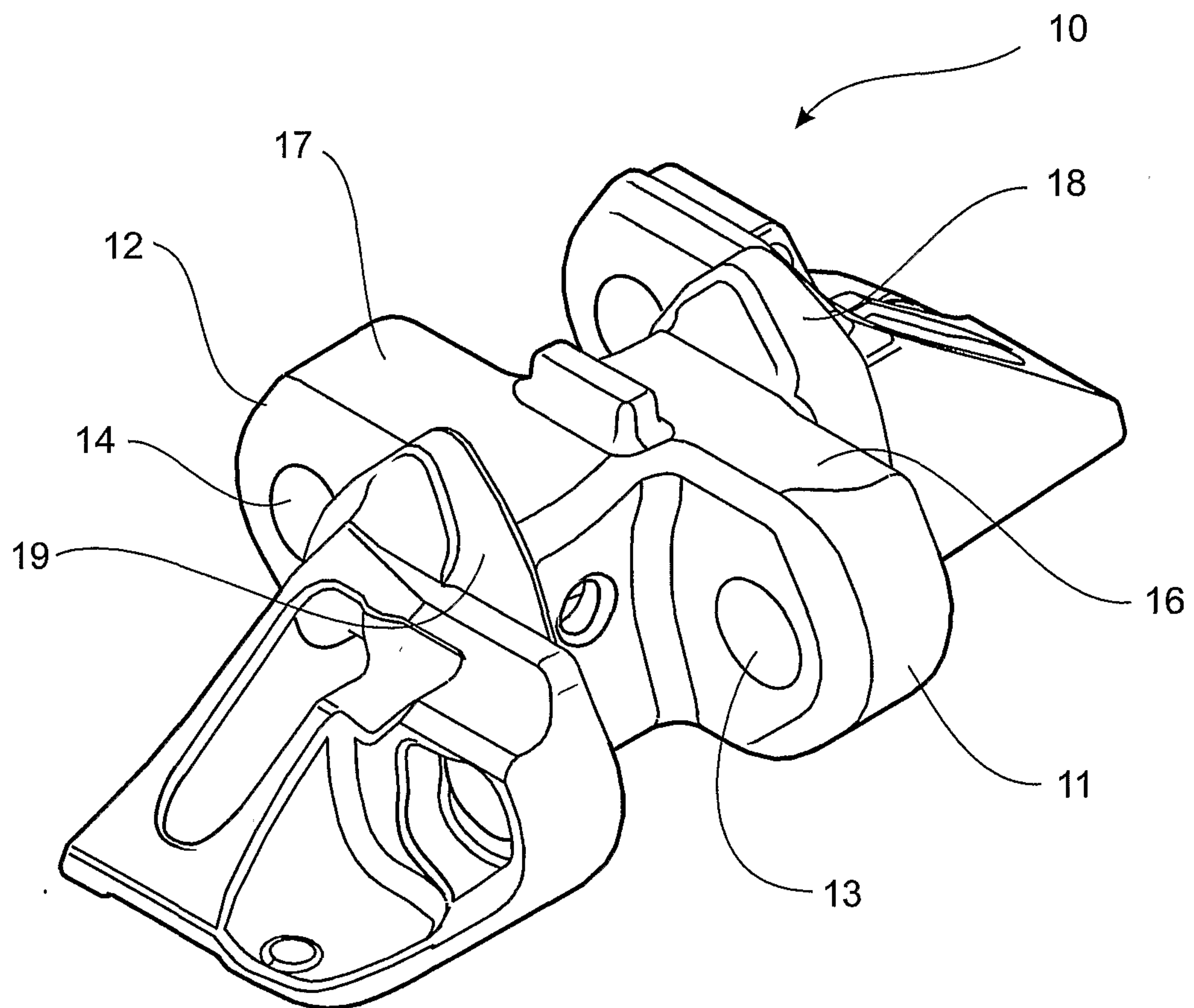


Fig. 2

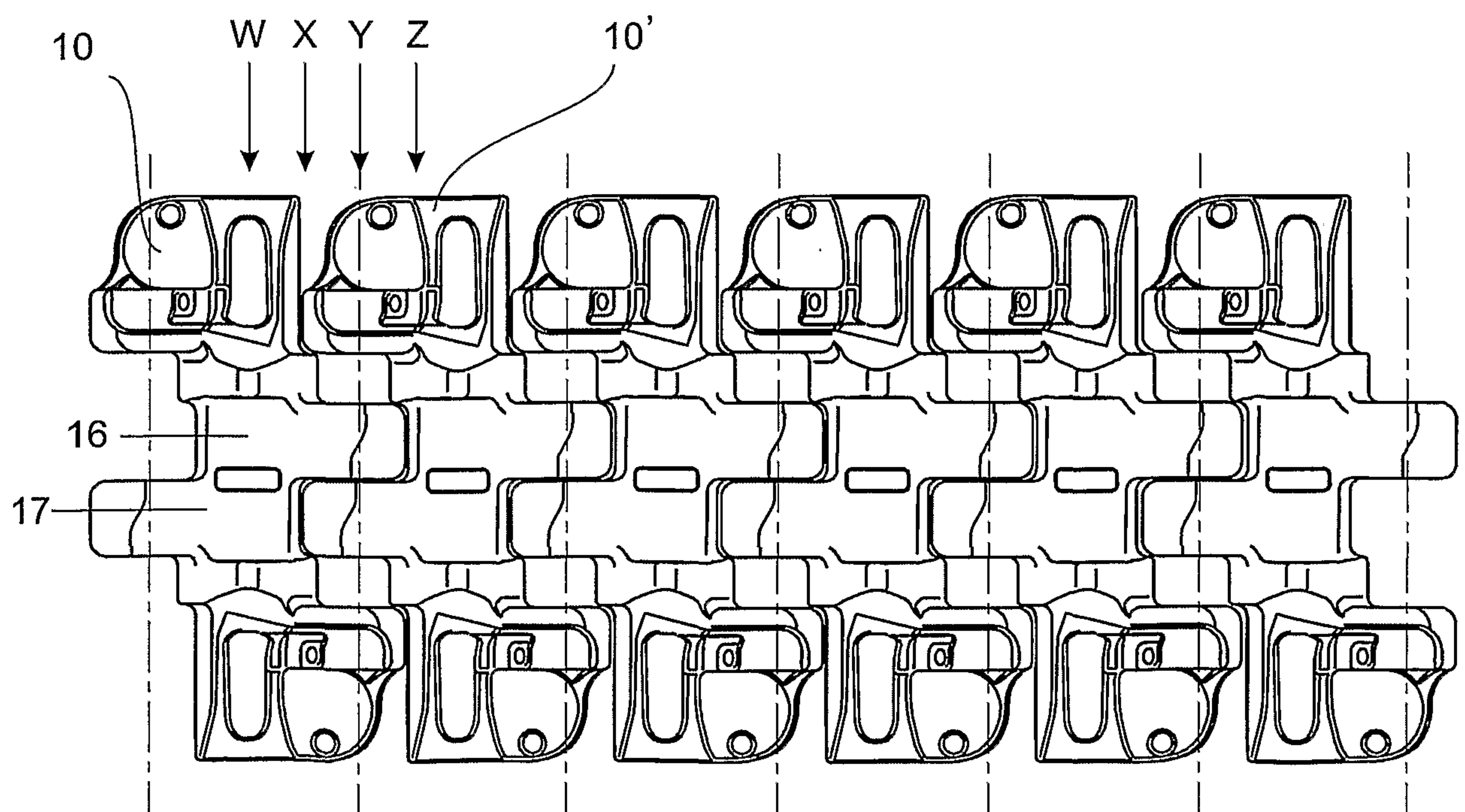


Fig. 3

