

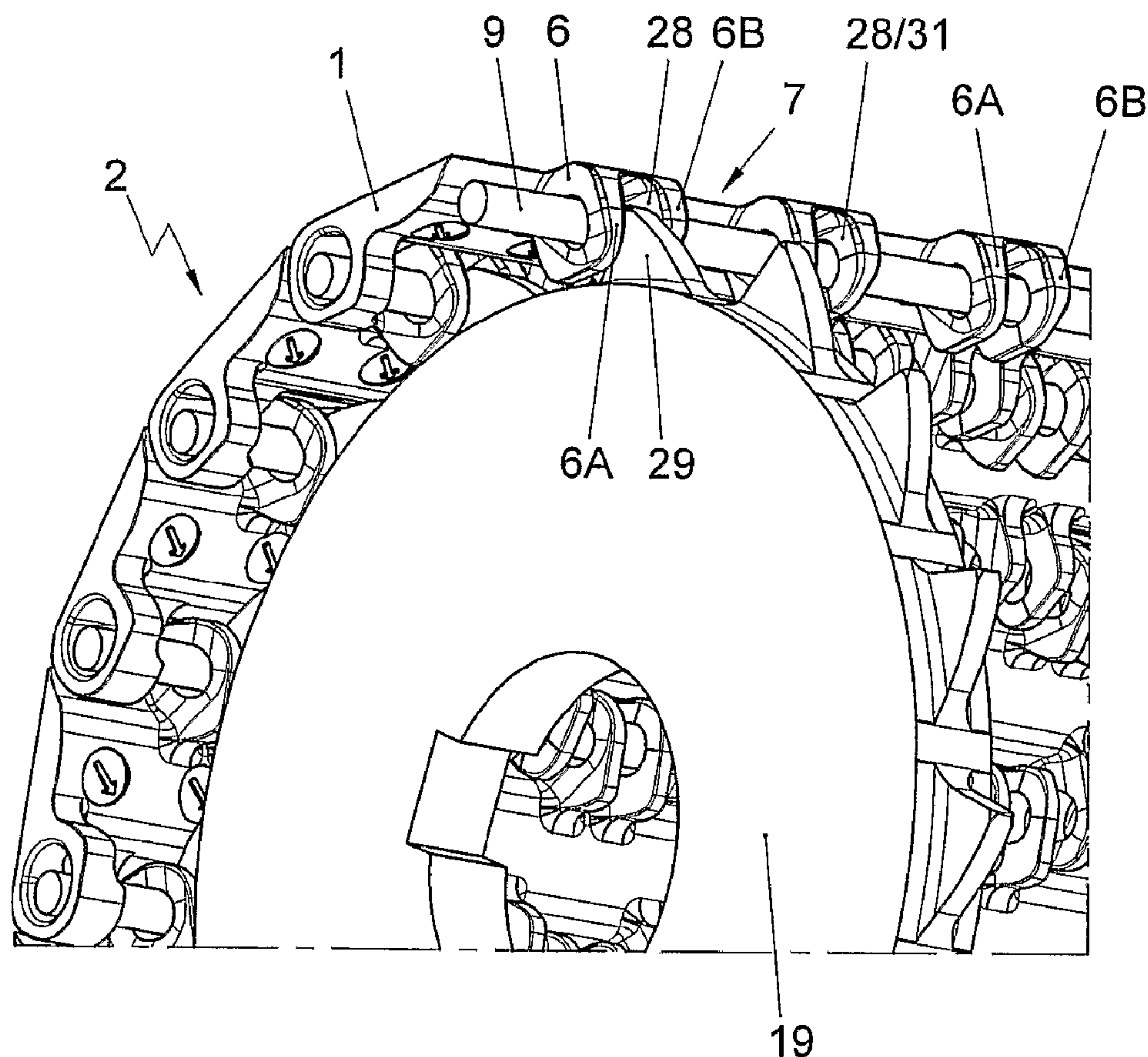


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(71) Demandeur/Applicant:
REXNORD FLATTOP EUROPE B.V., NL
(72) Inventeurs/Inventors:
CORNELISSEN, LEONARDUS ADRIANUS
CATHARINUS, NL;
VERDUIJN, GIJSBERTUS JOHANNES, NL
(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : MODULE POUR TAPIS DE TRANSPORTEUR, TAPIS DE TRANSPORTEUR MODULAIRE ET
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(54) Title: MODULE FOR A CONVEYOR MAT, MODULAR CONVEYOR MAT AND CONVEYOR



(57) Abrégé/Abstract:

A conveyor, comprising a modular conveyor mat (2) driven by sprocket wheels (19), wherein the conveyor mat is driven by the sprocket wheel on the hinge pins (9). The modular conveyor mat comprises a number of modules (1) successive in conveying



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

direction, which are each provided with a body part extending transversely to the conveying direction and having rows of hinge loops (6) reaching forward and rearward in the conveying direction, wherein the hinge loops of successive modules cooperate and are coupled using hinge pins.

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(71) Applicant (for all designated States except US):
REXNORD FLATTOP EUROPE B.V. [NL/NL];
Einsteinstraat 1, NL-2691 GV 's-gravenzande (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CORNELISSEN, Leonardus Adrianus Catharinus** [NL/NL]; Govert Bidlostraat 106, NL-2563 XJ 's-gravenzande (NL). **VERDUIJN, Gijsbertus Johannes** [NL/NL]; Zeggelaan 77, NL-4844 SC Terheijden (NL).

(74) Agent: **VAN LOON, C.J.J.**; c/o Vereenigde, Johan De Wittlaan 7, NL-2517 JR The Hague (NL).

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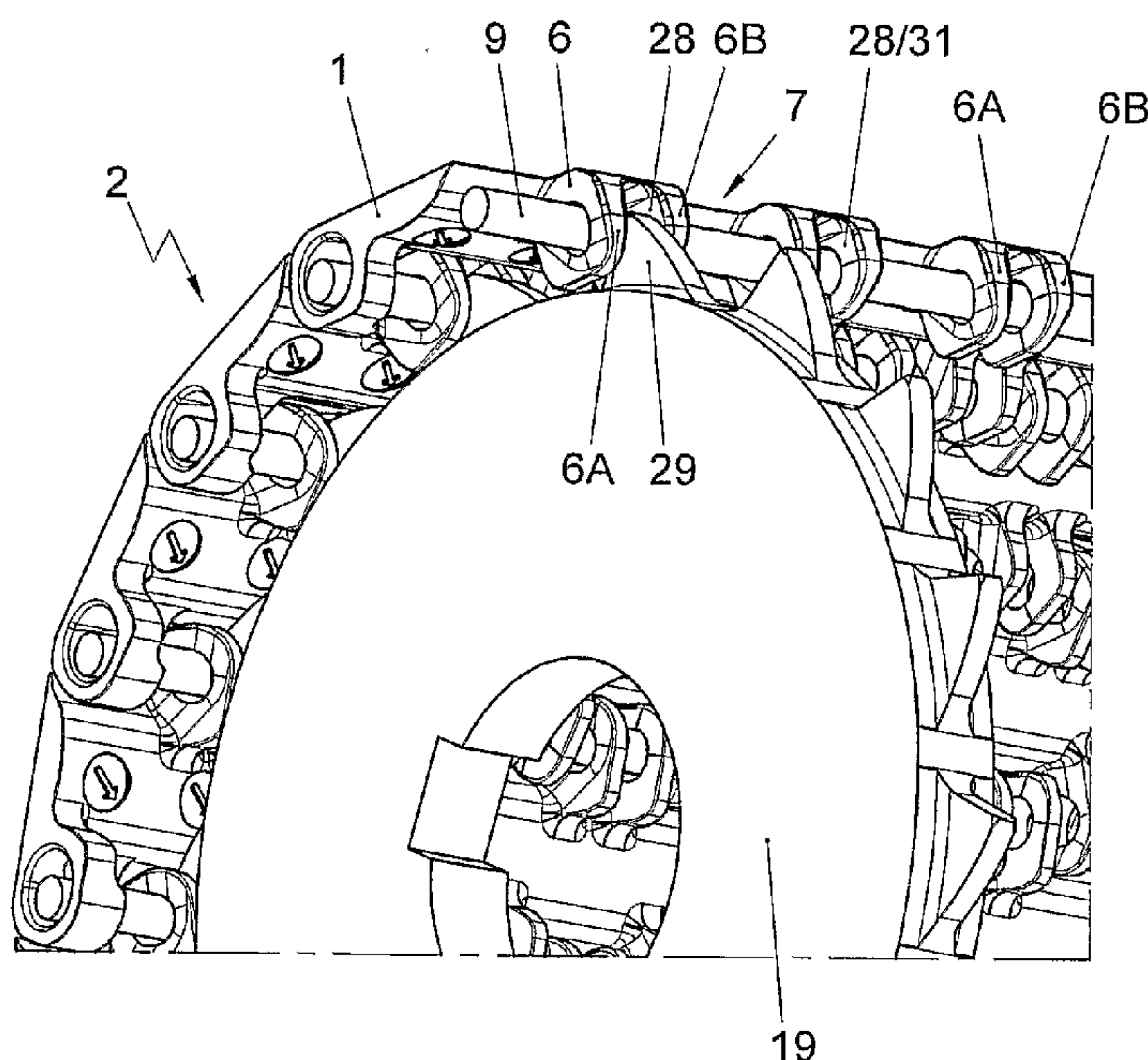
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(54) Title: MODULE FOR A CONVEYOR MAT, MODULAR CONVEYOR MAT AND CONVEYOR



(57) Abstract: A conveyor, comprising a modular conveyor mat (2) driven by sprocket wheels (19), wherein the conveyor mat is driven by the sprocket wheel on the hinge pins (9). The modular conveyor mat comprises a number of modules (1) successive in conveying direction, which are each provided with a body part extending transversely to the conveying direction and having rows of hinge loops (6) reaching forward and rearward in the conveying direction, wherein the hinge loops of successive modules cooperate and are coupled using hinge pins.

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Title: Module for a conveyor mat, modular conveyor mat and conveyor

The invention relates to conveyors with modular conveyor mats, to modular conveyor mats and to modules for modular plastic conveyor mats formed by rows of plastic mat modules hingedly coupled by means of hinge pins.

5 DE 1044707 discloses a chain band that is driven on the hinge pins via interspaces between the chain links.

US 5 706 934 discloses a modular conveyor mat that is driven on the hinge loops by a sprocket wheel.

As they are light-weight, do not corrode and are relatively easy to clean,
10 modular plastic conveyor mats are widely used, *inter alia* in conveying food products. Modular plastic conveyor mats are often built up from molded plastic modular connecting elements, called mat modules, which can be placed side by side in rows of the desired width. Rows of spaced-apart hinge loops extend along opposite sides of the modules. The rows of hinge loops are provided with
15 aligned hinge holes for receiving a hinge pin. The hinge loops along one side of a row of modules are then connected to the hinge loops of a side of an adjacent row of modules, for instance as the pattern of fingers of interlacing hands. A hinge pin received in the aligned hinge holes usually forms a hinge joint between adjacent rows. Rows of modules are mostly connected with each other
20 to form an endless conveyor mat which can pass around return wheels.

To drive the mat, typically, drive wheels are provided which engage driving locations of the modules. A problem presenting itself in modular mats is providing driving locations on the modules that limit the utility of the modules as little as possible. In particular, it is difficult to provide a driving
25 location that guarantees a good force transmission, allows proper cleaning and enables the conveyor mat formed with the modules to cooperate with already existing conveyor tracks and driving provisions included therein. With mats having a relatively small pitch between the hinge pins, for instance a pitch of

less than 1", lack of space makes it still more difficult to provide a suitable driving location. To reduce this problem, the invention provides a conveyor according to claim 1, a method for driving a conveyor mat according to claim 9, a module for a modular conveyor mat according to claim 11 and a modular
5 conveyor mat according to claim 26.

By driving the conveyor mat directly on the hinge pins, use is made of a new driving location which creates many extra possibilities. In particular, driving the pins requires little space, so that mats with a pitch of less than 1" can be driven relatively easily.

10 Preferably, the conveyor mat is driven using a sprocket wheel which engages the hinge pins at the location of interspaces present transversely to the conveying direction between hinge loops or parts of hinge loops, which interspaces render the hinge pin accessible for cooperation with the teeth of the sprocket wheel.

15 By providing a module for a modular conveyor mat with opposite, staggered rows of hinge loops with hinge holes situated eccentrically between inner and outer driving faces, the module can be driven at two locations on the hinge loops, so that a good force transmission can be combined with a good cleanability of the module and a good deployability of the module. In
20 particular, the outer driving faces can be optimized for cooperation with a first type of drive wheel, whose teeth can be received laterally between the side surfaces of two adjacent hinge loops of a successive module, in particular the teeth of a sprocket wheel having six to twelve teeth. The inner driving faces can be optimized for cooperation with teeth of another type of drive wheel, for
25 instance a drive wheel which cooperates with the inner driving faces of several hinge loops successive transversely to the conveying direction, and/or for instance a drive wheel with twelve or more teeth, in particular a sprocket wheel carried by the shell of a drum motor.

The invention also relates to a modular conveyor mat.

Further advantageous embodiments of the invention are represented in the subclaims and will be elucidated on the basis of exemplary embodiments represented in a drawing. In the drawing:

Fig. 1 shows a schematic top plan view of a conveyor mat according to the invention;

Fig. 2 shows a schematic front view of the conveyor mat of Fig. 1;

Fig. 3 shows a schematic bottom view of the conveyor mat of Fig. 1;

Fig. 4 shows a schematic bottom view of the conveyor mat of Fig. 1, cross-sectioned along the line B-B in Fig. 2;

Fig. 5 shows a schematic side view of the conveyor mat of Fig. 1;

Fig. 6 shows a schematic cross-section of the mat of Fig. 1 along the line A-A in Fig. 1;

Fig. 7 shows a schematic side view of a detail of a first type of drive wheel which cooperates with an outer driving face of the module; and

Fig. 8 shows a schematic side view, in detail, of teeth of a second type of drive wheel which cooperates with inner driving faces of the modules;

Fig. 9 shows a schematic side view of a third type of drive wheel, whose teeth cooperate with hinge pins of a conveyor mat, and

Fig. 10 shows a schematic perspective view of the modular conveyor mat of Fig. 9 which is driven with the sprocket wheel by way of the hinge pins.

It is noted that the Figures are only schematic representations of a preferred embodiment of the invention, which is described by way of non-limitative exemplary embodiment. In the Figures, identical or corresponding parts are designated with the same reference numerals.

Referring to Figs. 1 – 6, there is shown a module 1 which is included in a part of a conveyor mat 2. The module 1 comprises a body part 3 which, on a front side 4 and a rear side 5 operatively extending transversely to a conveying direction indicated with an arrow P, is provided with rows of hinge loops 6. Transversely to the conveying direction P, the hinge loops 6 are spaced apart with mutual interspaces 7. As indicated in Figs. 3 and 4, the hinge loops 6 of

the front row 8A are staggered transversely to the conveying direction relative to the hinge loops 6 of the back row 8B.

The hinge loops 6 are provided with hinge holes 9, extending transversely to the conveying direction P, which are aligned per row.

5 The front sides 4 and the rear sides 5 of the successive modules are coupled by means of a hinge pin 11 extending transversely to the conveying direction P. The hinge loops 6 then interlock like the fingers of two interlacing hands.

10 The hinge loops 6 extend from inner faces 13 situated nearer to the centerline 12 of the module 1, represented in Fig. 6, to outer faces 14 situated further away from the center line and located on the front side 4 or the rear side 5, respectively, of the module 1.

Here, the outer faces 14 are situated nearer to the hinge holes 9 than the inner faces 13.

15 The inner faces 13 are provided with inner driving faces 13a for cooperation with the teeth of a first type of drive wheel 15. The outer faces 14 are provided with outer driving faces 14a for cooperation with the teeth of a drive wheel 16 of a second type.

20 The inner driving faces 13a and the outer driving faces 14a have a substantially curved configuration: the driving faces are curved relative to an axis of curvature A1 or A2, respectively, extending substantially transversely to the conveying direction. This axis of curvature is formed by the central axis of the hinge pin 11 when this abuts against the edge of the hinge loop 6 contiguous to the driving face.

25 The curvature of the outer driving faces 14a is stronger than the curvature of the inner driving faces: the radius of curvature R1 of the outer driving faces 14a is smaller than the radius of curvature R2 of the inner driving faces 13a.

30 The body part 3 is substantially of sheet-shaped design. The hinge loops 6 extend downward relative to the conveying surface 17 of the module, and

forward or rearward in conveying direction relative to the centerline 12 of the module.

The conveying surface 17 on the top side of the body part 3 of the modules 1 has a substantially planar configuration and is of closed design. The bottom
5 side 23 of the body part 3, viewed transversely to the conveying direction, has a substantially belly-shaped configuration.

The conveying surface 17 links up in a substantially plane manner with the closing surfaces formed by back parts 21 of the hinge loops 6. Consequently, when successive modules 1 are situated in a flat plane, their
10 conveying surfaces 17 form a closed conveying surface.

In Figs. 2 and 6 it is clearly visible that the bottom side 23 of the body part is reduced adjacent the side edge, at least at the location of an interspace 7 situated between the hinge loops 6. Between the inner driving faces 13A, further, a free space 18 is present. This free space enhances the cleanability of
15 the bottom side of the module.

In Fig. 7, a first type of drive wheel 15 is shown, of which a tooth 24 cooperates with an outer driving face 14A of the module 1. In this exemplary embodiment, this drive wheel has six teeth 24, uniformly distributed along the circumference. The teeth 24 can be received between side surfaces 25 of two
20 adjacent hinge loops 6 of a successive module 1. The teeth 24 each have a driving flank 24A and are for driving in one conveying direction. The sprocket wheel 15 can also be provided with an equally large set of mirrored teeth, staggered transversely to the conveying direction, for driving in the opposite direction. It is clearly visible in the Figure that the reduced interspace 7
25 renders the outer driving face 14A well accessible to the tooth 24, and that as a result, the outer driving face 14A, when passing around, can be cleaned well from the conveying surface 17.

In Fig. 8, a second type of drive wheel 16 is shown, which cooperates with the inner driving faces 13A of the modules 1. In contrast with the first type of
30 drive wheel, of which the width of the teeth 24 corresponds to the width

transverse to the conveying direction of an outer driving face 14A, the width of the teeth 26 of this second type of drive wheel 16 corresponds to the width of a plurality of inner driving faces 13A. The second type of sprocket wheel 16 can, for instance, be a sprocket wheel carried by the shell of a drum motor and
5 having a relatively large diameter, and which is provided with, for instance, twelve teeth. This Figure clearly shows that the free space 18 can also be utilized for receiving a relatively large tooth 26. Such a tooth can be provided with driving flanks 27A, B on both sides for driving in two opposite directions.

At least a part of the hinge loops 6 is provided with a groove 28,
10 extending in conveying direction P, reaching into the hinge hole 9. This groove extends from the bottom side 27 of the hinge loop 6 in the direction of the conveying surface 17, to a point spaced from the conveying surface. In this exemplary embodiment, the groove 28 extends as far as the bottom side 23 of the body part 3.

15 Figs. 9 and 10 show a conveyor, comprising a modular conveyor mat 2 driven by a sprocket wheel 19 of a third type. The conveyor mat 2 is driven by the sprocket wheel 19 on the hinge pins 9. The modular conveyor mat 2 comprises a number of modules 1 successive in conveying direction P. The modules 1 are each provided with a body part 3 extending transversely to the conveying direction. At the front side 4, the body part 3 is provided with hinge
20 loops 6 extending forward in the conveying direction. Further, at the rear side 5, the body part 3 is provided with hinge loops 6 extending rearward in the conveying direction. The hinge loops 6 of successive modules 1 in the conveying direction P cooperate and are coupled using hinge pins 9.

25 The flanks 30 of the teeth 29 of the sprocket wheel 19 engage the hinge pins 9 at the location of interspaces 31 present transversely to the conveying direction P between hinge loops 6. The interspaces 31 render the hinge pin 9 accessible for cooperation with the teeth 29 of the sprocket wheel 19.

The sprocket wheel 19 cooperates with the hinge pins 9 at the location of
30 the underside 23 of the mat 2 remote from the conveying surface 17. In this

exemplary embodiment, the interspaces 31 are situated between loop parts 6A, 6B of the same module 1 that are successive transversely to the conveying direction P. The interspace 31 here corresponds to a groove 28 extending in conveying direction, which is provided in the hinge loop 6 and which extends
5 into the hinge hole.

The interspaces 31 may also be situated between hinge loops 6 of two modules 1 adjacent to each other transversely to the conveying direction P. This can be done, for instance, by choosing the interspace 7 between the hinge loops 6 to be greater than the width of the hinge loop 6 transversely to the
10 conveying direction P.

The interspaces 31 may also be situated between hinge loops 6 of successive modules 1 in conveying direction P that are coupled via a hinge pin 9.

It will be clear that the invention is not limited to the exemplary
15 embodiments represented here. For instance, the body part of the module may be designed to be at least partly open, for instance as a so-called flush grid mat module, and/or it may for instance have a sinuous, wavy, zigzag, grid or spine shape. Further, the conveying surface may be of non-planar design, for instance concave, convex and/or corrugated. Such variants will be clear to
20 those skilled in the art and are understood to fall within the scope of the invention as represented in the following claims.

CLAIMS

1. A conveyor, comprising a modular conveyor mat driven by at least one sprocket wheel, wherein the modular conveyor mat comprises a number of modules successive in conveying direction, which are each provided with a body part extending transversely to the conveying direction and having rows of
5 hinge loops respectively reaching forward and rearward in the conveying direction, the hinge loops being spaced apart transversely to the conveying direction, wherein the hinge loops of successive modules cooperate and are coupled using hinge pins, and wherein the conveyor mat is driven by the sprocket wheel on the hinge pins.
- 10 2. A conveyor according to claim 1, wherein teeth of the sprocket wheel engage the hinge pins at the location of interspaces present transversely to the conveying direction between hinge loops, which interspaces render the hinge pin accessible for cooperation with the teeth of the sprocket wheel.
3. A conveyor according to any one of the preceding claims, wherein the
15 sprocket wheel cooperates with the hinge pins at the location of the underside of the mat remote from the conveying surface.
4. A conveyor according to claim 2 or 3, wherein at least a number of interspaces are situated between loops or loop parts of the same module that are successive transversely to the conveying direction.
- 20 5. A conveyor according to any one of claims 2-4, wherein at least a number of interspaces are formed by grooves or recesses in the hinge loop which are accessible from the underside of the module.
6. A conveyor according to any one of claims 2-4, wherein at least a number of interspaces are situated between hinge loops of two modules that
25 are adjacent to each other transversely to the conveying direction.

7. A conveyor according to any one of the preceding claims, wherein at least a number of the interspaces are situated between hinge loops of modules successive in conveying direction which cooperate via a hinge pin.
8. A method for driving a modular conveyor mat which is built up from
5 modules coupled by hinge pins, wherein the conveyor mat is driven on the hinge pins.
9. A method according to claim 8, wherein the conveyor mat is driven using a sprocket wheel which engages the hinge pins at the location of interspaces present transversely to the conveying direction of the conveyor mat between
10 hinge loops or parts of hinge loops.
10. A module for a conveyor mat, comprising a body part which is provided, on front and rear sides extending transversely to a conveying direction, with mutually staggered rows of hinge loops spaced apart with mutual interspaces transversely to the conveying direction and having hinge holes extending
15 transversely to the conveying direction, such that front and rear sides of successive modules can be coupled using a hinge pin extending transversely to the conveying direction, with the hinge loops interlocking, which hinge loops extend between, on the one hand, outer faces situated at the front or rear side of the module and, on the other, inner faces situated nearer to the middle of
20 the module, wherein the outer faces are situated nearer to the hinge holes than the inner faces, and wherein the outer faces are provided with outer driving faces for cooperation with teeth of a drive wheel of a first type, and wherein the inner faces are provided with inner driving faces for cooperation with the teeth of a drive wheel of another type.
- 25 11. A module according to claim 10, wherein the inner or outer driving faces have a substantially curved configuration.
12. A module according to claim 11, wherein the driving faces are curved with substantially constant radius of curvature relative to an axis of curvature extending substantially transversely to the conveying direction.

13. A module according to claim 11 or 12, wherein the curvature of the outer driving faces is stronger than the curvature of the inner driving faces.
14. A module according to claim 12, wherein the radius of curvature of the outer driving faces is smaller than the radius of curvature of the inner driving
5 faces.
15. A module according to any one of claims 10-14, wherein the body part is substantially sheet-shaped.
16. A module according to claim 15, wherein the hinge loops extend substantially outward and downward relative to a conveying surface of the
10 body part.
17. A module according to any one of claims 10-16, wherein the module is provided with a conveying surface which is substantially closed.
18. A module according to any one of claims 10-17, wherein the conveying surface of the module links up in a substantially plane manner with closing
15 faces formed by back parts of the hinge loops.
19. A module according to any one of claims 10-18, wherein between the inner driving faces at the bottom side of the module a free space is present.
20. A module according to any one of claims 10-19, wherein the body part is provided, at the location of an interspace between the hinge loops, with a
20 reduced portion tapering towards a conveying surface of the module.
21. A module according to any one of claims 10-20, wherein the bottom side of the body part, transversely to the conveying direction, has a substantially belly-shaped configuration.
22. A module according to any one of claims 10-21, wherein at least a part of
25 the hinge loops is provided with a groove extending in conveying direction, which reaches into the hinge hole.
23. A module according to claim 22, wherein the groove extends from the bottom side of the hinge loop in the direction of the conveying surface to a point at a distance from a conveying surface of the module.

24. A module according to any one of claims 10-23, wherein interspaces are provided present transversely to the conveying direction between the hinge loops or parts thereof, which interspaces during use render the hinge pin accessible for cooperation with the teeth of a sprocket wheel.

5 25. A modular conveyor mat, comprising a number of modules successive in conveying direction, each provided with a body part extending transversely to a conveying direction, having hinge loops reaching forward and backward in conveying direction, the hinge loops of successive modules cooperating and being coupled using hinge pins, while at least two successive modules are
10 designed according to any one of claims 10-24.

26. A modular conveyor mat according to claim 25, wherein the conveyor mat can be driven, as desired, with a first type of drive wheel, of which the width of the teeth corresponds to the width of an outer driving face, or with another type of drive wheel, of which the width of the teeth corresponds to the
15 width of a plurality of inner driving faces.

27. A modular conveyor mat according to claim 25 or 26, wherein interspaces are provided present transversely to the conveying direction of the conveyor mat between hinge loops or parts of hinge loops, which interspaces render the hinge pin accessible for cooperation with the teeth of a sprocket
20 wheel.

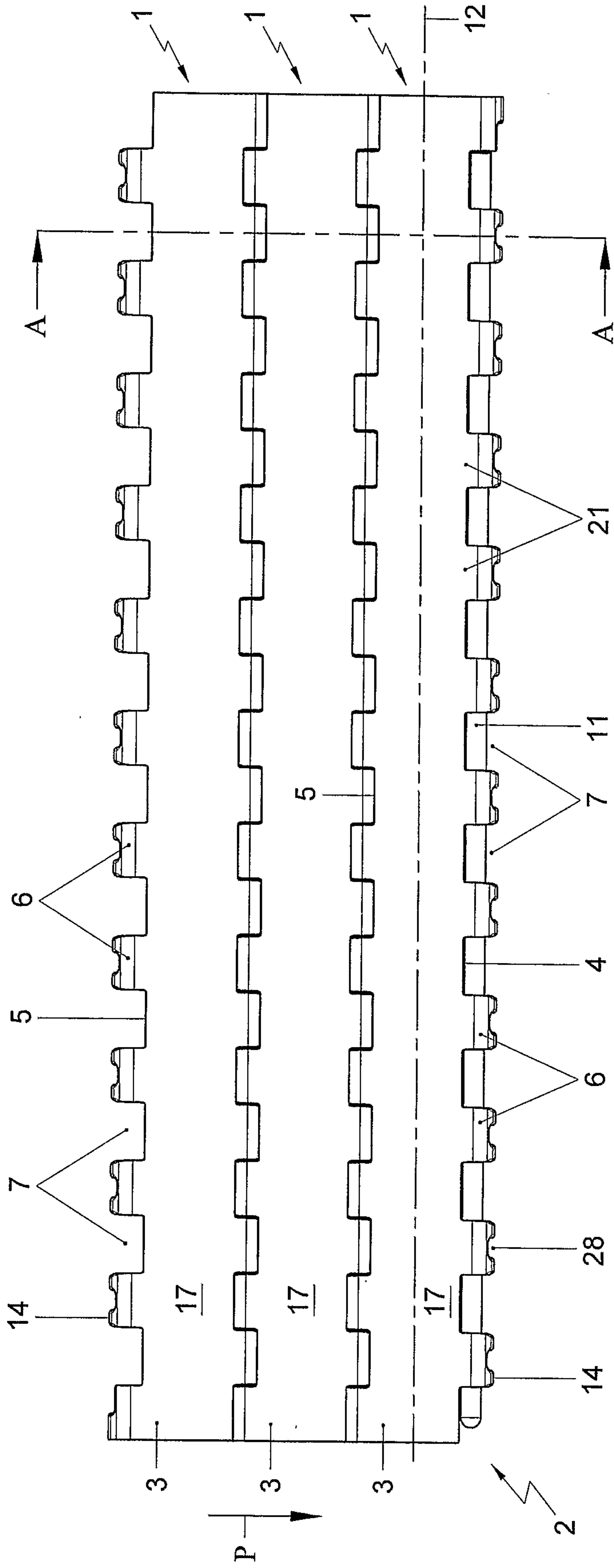


Fig. 1

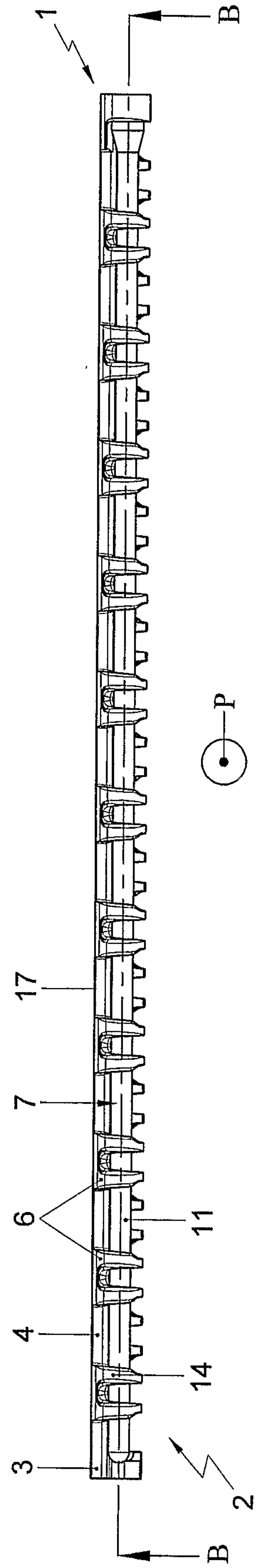


Fig. 2

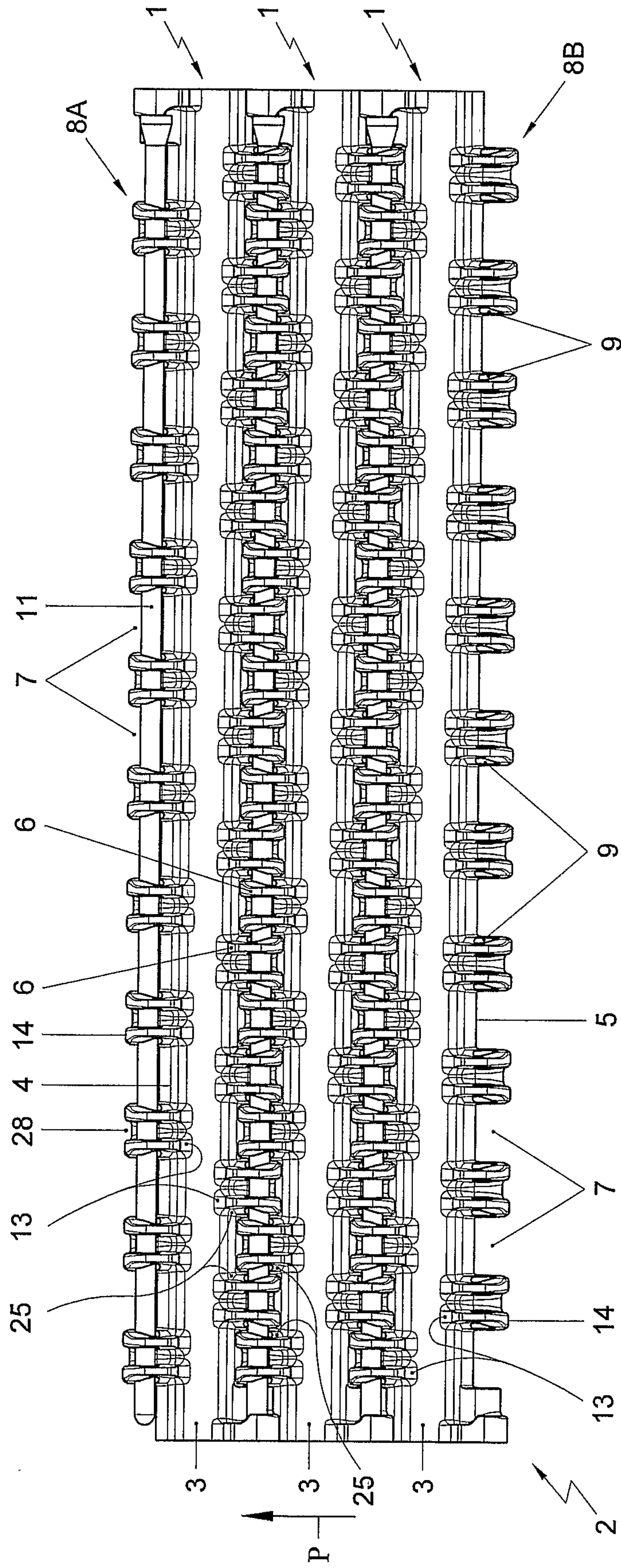


Fig. 3

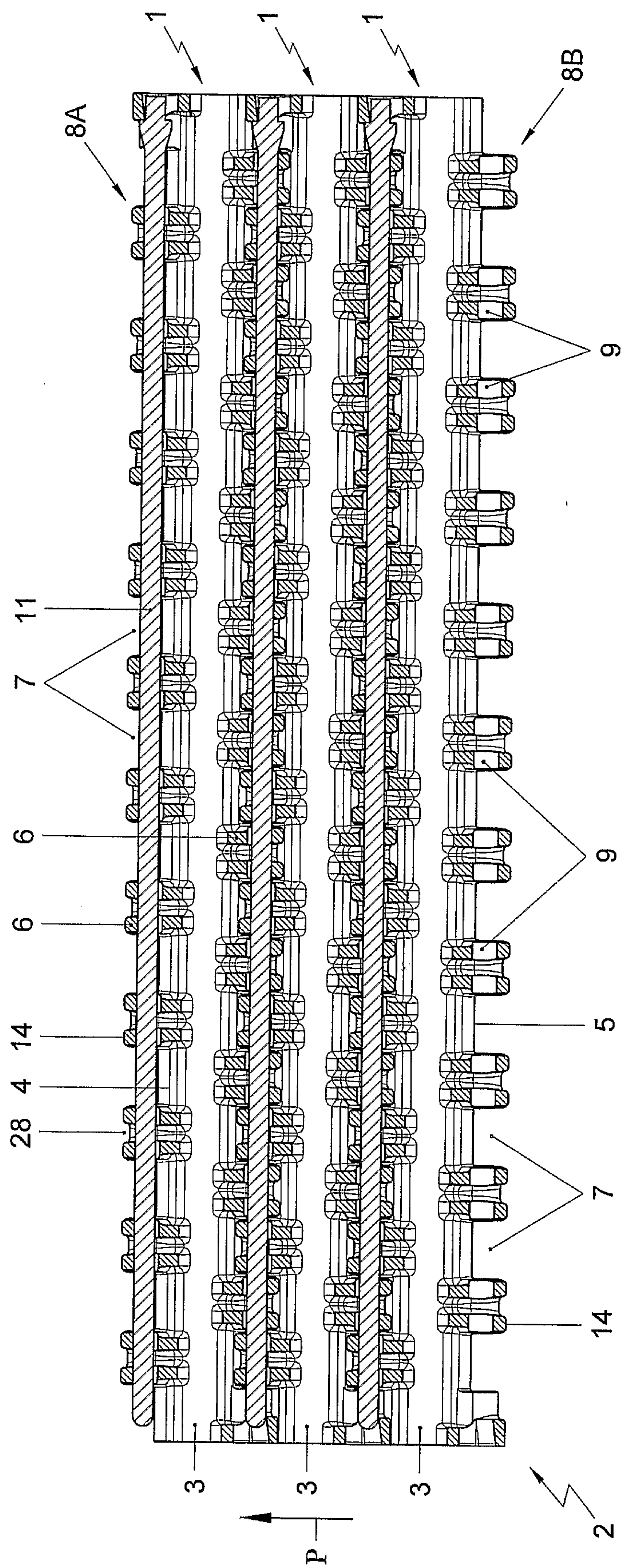


Fig. 4

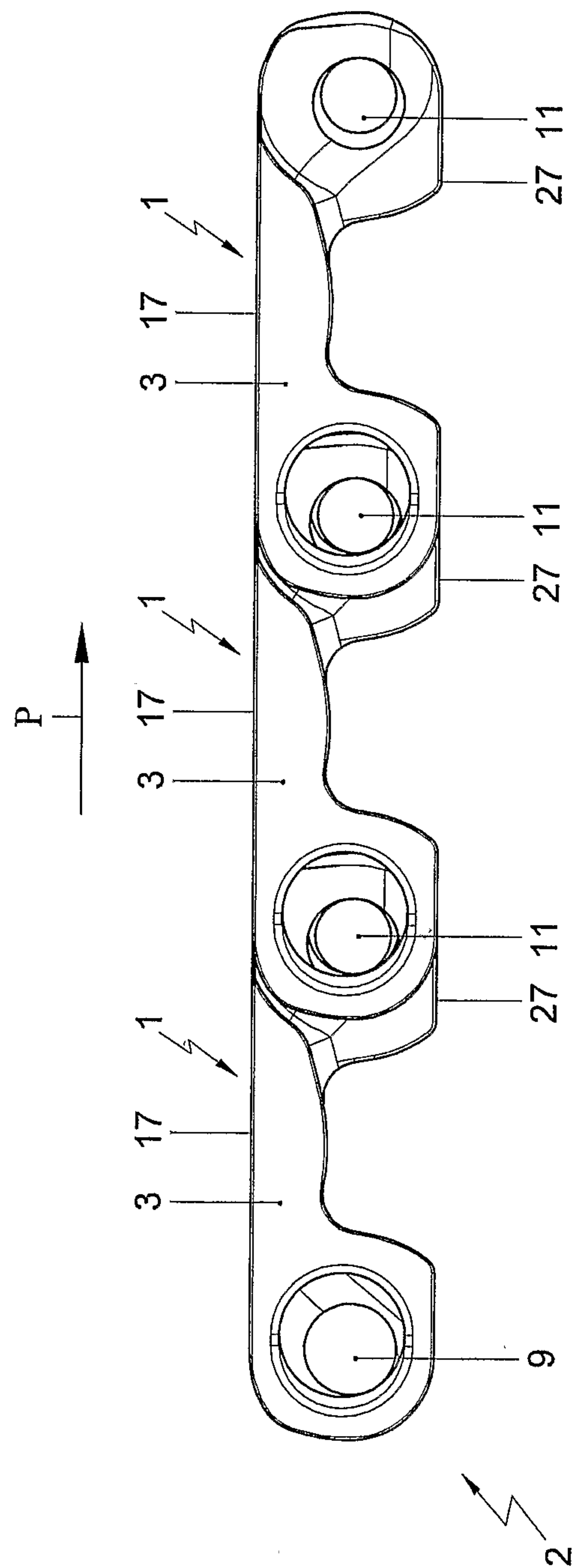


Fig. 5

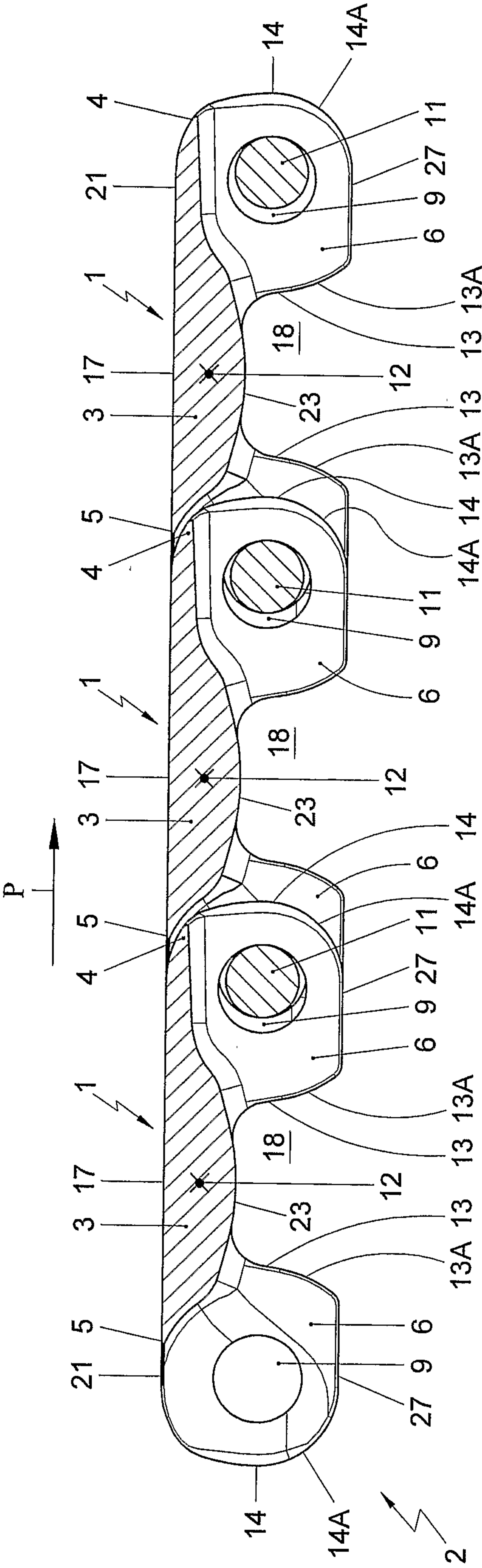


Fig. 6

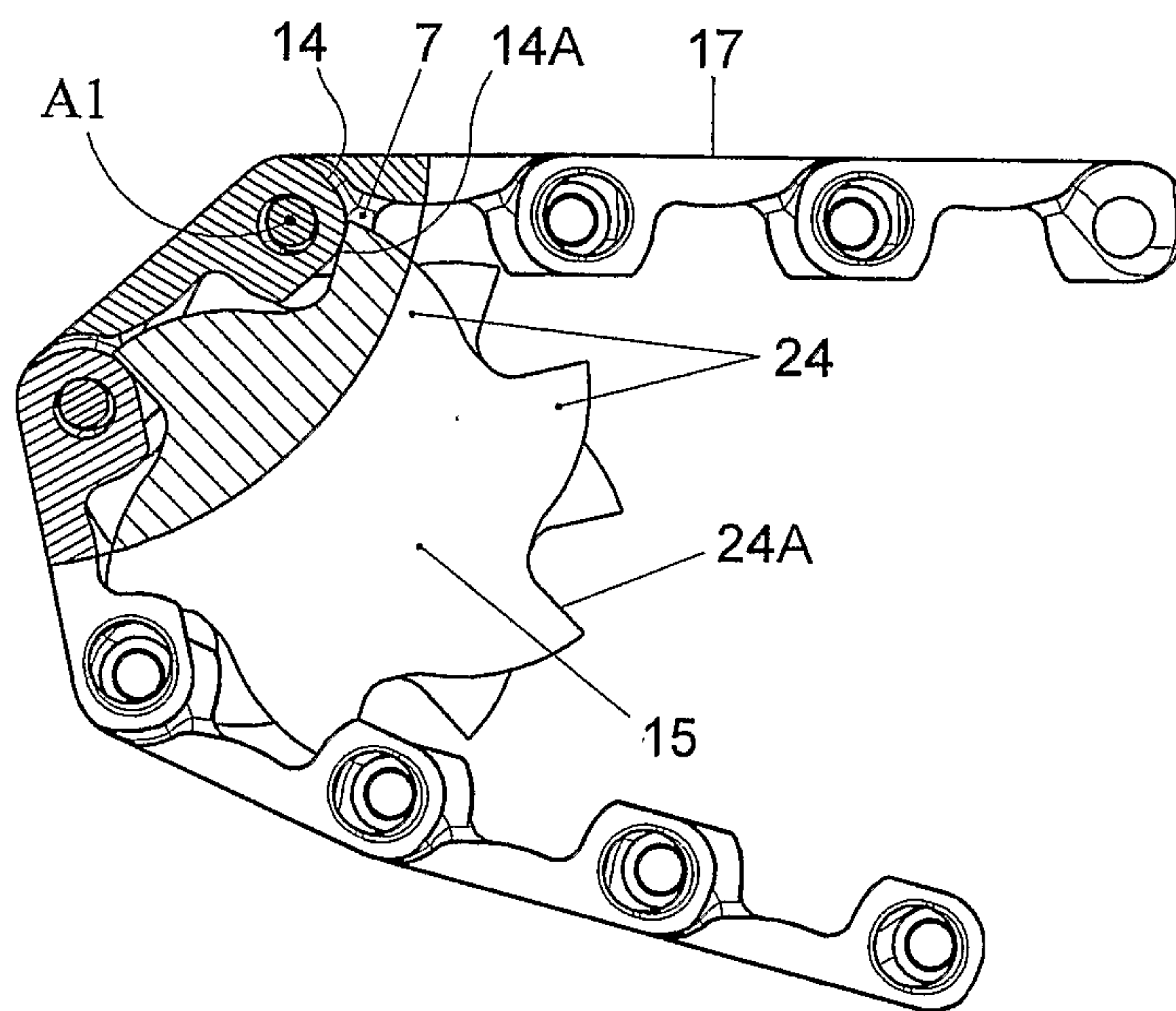


Fig. 7

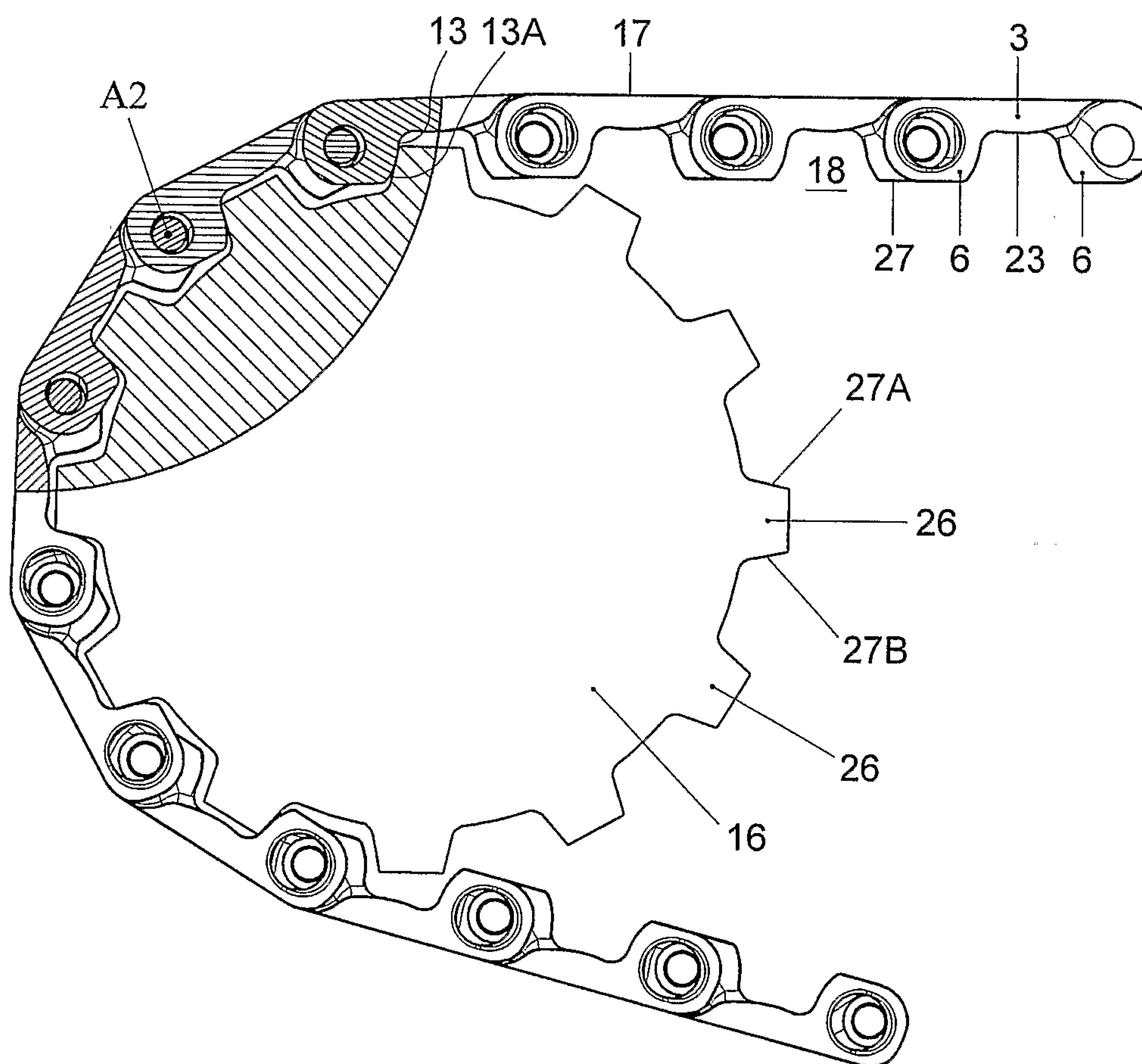


Fig. 8

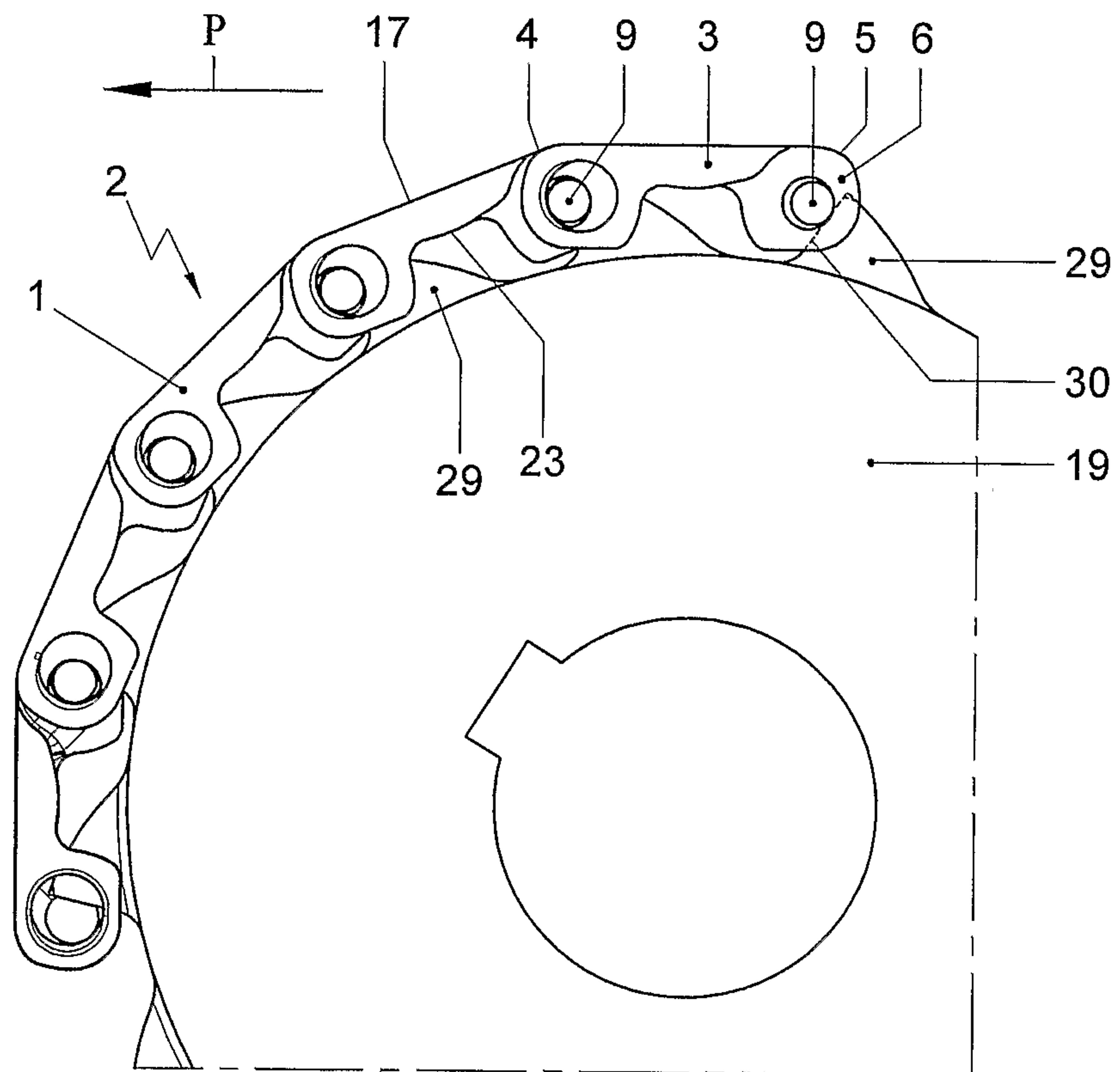


Fig. 9

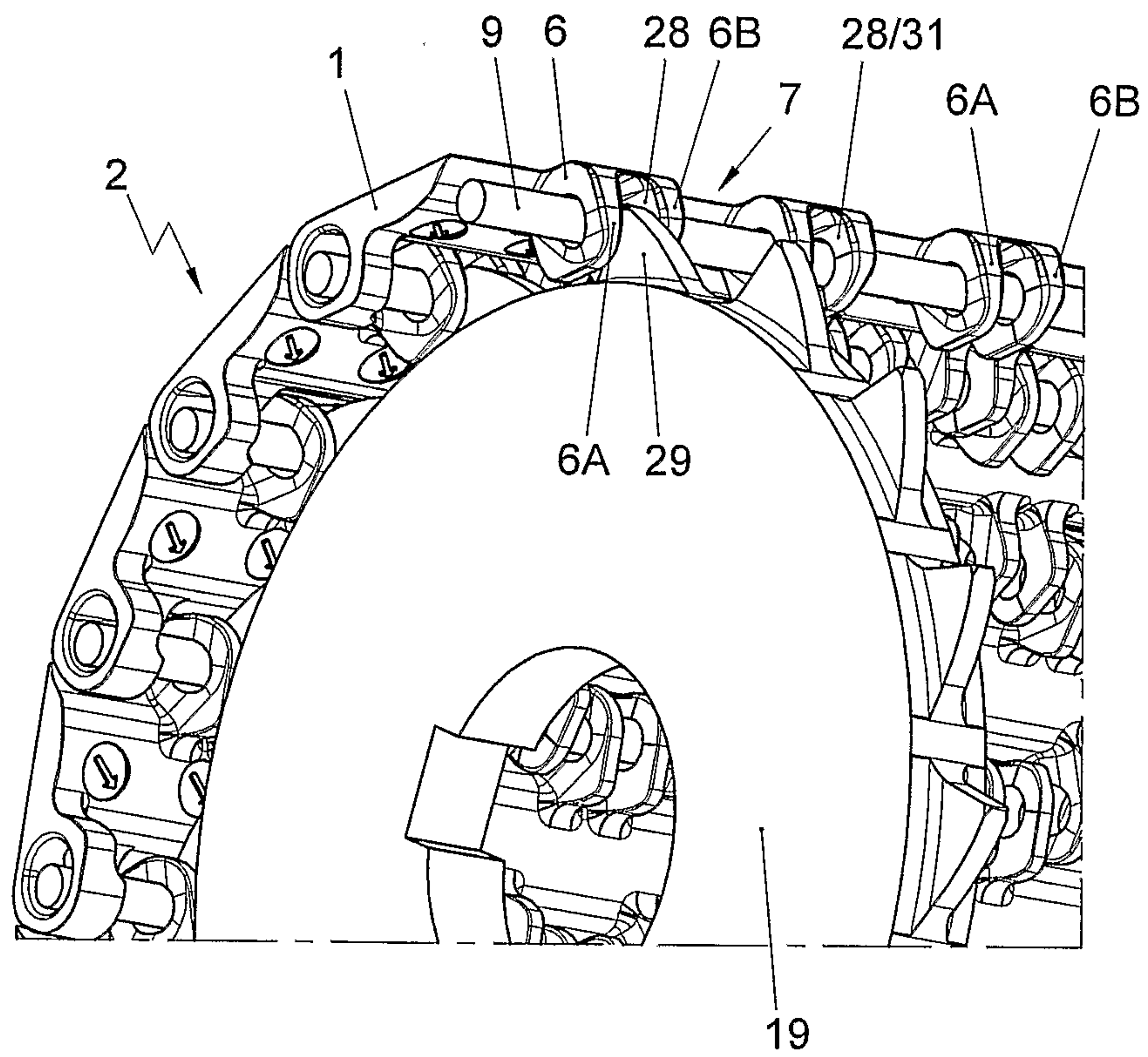


Fig. 10

