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(72) Feltaláló(k):
LAUMANN, Bernhard, 48477 Hörstel-Riesenbeck (DE)
RESCH, Rainer, 49170 Hagen a. TW (DE)

(73) Jogosult(ak):
Amazonen-Werke H. Dreyer GmbH & Co. KG, 49205 Hasbergen (DE)

(74) Képviselő:
Danubia Szabadalmi és Jogi Iroda Kft., Budapest

(54) **Forgóeke**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

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REVERSIBLE PLOUGH

Description

The invention relates to a reversible plough according to the preamble of Claims 1 and 4.

Reversible ploughs with ploughshare rows arranged on opposite sides of a plough frame have ploughshare rows which have right-turning plough bodies on one side, and left-turning plough bodies on the other side, and these are each used in alternation during forward and backward movement. The plough is to be transferred into the respective working position each time by a drive device, by way of example in the form of a rotary cylinder. Furthermore in order to adjust the working width the reversible plough can be fitted with a separate device in order to be able to adapt the plough working width in the respective working position.

EP 2 014 145 A1 discloses a reversible plough having ploughshare rows arranged on opposite sides of a plough frame. The ploughshare rows have right-turning plough bodies on one side and left-turning plough bodies on the other side, and these are each used in alternation during forward and backward movement. The plough frame is configured as a cuboidal tube. The headstock is clamped to one side of the plough frame by means of a screw connection having screws. The forces acting on the headstock have to be absorbed only by the screws of the screw connections. As a result, strong shear forces act on the screws. Here, it is then sometimes disadvantageously possible for the screws of the screw connections to shear off. The screws then have to be replaced in order that the headstock is fastened to the ploughshare frame again in the intended manner.

The object of the present invention is to further develop a reversible plough of the type already mentioned at the beginning, in such a way that improved fastening of the headstock to the plough frame with relief of the screw connection is achieved.

This object is achieved by the characterizing features of Claim 1 or Claim 4.

The reversible plough is firstly characterized in that the headstock is attached via a holding part only to one sidewall or only to two sidewalls of the plough frame with respect to the working position thereof. Here, the holding part of the headstock is screwed to the one sidewall or to two sidewalls of the plough frame. The latter can be carried out so that at least one screw or similar fastening means passes through the plough frame so that the holding part of the headstock is attached to both sidewalls of the plough frame without the holding part bearing against the wall parts there in the regions above or below the plough frame.

As a result of the holding part of the headstock having at least one extension element which engages in a form-fitting manner into a complementarily formed recess of the plough frame, the basic prerequisite of relief of the screw connection is achieved. Alternatively an extension element of this kind can also be provided on the plough frame which engages in a correspondingly complementarily formed recess of the holding part of the headstock. It is likewise possible to provide two or more extension elements on the holding part of the headstock or conversely on the plough frame which engage in corresponding recesses. The holding part of the headstock is first to be centred on the plough frame through this

extension element, and can then be securely connected to the plough frame by way of further fastening elements, by way of example by further screws. Through the form-fitting engagement of a corresponding extension element in the recess which is configured complementarily therewith, a secure arrangement of the holding part of the headstock on the plough frame is produced which relieves the screw connection, and which also serves as an abutment and thus reliably absorbs the shock loads.

A corresponding configuration and fastening is likewise possible with the plough body holder. This, too, can be attached only to one sidewall or to two sidewalls of the plough frame with respect to the working position thereof on the plough frame, i.e. to the two sidewalls in the case of a conventional square plough frame. Thus, the plough frame is also free of fasteners and fastening extensions of plough body holders in its regions above its upper wall and below its lower wall in its working position, thereby reducing an associated risk of clogging and/or soiling. The plough body holder can be formed in a similar manner to the holder part of the headstock, i.e. with one or more extension elements, as described above and as specified in the claims. The extension element can be formed for example such that it has a movable part with for example an end-side cone which engages in the recess in the holder part on plough frames and/or the plough body holder. Thus, it should be provided in a variable position at the recess. To this end, for example, a type of bolt can be provided having a nut, which engages with a corresponding thread of a bush part.

A device for adjusting the plough working width can also be attached in a particularly advantageous manner to the plough body holder, particularly if the latter is provided at the side on the plough frame, namely such that the plough body is pivotable about a substantially vertical axis on the plough frame and adjustable by a lever passing through a recess of the plough frame. The lever passing through the recess of the plough frame can in turn be connected movably to at least one part of the plough body holder. For this the plough body holder can be formed in two or more parts, by way of example with a plough body holding part which – as already mentioned – is fastened at the side on the plough frame with screws and an extension which engages in form-fitting manner in a recess. Consoles for example can be fastened on this plough body holding part wherein a perpendicular axis is defined between the consoles so that the consoles on which a plough body is to be fastened can be moved relative to the plough body holding part which is fastened on the plough frame. The plough frame holding part which is connected at the side to the plough frame can in turn have a recess, by way of example a slot-like recess, which aligns with the recess in the plough frame, so that the lever for adjusting the working width can pass through not only the plough frame but also the plough frame holding part.

Through the movable connection of the lever to the plough body holder, more particularly through the pivotally movable connection and the pivotal action about a substantially horizontal axis, shocks can furthermore be actively absorbed in order to further reduce the wear sensitivity of the plough. Further advantages and developments of the invention are apparent from further dependent claims, the following description and the drawings in which:

Figure 1 shows a diagrammatic side view of an exemplary embodiment of a reversible plough according to the invention;

Figure 2 shows in a perspective sectional view a partial region of the plough frame with the plough share indicated;

Figure 3 shows a view, similar to Figure 2, of another perspective more viewed from above;

Figure 4 shows a partial section of a perspective view of the plough frame with plough body holder (without plough share);

Figure 5 shows a perspective view inclined from above of the exemplary embodiment according to Figure 4 with the plough share indicated;

Figure 6 shows a view analogous with Figure 5;

Figure 7 shows a view of a partial region of the plough frame in a view inclined from above;

Figure 8 shows a side view of the plough body holder from the side facing away from the plough share;

Figure 9 shows a partial section of a perspective view of an exemplary embodiment of a reversible plough in the region of the connection of the plough frame on the headstock for connection with an agricultural tractor;

Figure 10 shows on an enlarged scale the region of the holder part of the headstock attached at the side on the plough frame;

Figure 11 shows a view similar to Figure 10 of the appendage part of the exemplary embodiment according to Figures 9 and 10 prior to assembly;

Figure 12 shows a view analogous with Figure 11, seen from the opposite side, prior to assembly on the plough frame, and

Figure 13 shows an exemplary embodiment of an adjustably formed extension element of the mount part or plough body holding part which is to be inserted into a corresponding recess inside the plough frame.

In the drawings, the parts which fundamentally agree with one another are provided with matching reference numerals.

Figure 1 shows an exemplary embodiment of a reversible plough, marked generally by 1, which can be hung by way of an headstock (not shown in detail) on an agricultural tractor (likewise not shown in further detail), and which has a plough frame 2 which is to be supported on the soil by way of a support wheel 3. The plough frame 2 supports opposing ploughshare rows, marked generally by 4, with plough bodies 6 which are arranged on the plough arms 5 and which are arranged opposite one another on the plough frame 2. Only one plough body 6 is indicated in the exemplary embodiment according to Figure 1.

In the illustration according to Figure 1 the lower plough bodies 6 of a ploughshare row 4 are in the working position. The plough frame 2 can be rotated through a movement around 180° so that the opposite ploughshare row 4 with the plough bodies 6 mounted thereon moves into the working position. The parts required for this, such as the rotary shaft, cylinder units, are not shown for reasons of clarity.

The plough bodies 6 and thus the ploughshare rows 4 are fastened on the plough frame 2 by way of the plough arms 5 on a plough body holder marked in general by 7. As shown in detail using the further figures, the plough body holder 7 is formed in several parts in the exemplary embodiment illustrated,

namely configured so that it leaves free the upper region of the plough frame 2 in exactly the same way as the lower region of the plough frame 2 and only adjoins the lateral regions of the plough frame 2, facing the viewer in Figure 1. Thus considerable advantages are gained in everyday operation since more particularly the upper side of the plough frame is configured free of attachments with considerable advantages in rough everyday use.

As will be explained in further detail below the plough arms 5 are pivotable with the plough bodies 6 about a perpendicular axis and are also to be adjusted as regards their working width. This will be explained in further detail using the further illustrations.

As shown in Figures 2 and 3, the plough bodies 6 and thus the ploughshare rows 4 and 5 are fastened on the plough frame 2 by way of the plough body holder 7. Figure 3 shows that an adjusting rod 8 is provided at the side next to the plough frame 2 in order to set by means of adjusting cylinders (not shown) the working width of the plough 1 via an adjustment and thus a pivotal movement of the ploughshare rows 4 with the plough bodies 6 arranged thereon. The ploughshare rows and the corresponding mounts 7 of the plough bodies 6 are screwed to the plough body holder 7 by way of a fastening plate. The corresponding parts are apparent in further detail from Figures 4, 5 and 6. The plough body holder 7 consists, in the illustrated exemplary embodiment, of several parts, namely at first the plough body holding part 9 and two consoles 10.1 and 10.2 which are arranged at a distance from one another wherein 10.1 marks the upper console and 10.2 the lower console. These are angled in opposite directions in order to connect the fastening plate of the plough arms 5 of the ploughshares 6 there by way of screws which are to be inserted into corresponding screw holes. The consoles 10.1 and 10.2 are connected to one another by way of a screw 11 and a bolt sleeve fastening 12. The bolt sleeve fastening 12 furthermore defines a perpendicular axis via which the consoles are to be pivoted within a predetermined pivotal path with adapted ploughshares 4 and 5 relative to the plough frame 2 for adjusting the working width.

A lever 13 is provided for this which passes through a recess 14 (Figure 7). Furthermore a recess 15 is likewise provided in the plough body holding part 9 and the lever 13 likewise passes through this recess 15. As is apparent from Figure 5, the lever 13 is connected for articulated movement to the adjusting rod 8. The plough body holding part 9 has a substantially U-shaped cross section and is connected to the plough frame part 2, namely by way of screws 16. Furthermore the plough body holding part 9 also has projections 17 and 18 which engage in a corresponding recess inside the plough frame 2 and/or the recess 14 on the plough frame 2 in order to provide an abutment so that the plough body holding part 9 is secured on the plough frame 2 not only by way of the screws 16. Alternatively, corresponding projections can also be provided on the plough frame 2 in order to engage in corresponding recesses on the plough body holding part 9.

In a particularly advantageous manner the lever 13 is connected movably to the bolt sleeve unit 2 and thus to the part of the plough body holder 7 which is able to pivot relative to the plough frame 2, which are formed by the consoles 10.1 and 10.2. For this the lever 13 is connected at its end facing away from the articulation point 19 on the adjustment lever 8 to the substantially horizontally aligned axis 21. This articulation bolt is arranged in an articulation sleeve which is connected to the bolt/sleeve part 12

by way of a flange 22 so that the adjustment of the consoles 10.1 and 10.2 together with the articulation bolt/sleeve unit 20 is to be completed via the lever 13 with which the ploughshare rows 4 and thus the plough arms 5 with the plough bodies 6 are to be adjusted.

The lever 13 is movable by way of the axis 21 relative to the plough body holder 7 about the substantially horizontally aligned axis 23 and thus also relative to the plough arms 5 supporting the plough bodies 6. Similarly the lever 13 is guided inside the recess 14 and/or recess 15 in the plough body retaining part 9, namely with regard to the stops which are located left and right, in relation to the illustration according to Figure 4, next to the illustrated lever 13, and also upwards and downwards so that the respective recess 14 on the plough frame 2 and the recess 15 in the plough body holding part 9 has a vertical extension such that the lever 13 can be pivoted and moved up and down relative to the plough body holder 7, but after a specific swivel path up and down encounters stops through the respective boundary walls of the recesses 14 and 15, whereby the movement up and down is restricted. Thus tensions in the movable connection between the lever 13 and the plough body holder 7 or parts thereof are effectively prevented which leads to a reduction in repairs during operation of the reversible plough.

The aforementioned details regarding configuration are shown in further detail in the further illustrations according to Figures 6, 7 and 8.

In addition to the parts of the plough body holder 7 and the plough arms 5 of the ploughshare rows 4 already illustrated in the figures, Figures 9 to 12 show an headstock of the plough 1 which is numbered in general by 23 and which serves to connect the plough 1 and thus the plough frame 2 to the agricultural vehicle, by way of example an agricultural tractor, and which is to be connected there for example to a power take-off shaft for the corresponding rotating and other adjusting movements of the plough 1.

For clarity the more detailed configuration of the attachment 23 at this point has been omitted. This should however have technical details which are known in the prior art and consequently has numerous prototypes.

It is important within the scope of the present invention that this headstock 23 has a holder part 24 which in turn is also flanged onto a sidewall of the plough frame 2 so that the upper and lower side of the plough frame 2 which is designed as a square frame is formed free of appendages of connecting parts of the plough frame 2. Since the plough mount 7 is already likewise connected to a sidewall of the plough frame 2, the plough frame 2 thus as a whole on its upper and its lower side is free of any functional part attachments so that any possible soiling and risk of blockages caused thereby and occurring in the prior art are avoided.

The holder part 24 is in turn provided with one or more projections or extension elements 25 and 26 (Figure 12) which can engage in corresponding recesses 27 and 28 (Figure 11). Furthermore the retaining part 24 after corresponding insertion of the projections 25 and 26 into the receeses 27 and 28 on the plough frame 28 is braced with the plough frame 2 by way of screw connections or the like. The corresponding fastening connections, thus as a rule the screw connections, can be effectively relieved by the extension elements 25 and 26.

Figure 13 shows by way of example a particularly configured extension element 29 which can be provided by way of example on the holder part 24 or also on the plough body holding part 27. This is shown by way of example on the plough body holding part 7. The plough body holding part 7 is connected to the plough frame 2. The extension element 29 which is to correspond to the extension element 17 of Figures 6 and 8, has a bush part 29.1 which has an internal thread into which a screw element 30 is screwed by a cone end 30.1, with a fixing cone 31 and a nut 32. The screw element 30 is thus held with variable position in the recess 33 of the plough frame so that the projection 29 or 17 can be adapted individually to the individual production and assembly requirements by changing the position of the projection 30. A pre-assembly and thus also a final securing of the projection 17 or 29 is thus also possible.

FORGÓEKE

SZTNH-100003867

SZABADALMI IGÉNYPONTOK

1. Forgóeke (1) egy, a forgóekét (1) egy mezőgazdasági vontató járműre csatlakoztató csatolóbakon forgathatóan és/vagy billenthetően rögzíthető kerettel (2) és a keret (2) szemközti oldalain elrendezett és eketestekkel (6) ellátott szántóvas sorokkal (4, 5), ahol egy meghajtó berendezés által forgatott keret (2) felváltva az egyik vagy a másik szántóvas sort (4, 5) üzemi állásba vagy üzemen kívüli állásba mozgatja, és ahol az eketestek (6) eketest tartók (7) segítségével vannak a keretre szerelve, ahol a csatolóbak (23) egy tartóelemen (24) keresztül van a keret (2) csak egyik oldalfalán vagy csak két oldalfalán van az üzemi állást illetően rögzítve, és a csatolóbak (23) tartóeleme (24) a keret (2) csak egyik oldalfalára vagy csak két oldalfalára van felcsavarozva, **azzal jellemezve**, hogy a tartóelem (24) és/vagy a keret (2) legalább egy toldat elemet (24, 26) tartalmaz, ami formazáróan illeszkedik a tartóelem (24), illetve a keret (2) komplementer kivágásába, ahol legalább két, távközzel elrendezett toldat elem (25, 26) van a tartóelemen (24) és/vagy a kereten (2) kialakítva, amik a tartóelemen (24) és/vagy a kereten (2) lévő, a toldat elemekhez (25, 26) hozzárendelt kivágásokhoz alakzáróan illeszkednek, és hogy legalább egy toldat elem (25, 26) és a hozzárendelt kivágás a tartóelem (24) számára alátámasztást képez, és az alátámasztás mellett egy, a keretbe beilleszkedő rögzítőelem is rendelkezésre áll.
2. Az 1. igénypont szerinti forgóeke, **azzal jellemezve**, hogy a toldat elem (25, 26) mellett meglévő rögzítőelemet csavarkötés képezi.
3. Az 1. vagy 2. igénypont szerinti forgóeke, **azzal jellemezve**, hogy egy toldat elem (25) tartalmaz egy mozgatható részt (30), ami helyzetváltoztatást lehetővé tevő módon a tartóelemen (24) és/vagy a kereten (2) lévő kivágásokban rögzíthető.
4. Forgóeke (1) egy, a forgóekét (1) egy mezőgazdasági vontató járműre csatlakoztató csatolóbakon forgathatóan és/vagy billenthetően rögzíthető kerettel (2) és a keret (2) szemközti oldalain elrendezett és eketestekkel (6) ellátott szántóvas sorokkal (4, 5), ahol egy meghajtó berendezés által forgatott keret (2) felváltva az egyik vagy a másik szántóvas sort (4, 5) üzemi állásba vagy üzemen kívüli állásba

mozgatja, és ahol az eketestek (6) eketest tartók (7) segítségével vannak a keretre szerelve, ahol egy eketest (6) eketest tartója (7) a keret (2) csak egyik oldalfalán vagy csak két oldalfalán van az üzemi állást illetően rögzítve, és az eketest tartó (7) a keret (2) csak egyik oldalfalára vagy csak két oldalfalára van felcsavarozva, **azzal jellemezve**, hogy a tartóelem (24) és/vagy a keret (2) legalább egy toldat elemet (17) tartalmaz, ami alakzáróan illeszkedik illetve a keret (2) komplementer kivágásába, ahol legalább két, távközzel elrendezett toldat elem (17) van az eketest tartón (7) és/vagy a kereten (2) kialakítva, amik a toldat elemen (17) és/vagy a kereten (2) lévő, a toldat elemekhez (17) hozzárendelt kivágásokhoz alakzáróan illeszkednek, és hogy legalább egy toldat elem (17) és a hozzárendelt kivágás az eketest tartó (7) számára alátámasztást képez, és az alátámasztás mellett egy, a keretbe beilleszkedő rögzítőelem (16) is rendelkezésre áll.

5. A 4. igénypont szerinti forgóeke, **azzal jellemezve**, hogy a toldat elem (17) mellett meglévő rögzítőelemet (16) csavarkötés képezi.
6. Az 1- 5. igénypontok bármelyike szerinti forgóeke egy berendezéssel a szántásszélesség beállítására bármilyen munkahelyzetben, ahol az eketestek (6) a szántásszélesség beállításához a kereten (2) egy függőleges tengely körül billenthetők és egy, a keret (2) egy kivágásán (14) átnyúló emelő (13) segítségével beállíthatók, **azzal jellemezve**, hogy a keret (2) kivágásán (14) átnyúló emelő (13) az eketest tartó (7) legalább egy részével (10.1, 10.2) össze van kötve.
7. A 6. igénypont szerinti forgóeke, **azzal jellemezve**, hogy az emelő (13) egy, az eketestek (6) munkahelyzetében lényegében vízszintes tengely (21) körül billenthetően van összekötve az eketest tartó (7) legalább egy részével (10.1, 10.2).
8. A 6. vagy 7.igénypont szerinti forgóeke, **azzal jellemezve**, hogy a keret (2) kivágásán (14) átnyúló emelő (13) egy olyan tengely (21) körül billenthető, ami párhuzamos vagy közel párhuzamos a keret (2) egy oldalfalával.
9. A 6 - 8. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy az emelő (13) egy, az emelő (13) és az eketest tartó (7) között lévő tengelyt (21) tartalmazó csuklócsapon (20) keresztül van az eketest tartóval (7) összekötve.
10. A 6 - 9. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy a keretnek (2) az emelőt (13) befogadó kivágása (14) egy, az emelőnek (13) egy lényegében vízszintes tengely (21) körül történő mozgását megengedő kiterjesztéssel van ellátva.
11. A 6 - 10. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy a kivágáson (14) átnyúló emelő (13) a billentő tengellyel (21) együtt úgy van az eketest tartóval (7) összekötve, hogy a tengely (21) a szántási szélesség beállításakor az adott munkafázisban az eketest tartó (7) legalább egy része a billenéssel a függőleges tengely körül együttmozog.
12. A 6 - 11. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy az eketest tartó (7) tartalmaz két, egymástól távközzel elrendezett konzolt (10.1, 10.2), amik között egy csuklócsappal ellátott hüvely (12) van, amik a szántási szélesség beállításához a függőleges tengelyt képezik, ahol a hüvellyel (12) egy rögzítőelem (22) van összekötve, amihez az emelő (13) a lényegében vízszintes tengely (21) kapcsolódik.

13. Az 1- 12. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy az eketest tartó (7) egymástól távközzel elrendezett konzoljain (10.1, 10.2) van az eketest (6) megtámasztva.

14. A 13. igénypont szerinti forgóeke, **azzal jellemezve**, hogy az egymástól távközzel elrendezett konzolok (10.1, 10.2) egy olyan eketest tartón (9) vannak rögzítve, ami a kerettel (2) van összekapcsolva.

15. Az 1 - 14. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy az eketest tartó tartalmaz egy rögzítő rátétet (18), ami benyúlik a keret kivágásába (14).

16. A 15. igénypont szerinti forgóeke, **azzal jellemezve**, hogy az eketest tartó (9) az egymástól távközzel elrendezett konzolok (10.1, 10.2) között egy végközeli tartószárat tartalmaz és a konzolokkal (10.1, 10.2) össze van csavarozva.

17. A 6 – 16. igénypontok bármelyike szerinti forgóeke, **azzal jellemezve**, hogy az eketest tartó (7) vagy annak egy része tartalmaz egy a keret (2) kivágásával (14) lényegében megegyező kivágást (15) az emelő (13) befogadására.

18. A vagy 5. igénypont szerinti forgóeke, **azzal jellemezve**, hogy a toldat elem (17) tartalmaz egy mozgatható részt (30), ami változtatható hosszban a kereten (2) és/vagy az eketest tartón (7) lévő kivágásban rögzíthető.

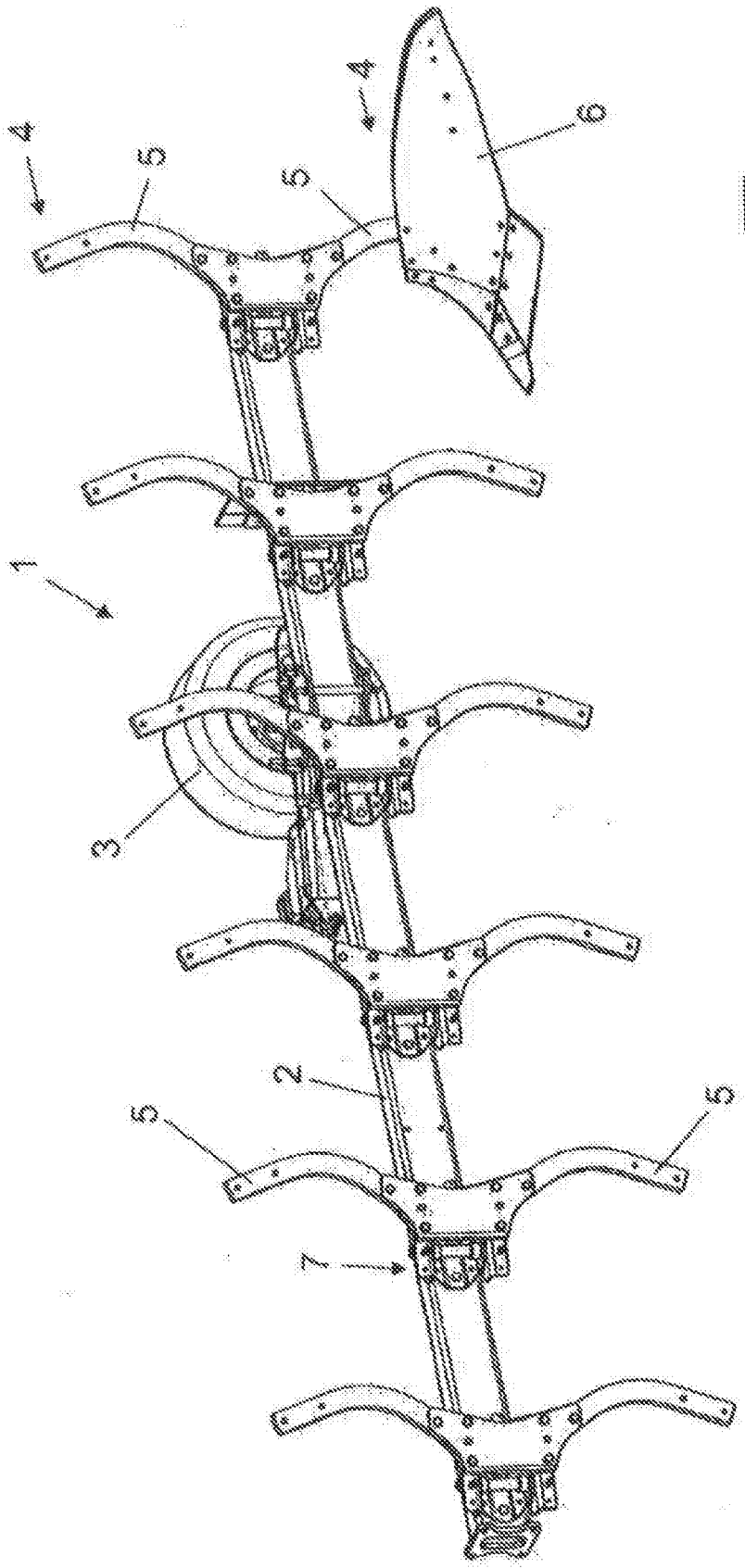

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Fig. 1

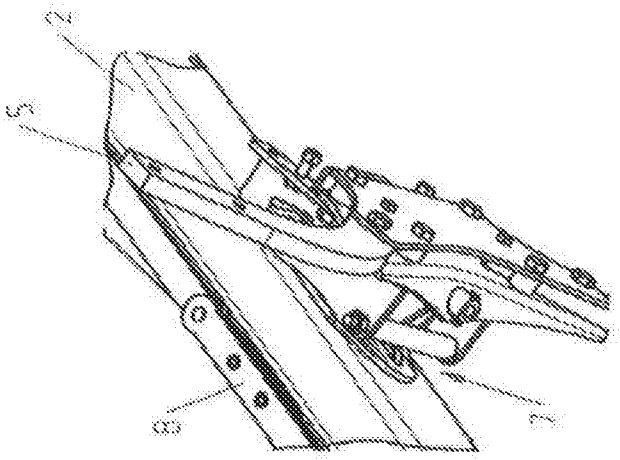

Fig 3

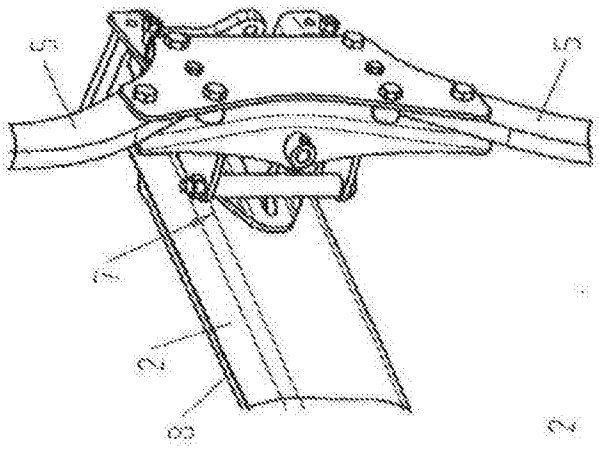

Fig 2

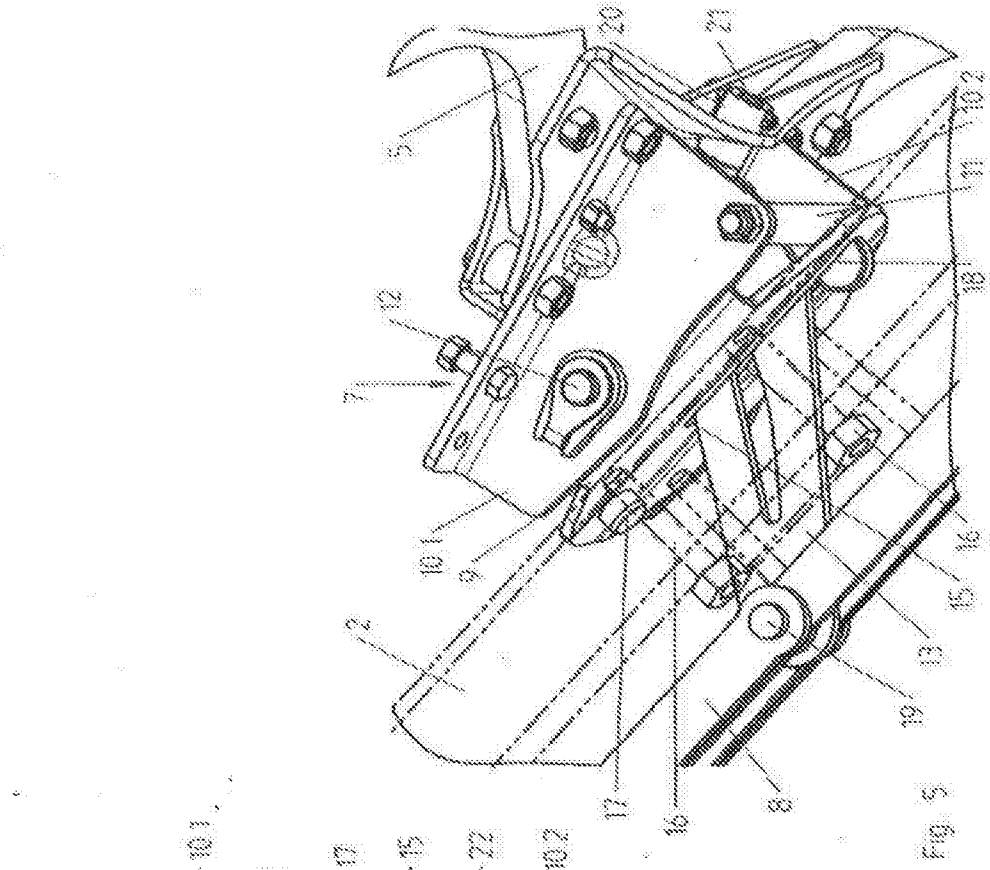
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Fig. 5

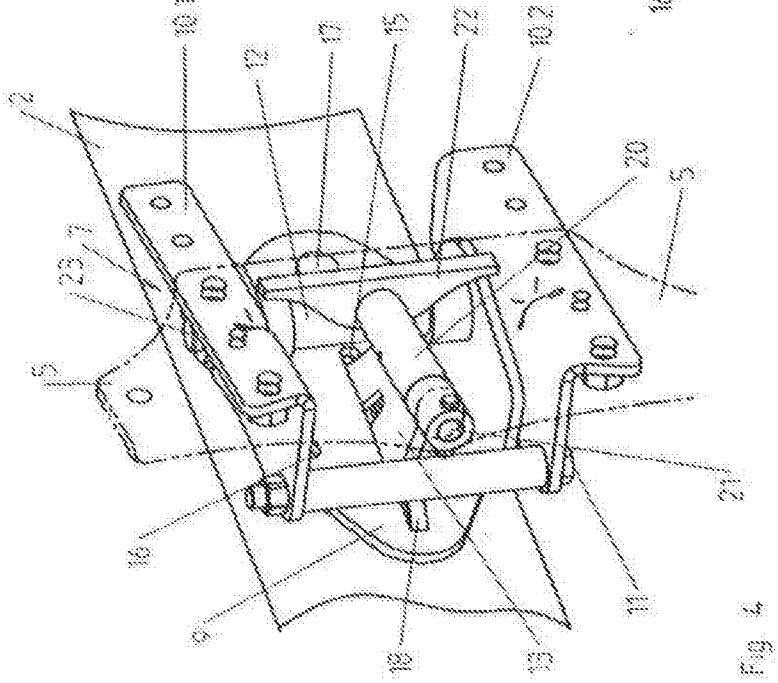
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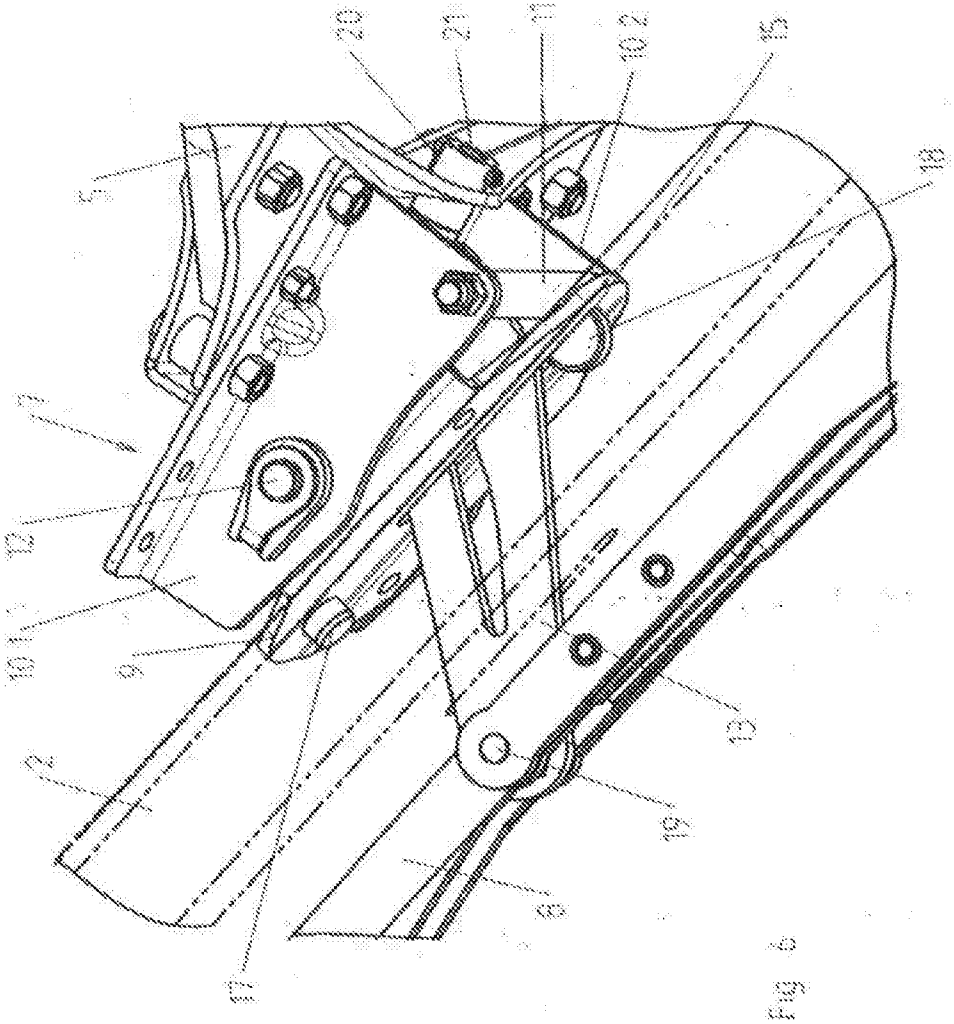
Fig. 4



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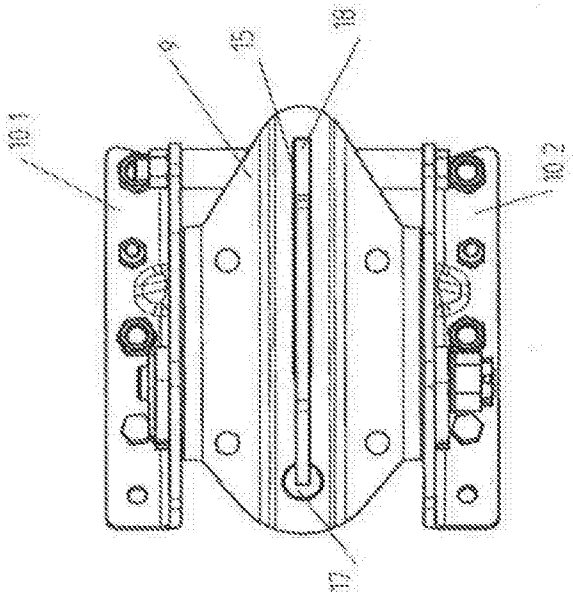

Fig. 8

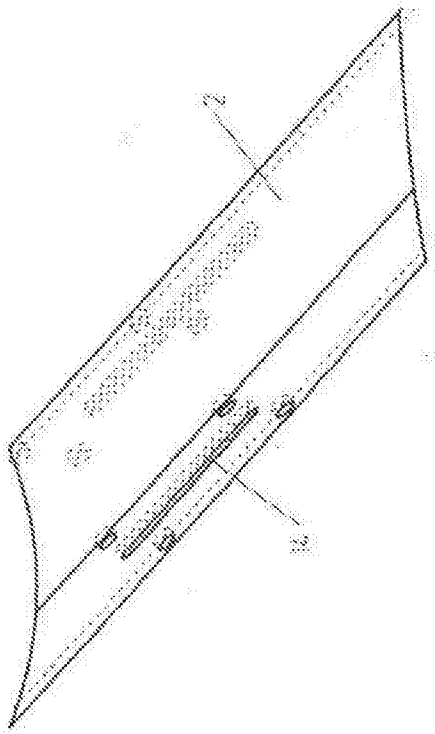

Fig. 7

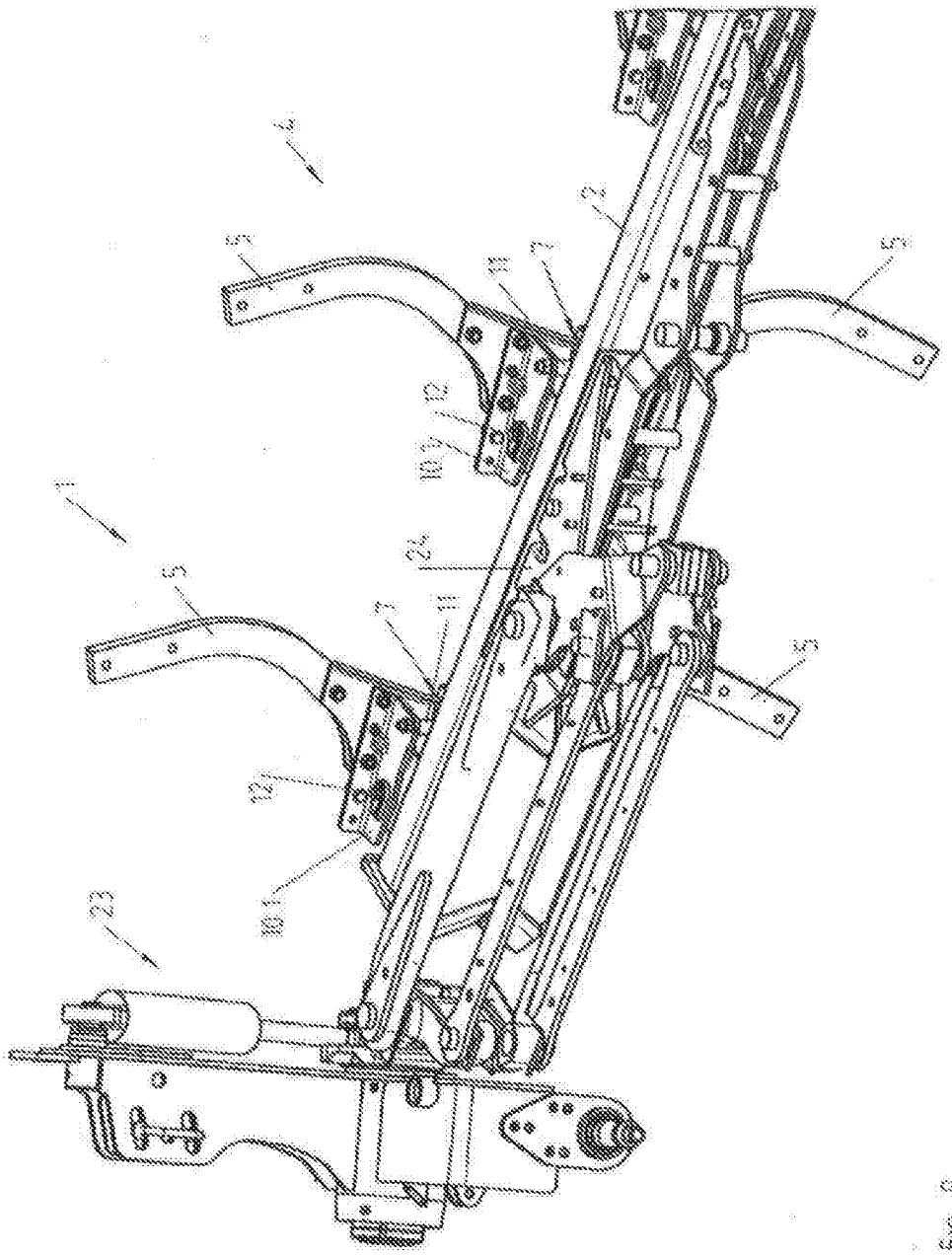

Fig. 6

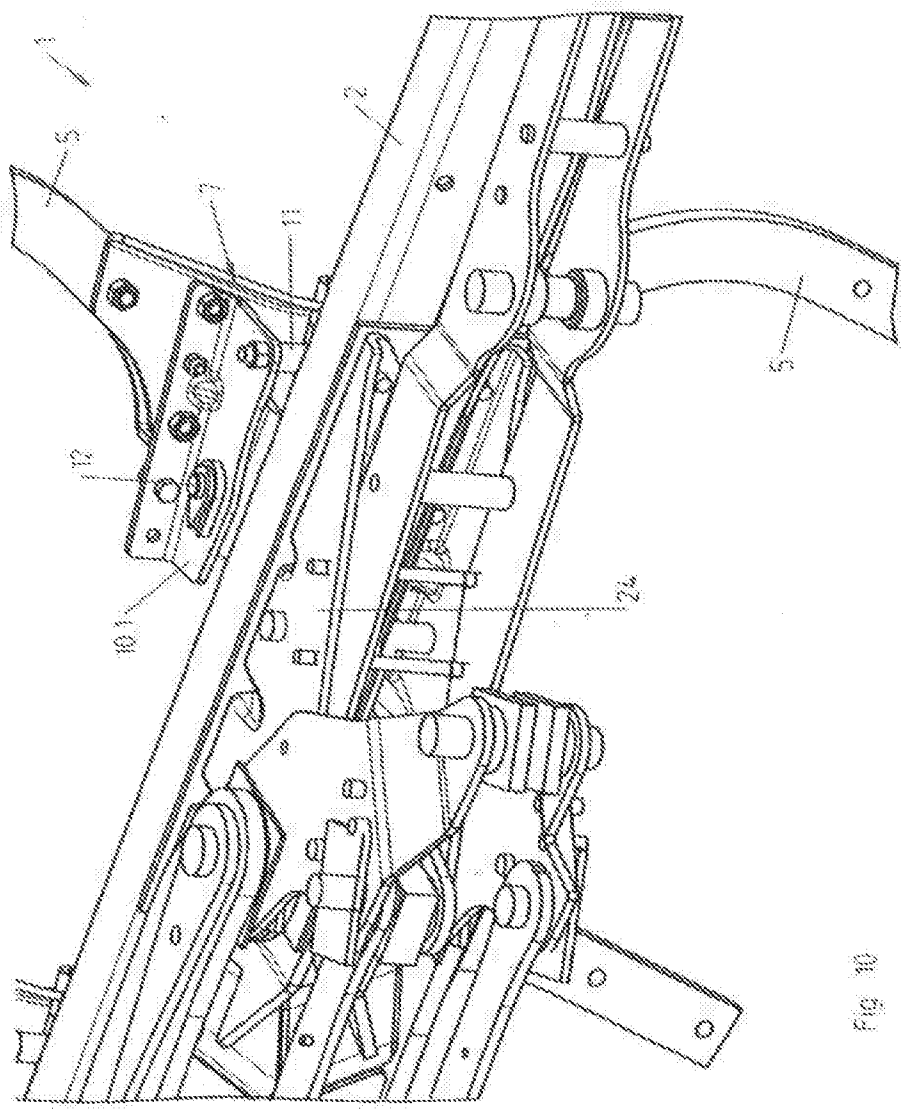

Fig. 10

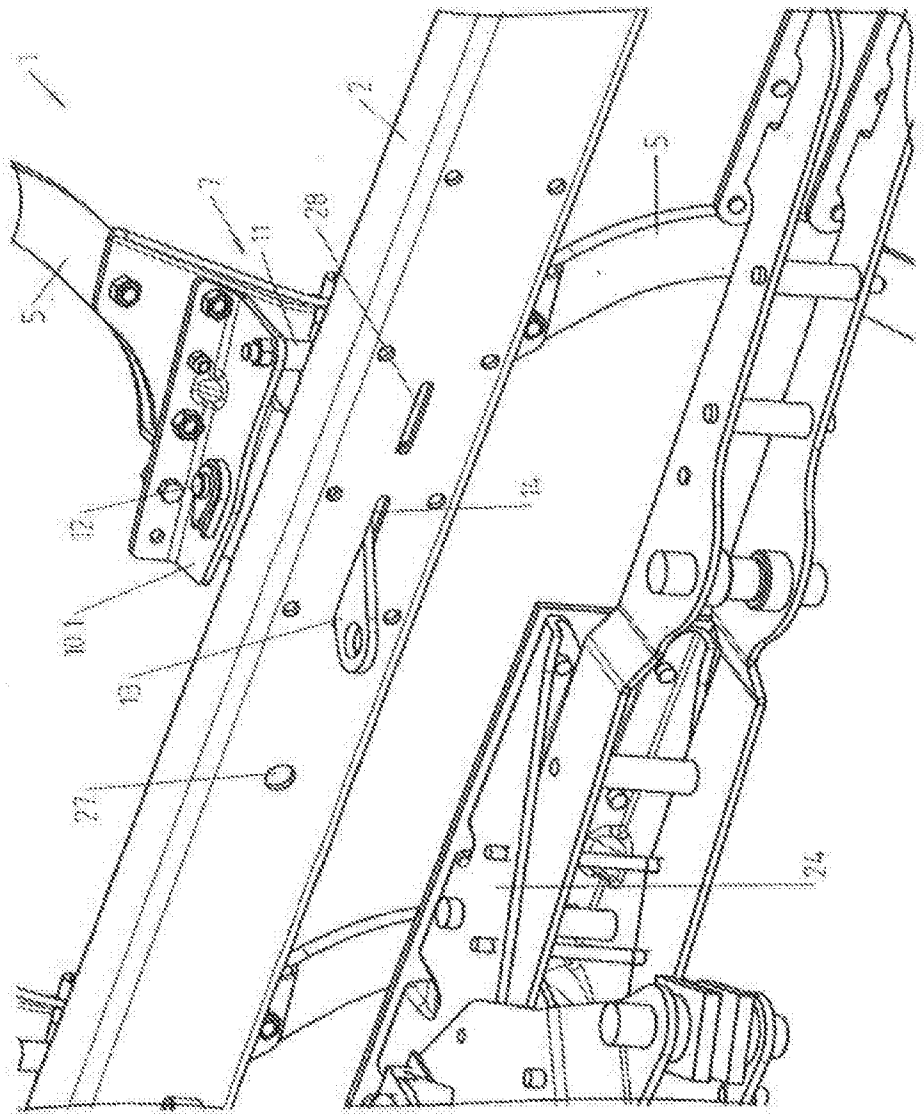

Fig. 11

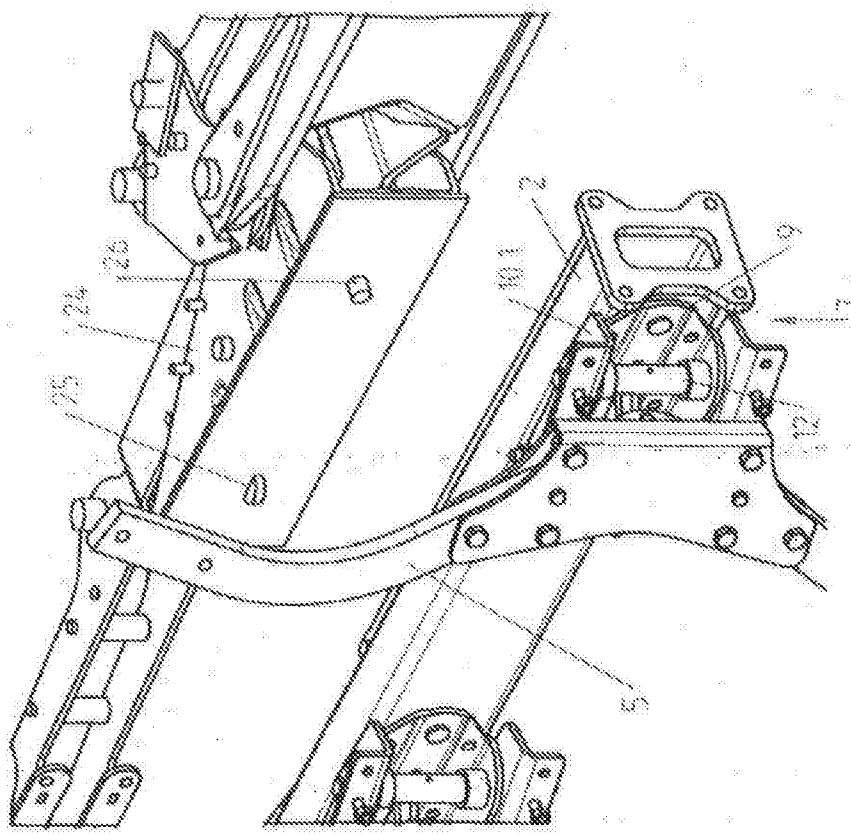

Fig. 2

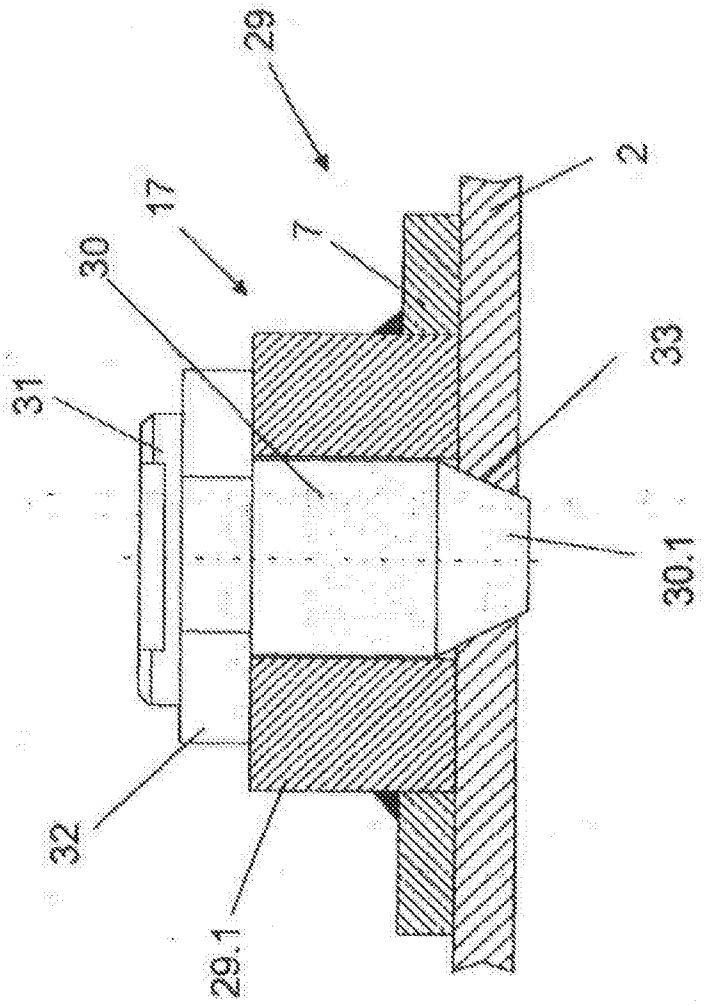

Fig. 13