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(71) Applicant: **Agco GmbH & Co.**
87616 Marktoberdorf (DE)

(72) Inventors:
• **Girstenbrei, Erich**
87640 Biessenhofen (DE)

• **Weident, Horst-Martin**
87616 Marktoberdorf (DE)
• **Reiterer, Peter**
87616 Marktoberdorf (DE)

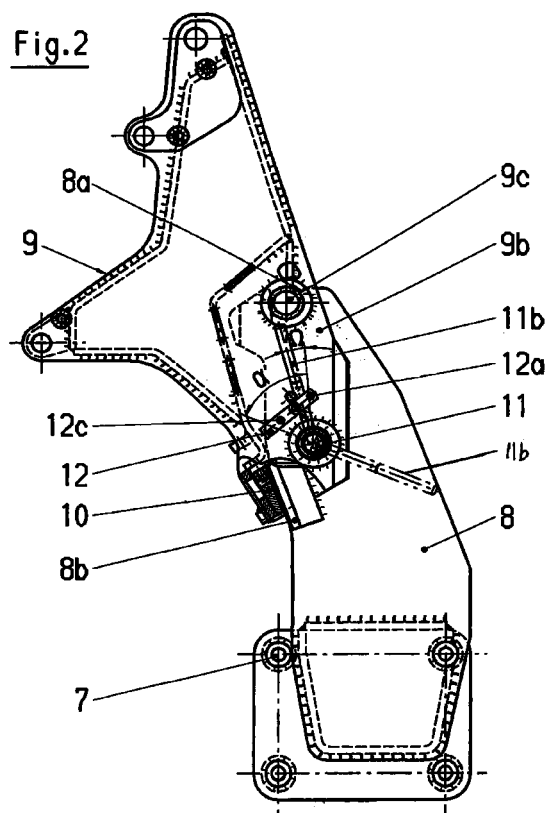
(74) Representative:
Elsworth, Dominic Stephen
AGCO Limited,
PO BOX 62,
Banner Lane
Coventry CV4 9GF (GB)

(54) **Apparatus for detachably securing a loader attachment on a vehicle**

(57) A device is described for detachably securing a front-loader attachment to a carrier vehicle, using a respective crank pin on each side of the vehicle, which is pivoted across an angular range terminating at the top dead centre of the crank, so that the crank pin is forcibly engaged, in order to lock a coupling member at the front-loader end received in a bracket at the vehicle-end in a locking position by means of initial tension and which in turn can be locked in the locking position, respective adjusting members being provided to set the requisite initial tension when the crank pin is in the locking position.

The device is distinctive as a means of keeping the number of re-settings to a minimum, since the adjusting member (10) is adjusted so that the requisite initial tension is built up approximately across an angle (Ω) after the start of the forced engagement-angular range (α) and across the entire forced engagement-angular range (α) by means of a locking device to secure the crank pin.

Fig.2



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Description

Field of the Invention

[0001] This invention relates to the attachment of loaders to vehicles, and in particular to the attachment of front-end loaders to tractors.

Background of the Invention

[0002] DE 3831312 A1 describes apparatus for detachably securing a front-loader attachment on a carrier vehicle. The apparatus comprises a pair of coupling members, each being attachable to respective brackets on either side of the tractor, and a crank pin having a cammed surface. The crank pin passes through the bracket and coupling member, and by rotating the crank pin to the end of its pivoting range the cammed surface thereof causes the crank pin to forcibly engage the coupling member and the bracket, thereby locking the coupling member in position. An adjusting member is provided to set the initial tension, which must be created by the crank pin in its locking position.

[0003] The crank pin is manually pivoted into its locking position, which is limited by a stop. In this position, the crank is at the end of its pivoting range, and in the immediate vicinity of the top dead centre of its stroke. When the coupling member is both tightened and released in the bracket, the crank pin and the parts of the coupling member receiving it or co-operating therewith as well as the bracket are subjected to a high degree of wear. With increasing wear, the initial tension by means of which the coupling member is forced against the bracket decreases, causing the attachment of the front-loader to the carrier vehicle to become increasingly unsafe. Before wear reaches a dangerous level, it becomes necessary to compensate for the wear by using the adjusting member and the original initial tension has to be reset. The adjusting member of the known device consists of a conically shaped block, which can be secured by means of a first screw and adjusted by means of a second screw. Compensating for wear involves loosening the securing screw, subsequently adjusting the block by means of the adjusting screw and pre-tensing the block by means of the securing screw, this procedure having to be repeated several times in succession as a rule until the original pre-tension in the vicinity of the top dead centre of the eccentric stroke is set to the requisite accuracy in the locked position. This setting procedure requires a considerable amount of time. In addition, the intervening periods between the adjustments which need to be made to the block are relatively short, particularly during the first few hours of use.

[0004] The objective of the invention is to reduce the time required to re-set the initial tension required to attach the front-loader using a device of the type outlined above.

[0005] The proposed solution to this objective is as follows: 1 the requisite pre-tension builds up approximately across an angle Ω with effect from the start of an angular range of rotation α of the crank pin, in which the crank pin forcibly engages with both the bracket and the coupling member.

[0006] An adjustment member may be provided to set the initial tension provided by the crank pin in its locking position. Preferably, the adjustment member is adjustable so that the initial tension builds up over the angle Ω .

[0007] Preferably, a securing device is provided for securing the crankpin in the locked position through the entire angular range α .

[0008] By shifting the locking position of the crank pin from the end region to the initial region of the angular range in which the crank is forcibly engaged, the pivoting range within which the crank pin can reach its locking position is significantly widened. With increasing wear on the components which maintain the pre-tension, the locking position of the crank pin is shifted in the direction towards the end of angular range α , so that the crank pin can be locked in any position within the angular range.

[0009] Where an adjustment member is provided it does not need to be re-adjusted until the wear reaches such a degree that the requisite pre-tension can no longer be reached even in the farthest position delimited by the stop.

[0010] The invention proposes a design that is simple yet meets all requirements and is based on a system whereby the securing device has two securing positions for the crank pins, at the beginning and at the end of the angular range α . Advantageously, the forced engagement-angular range α is approximately 40 degrees and the angle Ω approximately 10 degrees.

Brief Description of the Drawings

[0011] In the drawings, which illustrate an exemplary embodiment of the invention:

Fig. 1 is an agricultural tractor with brackets attached to the vehicle frame and the coupling member of a front-loader attachment placed on the brackets,

Fig. 2 is a view of the brackets from the vehicle-end and the coupling member of Fig. 1 on a larger scale locked in a first locking position,

Fig. 3 is a detailed view of the device illustrated in Fig. 2, having a crank pin locked in a second locking position,

Fig. 4 is a cross-section along the line A-A of Fig. 3 and

Fig. 5 is a cross-section along the line B-B of Fig. 3.

Detailed Description of the Preferred Embodiments

[0012] Fig. 1 depicts an agricultural tractor comprising a gear housing 1 and a frame 2, which extends forwards in the direction of travel on each side of the vehicle. Front wheels 3 of the vehicle are located in the front region of the frame 2 and are mounted on an axle which is attached to a gear housing 1. Arranged above the gear housing 1 and the frame 2 is a driver's cab 5, in front of which there is housed a drive motor covered by a hood 6. Attached to the frame 2 by means of four screws 7 on either side of the hood 6 is an upright bracket 8 which receives a coupling member 9 of a front-loader attachment, not otherwise illustrated in detail.

[0013] As may be seen from Fig. 2, a semi-circular shaped recess 8a open at the top is provided at the upper end of the bracket 8. Each coupling member 9 comprises spaced apart side plates 9a, 9b. When the coupling member 9 is mounted on one of the brackets 8, the upper end of the bracket 8 extends between the side plates 9a, 9b. A bearing pin 9c passes through the side plates 9a, 9b and rests in the recess 8a.

[0014] The bracket 8 is provided with an additional support point in the form of an inclined bearing surface 8b beneath the recess 8a. The bearing 8b surface supports the coupling member 9 via a conically shaped adjusting member 10 which is slidable along the bearing surface 8b.

[0015] As can be seen particularly clearly from Fig. 5, a bore 8c is provided in the bracket 8 between the recess 8a and the bearing surface 8b, positioned eccentrically relative to the bores 9d, 9e provided in the side plates 9a and 9b. These bores are designed in such away that a crankpin 11 having a crank 11a and a crank handle 11b can be inserted in them in a specific relative position. This relative position of the crank handle 11b, in which the crank 11a is not yet in contact with the wall of the bore 8c, is shown as a broken line in Fig. 2. If the crank pin 11 is pivoted anti-clockwise starting from the insertion position, the crank 11a lies against the wall of the bore 8c, where it is supported. From this position, the crank 11a is therefore forcibly engaged with the bracket 8.

[0016] The crank pin 11 can be pivoted about its own axis by up to 180 degrees, the crank 11a lying at top dead centre when the pin 11 has been pivoted through this angle. The crank 11a begins to engage the wall of bore 8c when it has been pivoted into the forced engagement angular range α , which is approximately 40 degrees and begins when the handle 11b has been rotated through 120 degrees from the position shown in broken lines in Figure 2.

[0017] Pivoting the crank pin 11 further, through the angle Ω (approximately 10 degrees) causes the crank 11a to increasingly push the coupling member 9 across

the adjusting member 10 towards the bearing surface 8b of the bracket 8 until the initial tension required to secure the coupling member 9 safely is reached and the crank pin 11 assumes the position illustrated in Fig. 2 with the crank handle 11b shown in solid lines. So that the bearing pin 9c lies in the recess 8a without any play, the bearing surface 8b is inclined towards the line where the recess 8a joins the bearing surface 8b in such a way that the force component generated is great enough to pull the bearing pin 9c into the recess 8a.

[0018] To ensure that the crank pin 11 exerts the requisite initial tension specifically at the moment it assumes, by means of the crank handle 11b, the position illustrated in Fig. 2, i.e. approximately 10 degrees after the crank 11a is forcibly engaged, it is necessary first of all to adjust the conical adjusting member 10 accordingly. This is done in the same manner as with the attachment device described in DE 38 31 212 A1 and there is, therefore, no need to repeat a description of this here.

[0019] To ensure that the crank pin 11 does not inadvertently work loose when performing rough work, it is secured in the assumed locking position by means of the securing device. As illustrated in Fig. 4, this device has a U-shaped bracket 12 attached to a side plate 9b, inside which the crank handle 11b can be pivoted. Two aligned bores 12a in the bracket 12 are so arranged that a pegging pin 13 inserted therein will be in a position behind the crank handle 11b of the crank pin 11 when it is located in the locking position described above and will prevent the crank handle 11b from pivoting back. In the embodiment described here, the pegging pin 13 is attached to the one end region of a swap 13a, the other end region thereof being mounted on a stub pin 12b attached to the bracket 12 and secured with a cotter pin 14.

[0020] If the locking position of the crank pin 11 shifts beyond the forced engagement-angular range α due to wear caused by repeated releasing and mounting of the front-loader attachment, it will have no effect on the mounting safety of the front-loader attachment provided the initial tension is re-set to a sufficiently high level beforehand. If the initial tension prevailing when the crank pin 11 is in the locking position illustrated in Fig. 2 is not high enough to ensure that the front-loader attachment can be safely mounted, the crank pin 11 can be pivoted until its crank handle 11b assumes the locking position illustrated in Fig. 3 at the end of the forced-engagement angular range α , in which it lies against the bracket 12 and can not be pivoted any farther. The crank pin 11 can also be secured in this position in the same manner as described above to prevent any inadvertent loosening. To this end, in the space between the bores 12a and the stub pin 12b at the oppositely lying end of the bracket 12, two additional bores 12c are provided in which the pegging pin 13, which moves into position behind the crank handle 11b, can be inserted.

Claims

1. Apparatus for releasably securing a loader attachment to a carrier vehicle, the vehicle having a loader mounting arrangement mounted thereon, the mounting arrangement comprising a pair of spaced apart bracket members, wherein the apparatus comprises a pair of coupling members each coupling being releasably attachable to one of said pair of spaced apart bracket members by attachment means, wherein the said attachment means includes a crank pin, and wherein upon rotation of the crank pin through an initial tensioning angle Ω degrees the crank pin forcibly engages with the bracket member and coupling member thereby locking the coupling member in position, characterised in that the crank pin locks the coupling member in position through an angular range ∞ degrees of rotation of the crank pin.

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2. Apparatus according to Claim 1, characterised in that each bracket and coupling member comprises a crank pin receiving means, and characterised in that the crank pin receiving means in the bracket member and the coupling member are aligned eccentrically.

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3. Apparatus according to Claim 1 or 2, characterised in that the crank pin comprises at least one cam surface.

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4. Apparatus according to any preceding claim, further comprising securing means to secure the said crank pin in the locked position throughout the angular range ∞ degrees.

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5. Apparatus according to Claim 4, characterised in that the said crank pin is provided with a crank handle, and securing means comprises a stop which, in use, is placed in the path of the said handle to limit the movement thereof.

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6. Apparatus according to any preceding claim, characterised in that the said angular range ∞ is 0 to 60 degrees.

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7. Apparatus according to Claim 6, characterised in that the said angular range ∞ is 0 to 40 degrees.
8. Apparatus according to any preceding claim, characterised in that the said initial tensioning angle Ω is 5 to 15 degrees.

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9. Apparatus according to Claim 8, characterised in that the said initial tensioning angle Ω is substantially 10 degrees.

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10. Apparatus according to any preceding claim, char-

acterised in that the apparatus further comprises an adjusting member for setting and resetting the initial tension required when the crank pin is in the locking position.

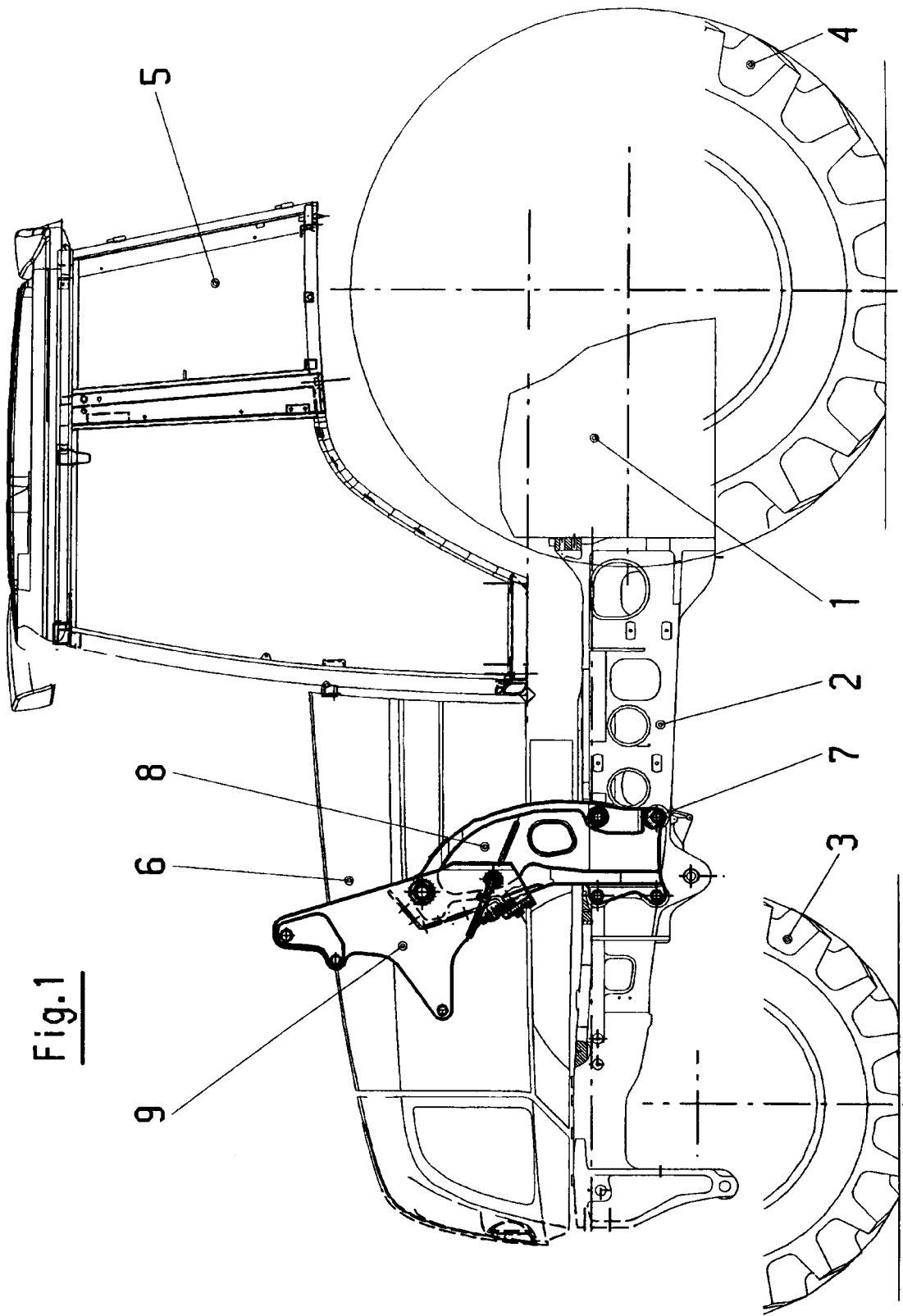
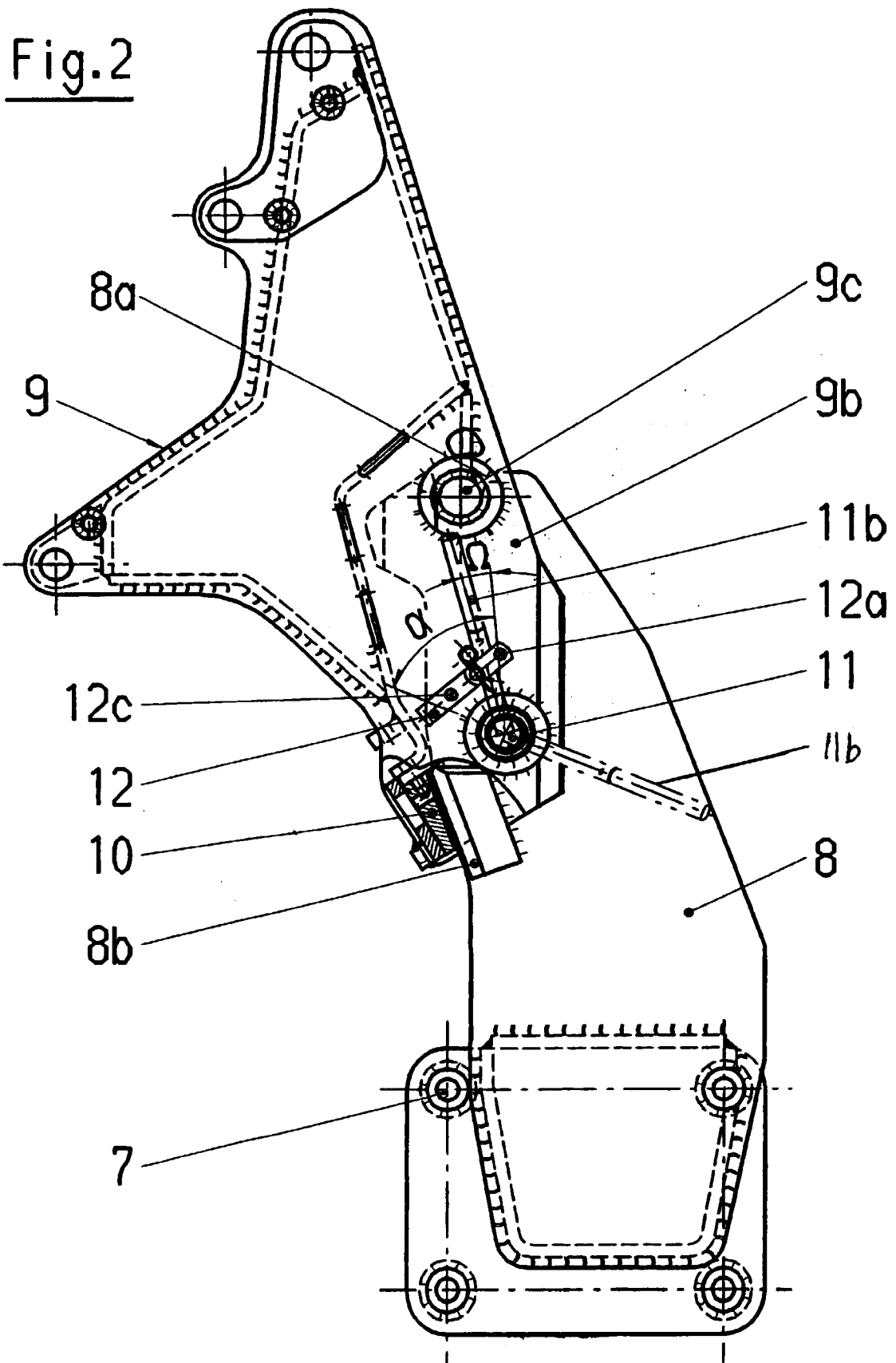


Fig.1



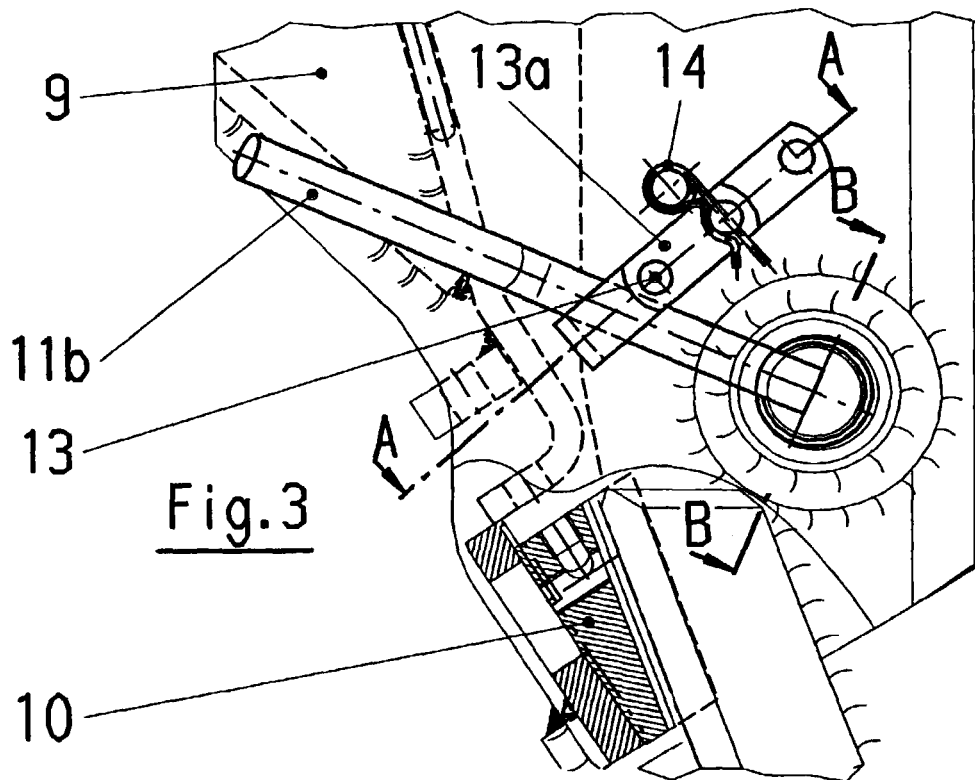


Fig. 4

Schnitt A-A

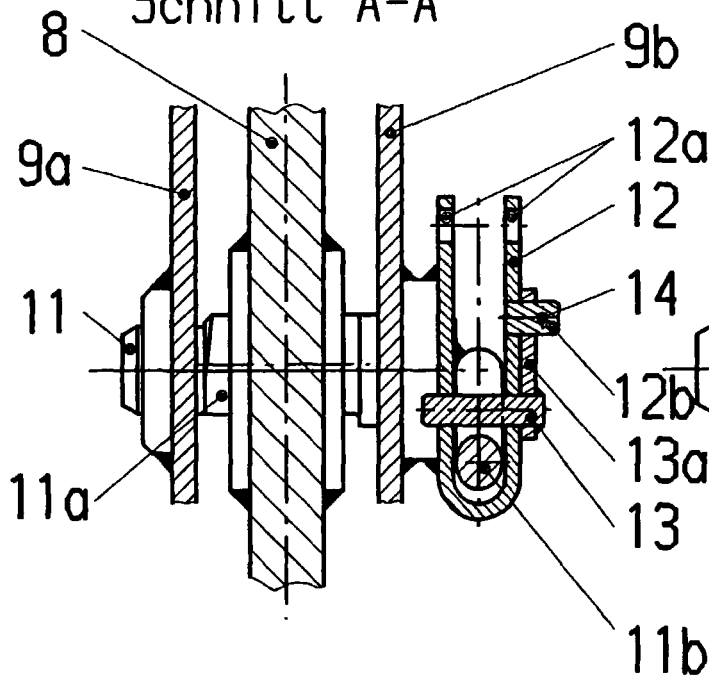


Fig. 5

Schnitt B-B

