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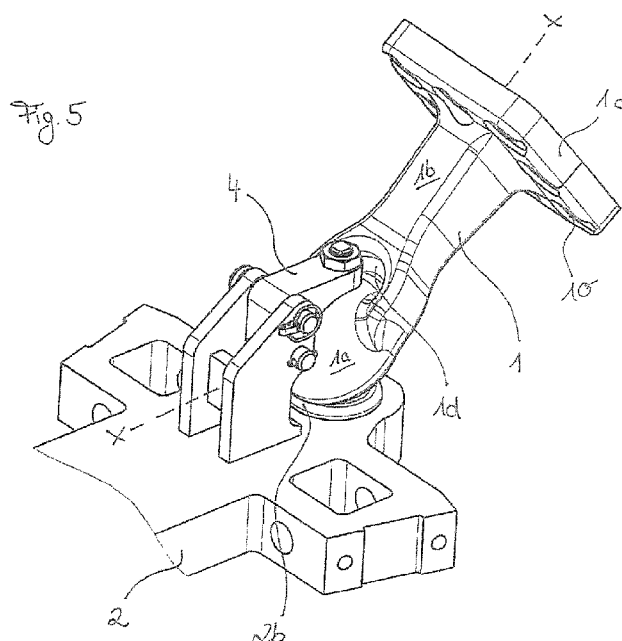
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(54) Title: BALL HITCH COUPLING DEVICE



(57) Abstract: A coupling device for use with a vehicle mounted ball hitch. The coupling device is provided with a head having a receiving socket for abutment with the ball hitch and a neck connecting the head to attachment means for attachment of the device to an object to be towed. The coupling device is provided with a cavity between the head and neck.

Ball Hitch Coupling Device

The present invention relates to a coupling device for use with a vehicle mounted ball hitch.

A ball hitch coupling assembly comprises a ball hitch mounted to a towing vehicle and a coupling device attachable to the ball hitch at one end and the object to be towed at the other end. A ball hitch coupling assembly may be used to couple an implement/trailer to an agricultural vehicle. In such a case, the ball hitch coupling assembling mainly consists of a ball hitch mounted on a tractor and a coupling device which is attachable to a trailer or implement to be towed. The coupling device has a head having a ball socket for coupling with the ball hitch and a neck which connects the head to an attachment means for connecting the coupling device to the trailer or implement. To prevent the socket becoming detached from the ball hitch during use, a suppressing bracket is used to secure the socket to the ball hitch. This suppressing bracket can be detached to allow coupling and uncoupling of the coupling device from the hitch. The suppressing bracket is suspended over the centre of the ball hitch and allows movement of the socket about the ball hitch whilst preventing uncoupling.

When towing a trailer, or implement over an uneven field, or on a slope, the coupling device can be inclined, or declined through a large angle with respect to the ball hitch. When the coupling device is inclined at a large angle relative to the ball hitch it is possible for the neck of the coupling device to come into contact with the suppressing bracket which results in damage to the suppressing bracket and/or coupling device. At worst this can lead to the tractor and trailer/implement becoming uncoupled.

It is therefore an object of the invention to provide a coupling device which overcomes, or mitigates at least some of the above mentioned problems.

According to the invention there is provided a coupling device for use with a vehicle mounted ball hitch, said coupling device provided with a head having a receiving socket for abutment with the ball hitch and a neck connecting the head to attachment means for attachment of the device to an object to be coupled to the vehicle,

characterised in that coupling device is provided with a cavity between the head and the neck.

The provision of a cavity between the neck and the head of the coupling device allows the device to incline to a greater angle relative to the horizontal than is permitted by known devices. This therefore reduces the damage to the device and/or suppressing bracket when towing on a slope or over uneven ground.

Preferred features of the device are claimed in the dependent claims.

The invention will now be described, by example only with reference to the following figures in which:

Figure 1 shows a perspective view of a coupling device in accordance with the invention,

Figure 2 shows a cross section along line X-X of fig. 1,

Figure 3 shows a further perspective view of the coupling device of fig 1,

Figure 4 shows a cross section along line X-X of fig. 3,

Figure 5 shows a perspective view of the coupling device of fig 1 in an inclined position,

Figure 6 shows a cross section along line X-X of fig. 5, and

Figures 7a to 7c show a cross sectional view, plan view and perspective view respectively of the coupling device in accordance with the invention.

Figures 1 and 2 show a ball hitch coupling assembly which can be used, for example by a tractor for towing a trailer or implement. The assembly comprises a coupling device 1, a ball hitch 2a (not fully visible in figure 1) and a securing holder 3. Coupling device 1 comprises a head 1a, a neck 1b and an attachment member 1c. Head 1a is a hemispherical open bottom socket which may be held in a coupling arrangement with ball hitch 2a. Neck 1b is a rigid elongated member which connects head 1a to attachment member 1c. Attachment member 1c is provided with bores 10 to enable screws or bolts to be used for fixing the coupling device 1 to an object to be towed such as an implement, or trailer (not shown). Coupling device 1 further

comprises a cavity 1d between head 1a and neck 1b, the purpose of which will be explained later.

The cavity 1d may comprise a recess, or an aperture. In the case of an aperture, the neck 1b may be seen as having two arms which are joined to the head 1a in diametrically opposed positions.

The ball hitch 2a and securing holder 3 are mounted on a mounting platform 2 which is mounted on a towing vehicle, such as a tractor (not shown). Securing means, such as a suppressing bracket 4 is secured to the holder 3 by bolts 5 and 6. The suppressing bracket 4 is shown in figures 1 and 2 in its closed position in which bolt 5 maintains bracket 4 in a closed position over the socket. Bracket 4 is held in a central position over ball hitch 2a and prevents the coupling device 1 from becoming detached from ball hitch 2a. In this position, the assembly can be used for towing an implement or trailer. Bolt 5 holds the bracket 4 in its closed position by a detachable split pin. Bolt 6 is non-detachably secured by using a set pin.

Figures 3 and 4 show how the coupling device 1 is coupled, or uncoupled from the ball hitch 2a. Suppressing bracket 4 is pivoted about bolt 6 into an open position by removing bolt 5 as shown in figures 3 and 4. In the open position the socket can either be lifted away from ball hitch 2a, or brought into contact with the ball hitch. If coupling the coupling device 1 to the ball hitch 2a, suppressing bracket 4 can be pivoted about bolt 6 back into the closed position (shown in figures 1 and 2) and secured in place by the split pin.

Figures 5 and 6 show an inclination of coupling device 1 relative to the mounting platform 2. This may happen, for example when a tractor is towing a trailer or implement across uneven ground, or on a slope and the implement, or trailer is on ground which is higher than that of the ground on which the tractor is travelling. The coupling assembly allows the socket 1a of the coupling device 1 to pivot about the ball hitch 2a so that coupling device member 1 can move upwards relative to the mounting platform 2. The coupling device 1 can pivot about the ball hitch 2a so that that the coupling device 1 can be inclined to approximately 37 ° with respect to the platform 2. Upwards movement of the coupling device 1 will stop when the

suppressing bracket contacts the neck 1b of the coupling device 1, or socket 1a contacts the base 2b of ball hitch 2a. In figure 6, cavity 1d is filled in with hatching 9. If no cavity is present it can be seen that part 9 of the neck 1b of the coupling device 1 comes into contact with suppressing bracket 4 at a smaller angle of inclination (approximately 20 °) than if a cavity is present.

Thus, the presence of a cavity 1d improves the safety of the coupling assembly, since an implement can be towed over rough ground or on a slope where angles of inclination of upto approximately 37° between the platform 2 and coupling device 1 may be experienced before the suppressing bracket is subjected to potentially damaging force from the coupling device.

Figures 7a, 7b and 7c are cross sectional, plan and perspective views respectively of coupling device 1. Head 1a shows the socket which partly surrounds ball hitch 2a (not shown).

Claims

1. A coupling device for use with a vehicle mounted ball hitch, said coupling device provided with a head having a receiving socket for abutment with the ball hitch and a neck connecting the head to attachment means for attachment of the device to an object to be coupled to the vehicle, characterised in that coupling device is provided with a cavity between the head and neck.
2. A coupling device as claimed in claim 1 wherein the cavity is a recess.
3. A coupling device as claimed in claim 1 wherein the cavity is an aperture.
4. A coupling device as claimed in any preceding claim wherein the neck of the device is pivotable in an upward direction about the ball hitch until the socket comes into contact with a base of the ball hitch.
5. A coupling device as claimed in any preceding claim for use with securing means for holding the device in abutment with the ball hitch, wherein the neck is pivotable in an upward direction moving the cavity over the securing means until the securing means abuts with the neck.

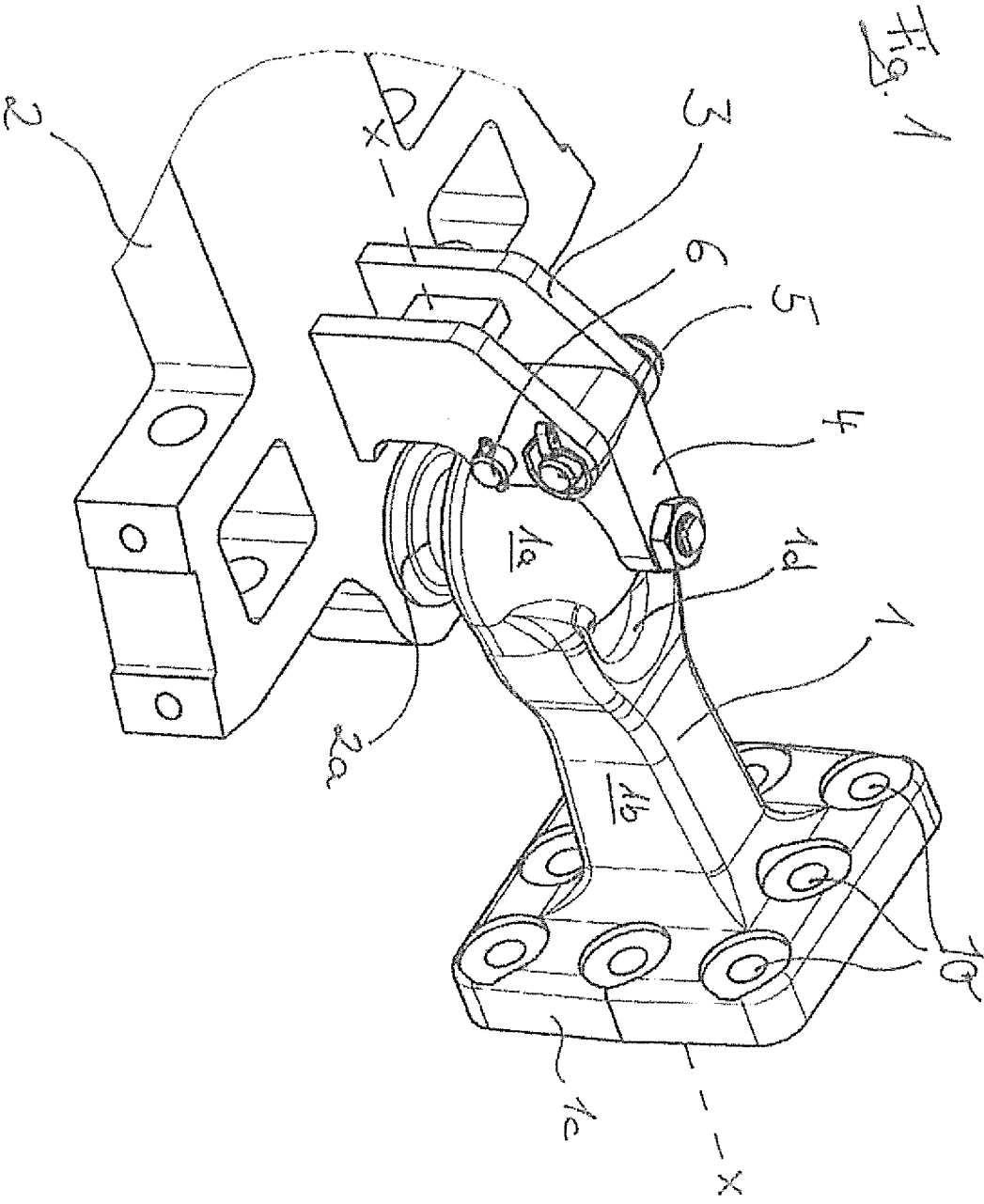
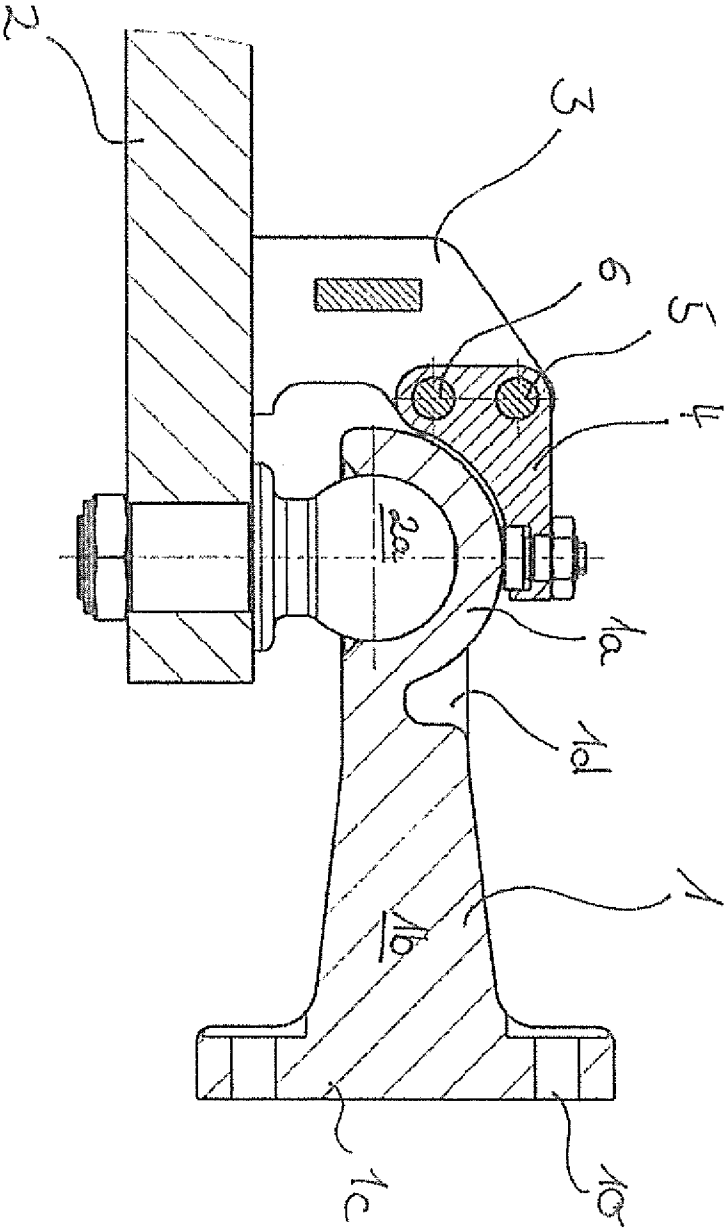
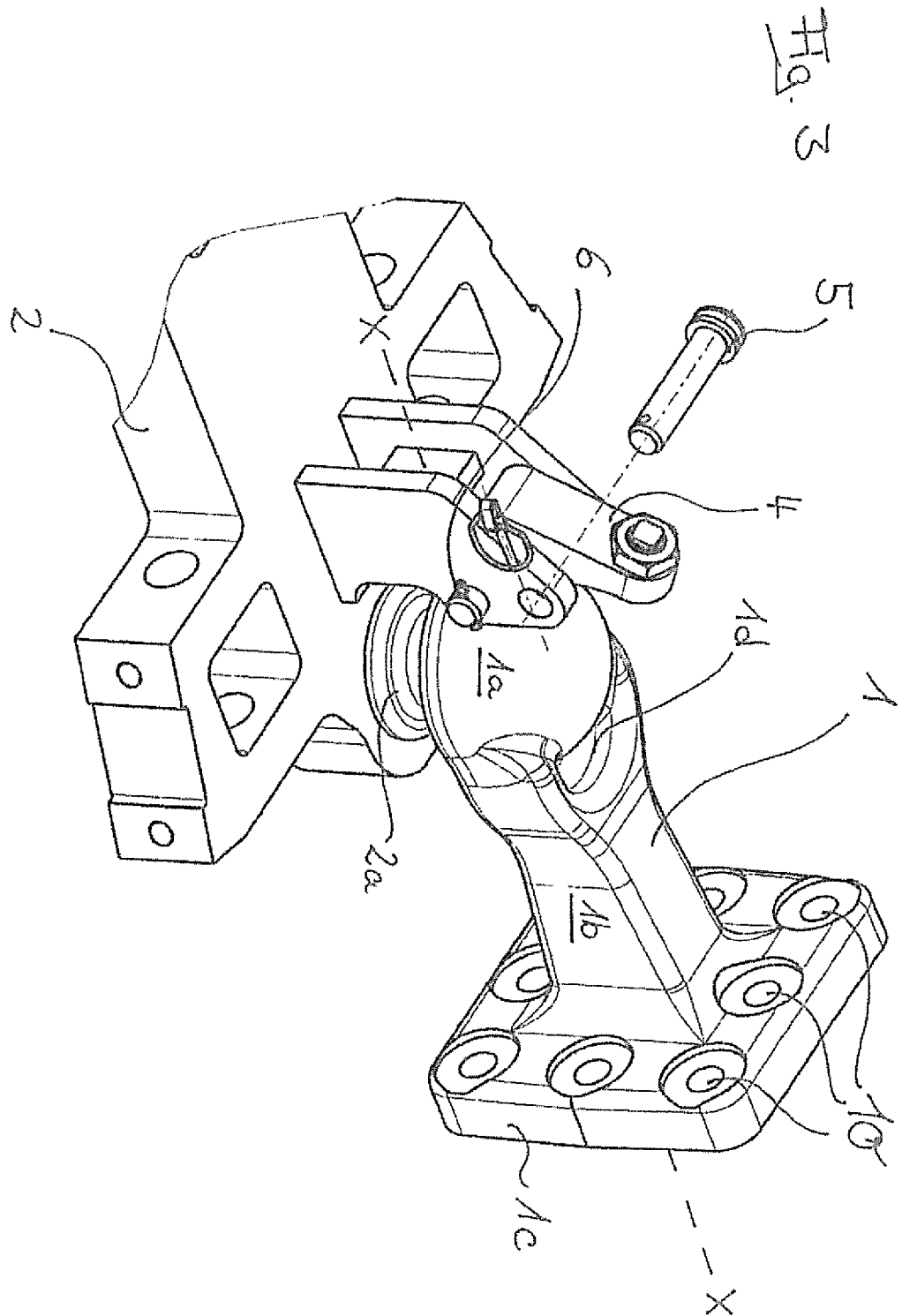
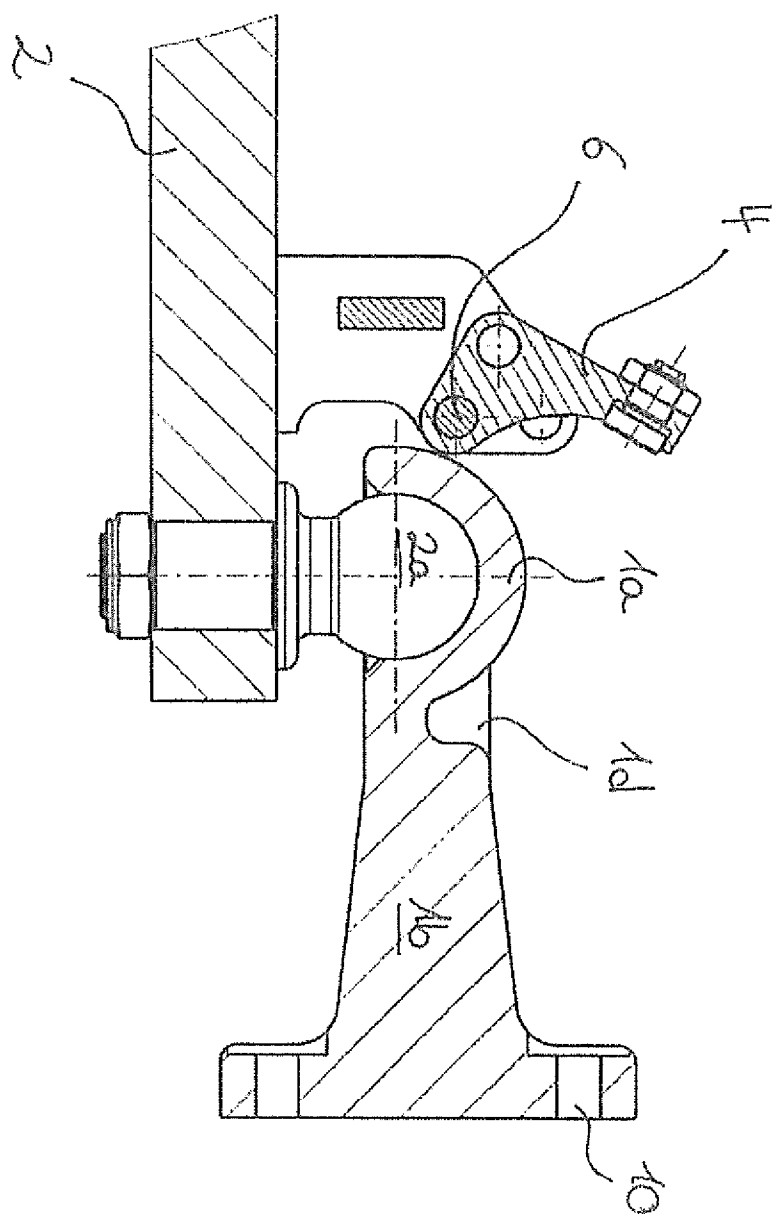


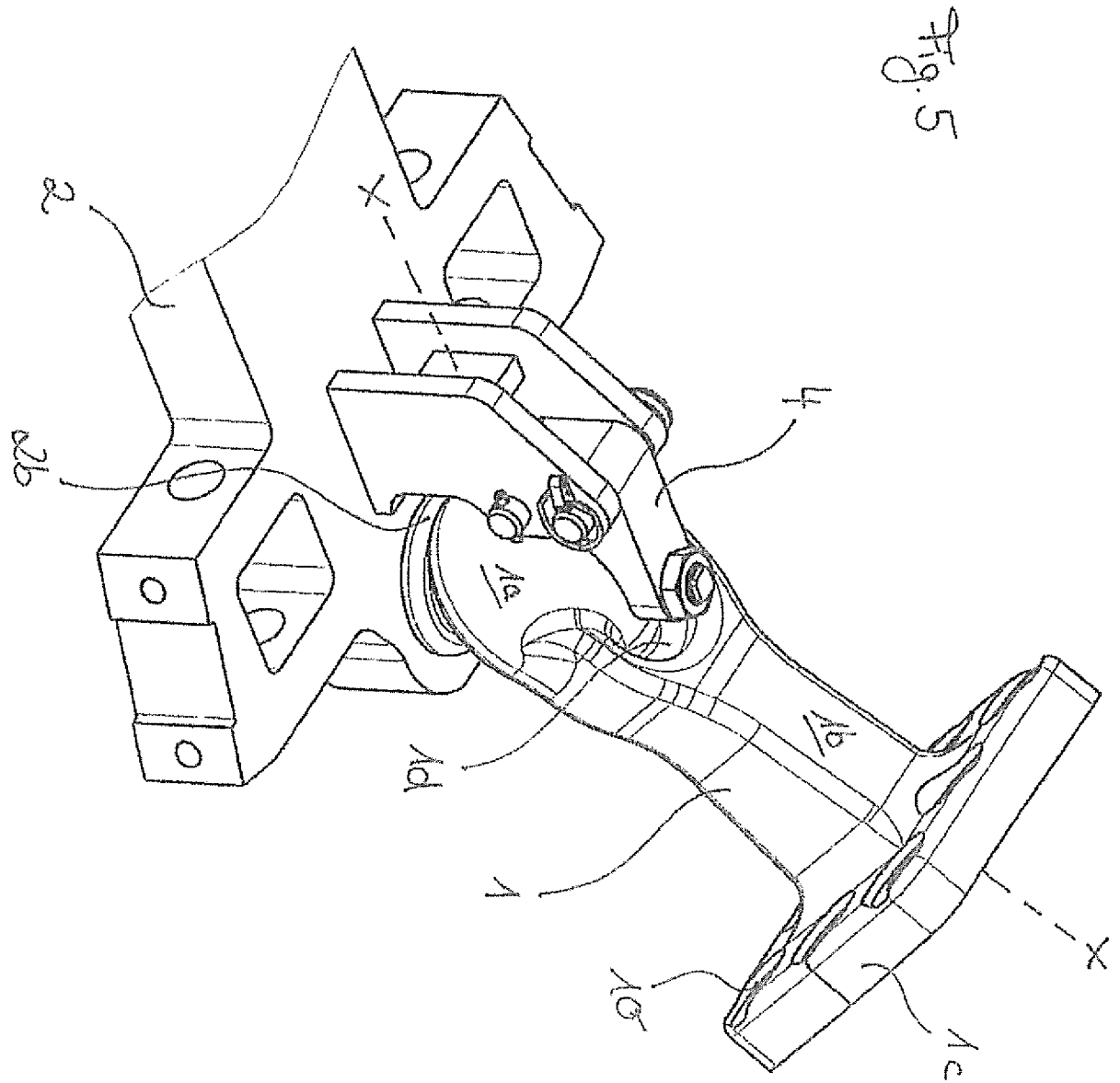
Fig. 2

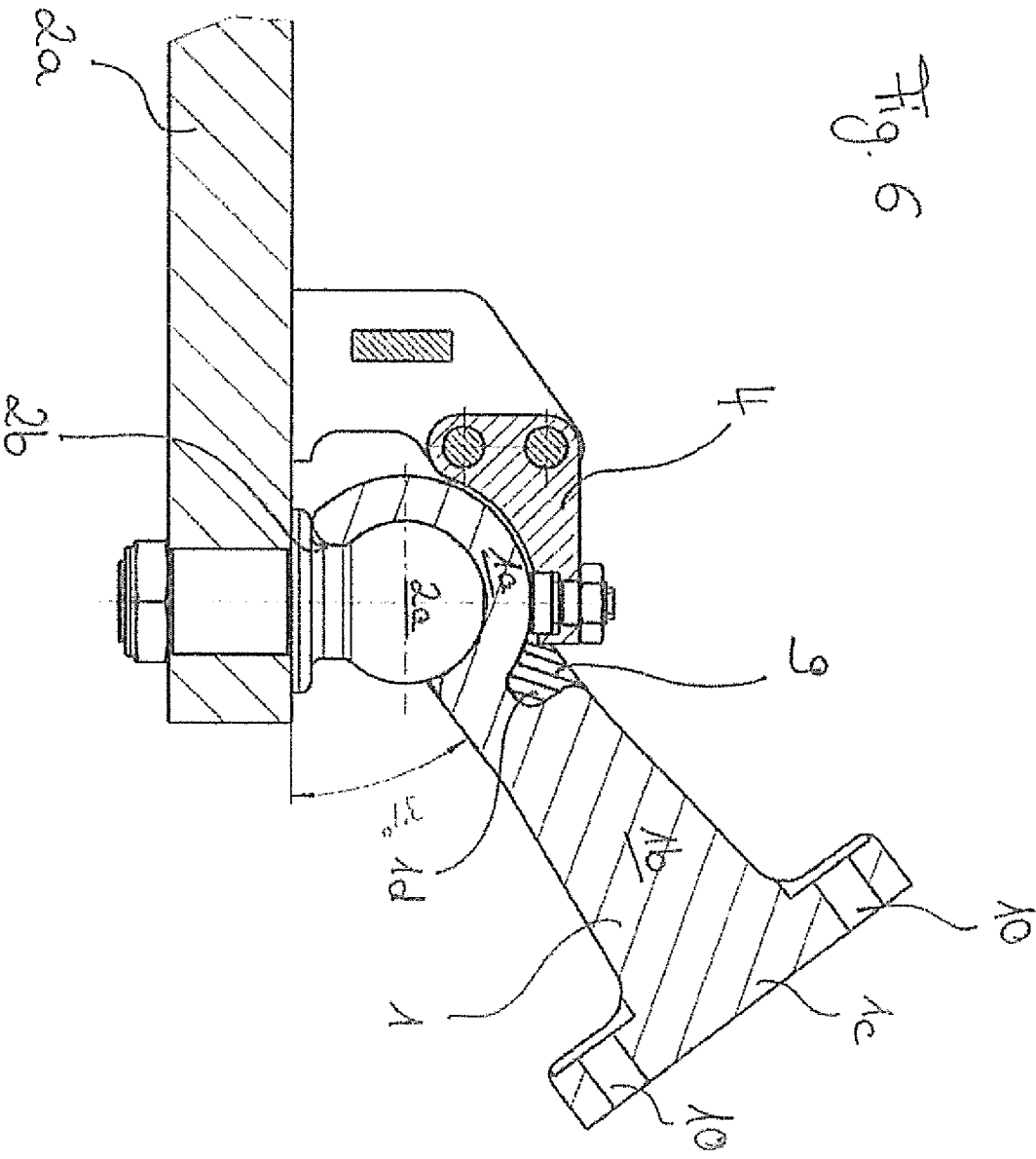


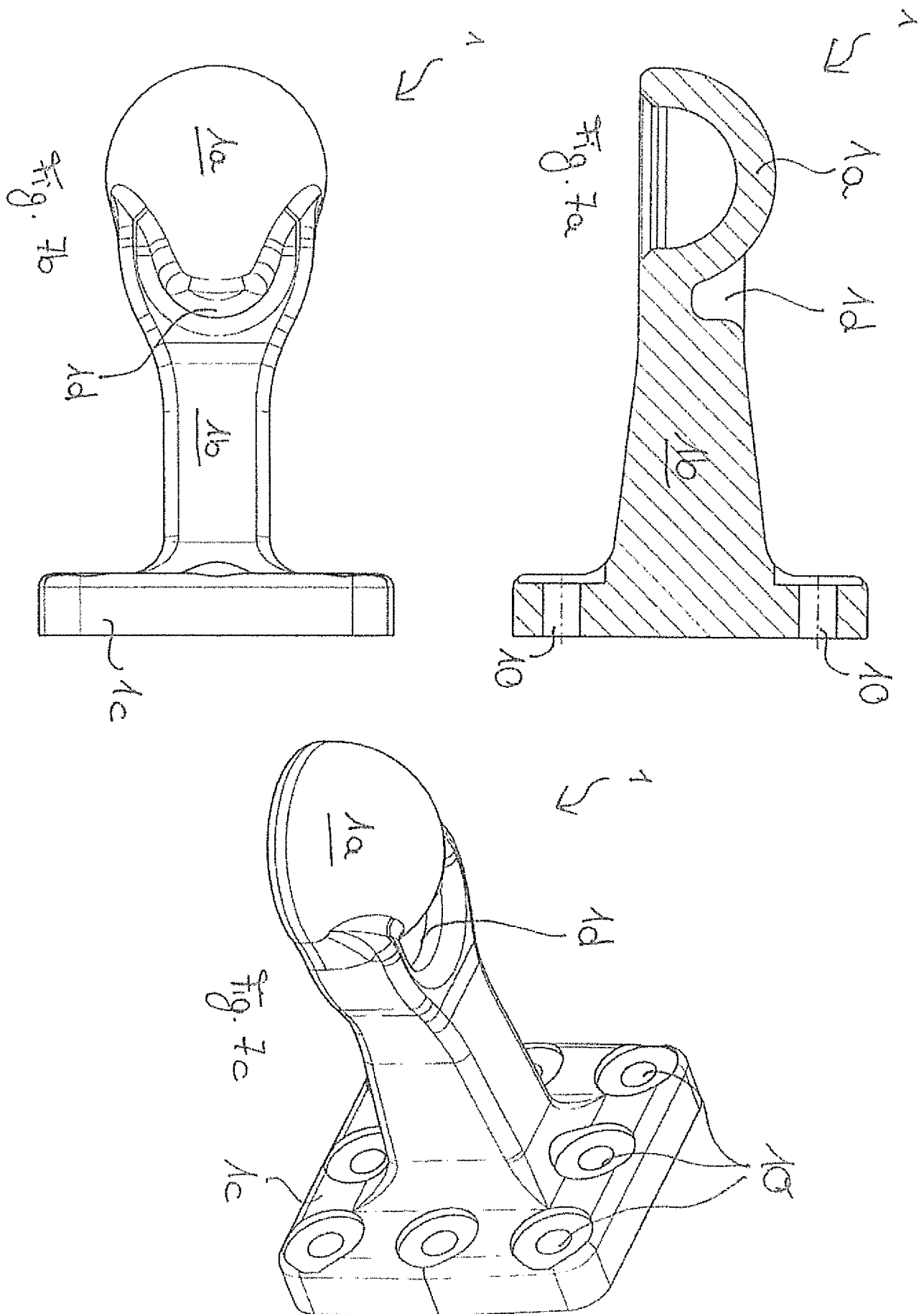




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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. B60D1/06 B60D1/28
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 78 12 640 U1 (APA GMBH & CO OTTO BAUDER [DE]) 17 August 1978 (1978-08-17) page 2, paragraph 3 page 3 figures	1-4
X	----- EP 1 559 592 A1 (CHARMUELLER JOSEF [AT]) 3 August 2005 (2005-08-03) paragraph [0028] - paragraph [0034] figures 2-10	1,2,4,5
X	----- DE 10 2005 022879 A1 (JOST WERKE GMBH & CO KG [DE]) 23 November 2006 (2006-11-23) paragraph [0029]; figures -----	1,2,4



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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