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(54) **Method and device for taking over a weft yarn by a gripper rapier from a donor rapier**

Verfahren und Vorrichtung zur Übergabe eines Schussgarns von einem Bringergreifer zu einem Nehmergreifer

Procédé et dispositif de transfert de trame d'une griffe porteuse à une griffe tireuse

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Description

[0001] The invention relates to a rapier device for a weaving machine comprising a donor rapier provided to present a weft yarn to a gripper rapier, provided to take up a weft yarn.

[0002] A device to exactly adjust the path of motion of the rapier in order to create a good take-over position, so that the gripper rapier may take over unfailingly the weft yarn from the donor rapier is known from the European patent disclosure EP 1.288.358.

[0003] Although it is possible to adjust the rapier device easily and exactly by means of the device described in EP 1.288.358, the gripper rapier has a tendency to be pushed away (away from the weaving reed) for a distance X2 - X1, when the hook of the gripper rapier collides with the weft yarn clamped in the donor rapier and tensioned by the weft supply device and/or the weft feeder. X1 is the distance between the hook of the gripper rapier and the donor rapier in the free position. X2 is the distance between the hook of the gripper rapier and the donor rapier being pushed away. The donor rapier however, may be kept in its position, for instance, by providing a guide on its back side moving along the dent of the weaving reed at least the moment the yarn is taken over. Because the gripper rapier is pushed away, the relative position of the gripper rapier with respect to the donor rapier is not secured during the take-over.

[0004] In the European patent EP 1.277.864 a device is described in which the relative position of the gripper rapier with respect to the donor rapier is secured during the take-over by applying a device which makes an insert part connected to one gripper fittingly sliding into a taking-up part connected to the other gripper. This device secures this relative position during take-over as long as the deviation falls within the limits of the bevelled edge of the insert part with respect to the limits of the bevelled edge of the taking-up part. Once this limit is exceeded, a collision will occur, which will cause substantial mechanical damage, will lead to a rupture of weft and warp yarns, and will finally result in a considerable stoppage of machines.

[0005] If we consider the two embodiments according to EP 1.277.864:

a) The coupling between the two rapiers has not yet started when the hook of the gripper rapier collides with the weft yarn in the donor rapier. As already described in EP 1.288.358, the gripper rapier may be pushed away for a distance X2 - X1 as a result of the tension of the weft yarn on the gripper rapier, and there is the risk that said limits will be exceeded and a collision will occur causing severe mechanical damage to the device, the rupture of the weft and warp yarns and will result in a considerable stoppage of the machine. In the invention, this risk will be limited by providing the device in such a manner that it is guided on the warp yarns in the shed and will resist to this being pushed away. However, depending on the tension of the weft yarn, this may lead to an increased weft yarn load and the risk of a rupture of the yarns, or to the danger of the gripper rapier getting stuck crosswise in the shed, because of which the coupling device to secure the relative position between gripper and donor rapier, will be additionally loaded which may lead to a collision.

b) The coupling between the two rapiers is started when the hook of the gripper rapier collides with the weft yarn in the donor rapier. In this case, it will not be possible to push away the gripper rapier with respect to the donor rapier, because of the coupling but the weft yarn load caused by the taker gripper will increase. This is harmful to the weft yarn and may lead to the rupture of the weft yarn or will even cause damage to the weft yarn which may become visible in the fabric and will finally result in a fabric of lower quality.

[0006] The purpose of the present invention is to provide a rapier device no longer having the above-mentioned disadvantages on take-over the weft yarn from the donor rapier by the gripper rapier.

[0007] The purpose of the present invention is attained by providing a rapier device for a weaving machine, comprising a donor rapier, being provided to present a weft yarn to a gripper rapier provided to take up the weft yarn, the donor rapier and/or the gripper rapier being provided with means to realize a magnetic attractive force between the two rapiers in a take-over zone.

[0008] Henceforth, in this patent application, the take-over zone will be considered to be the zone from where a magnetic attractive force between donor and gripper rapier may be realized.

[0009] The advantage of such a rapier device is that because of the attractive force between the donor and the taker rapier, the relative position of the two rapiers is secured when taking- over.

[0010] In a preferred embodiment of the rapier device according to the invention, the means to realize a magnetic attractive force between the two rapiers in the take-over zone will comprise a permanent magnet or a magnetic actuator. Preferably, the donor and gripper rapiers are each provided with a permanent magnet having opposite signs.

[0011] In a particular preferred embodiment of the rapier device according to the invention one rapier is provided with a permanent magnet or a magnetic actuator, while the other rapier, at least partially, is made of a material that may be attracted by the magnet or the actuator.

[0012] In a more particular embodiment of the rapier device according to the invention, the device is designed to realize a contact between the two rapiers, when the rapiers are situated, at least partially, next to one another, in the take-over zone, the contact being the result of said attractive force.

[0013] Preferably, the attraction between the two rapi-

ers is only realized after the hook of the gripper rapier has been pushed away by the collision with the weft yarn. For that purpose, the permanent magnet or actuator is preferably installed in a place where, at the operating speed, the magnet will only attract the gripper rapier, after the hook of the gripper rapier has collided with the weft yarn in the donor rapier and has been pushed away as a result.

[0014] In a most particular embodiment of the rapier device according to the invention, the path of motion of the donor and the gripper rapiers in the take-over zone is determined in such a manner that the donor and the gripper rapiers in the take-over zone will reach a take-over position in which these rapiers on their respective path of motion are situated next to one another, at least partly and that the device is designed to realize the magnetic attractive force between the two grippers, when the grippers are in this take-over zone. Preferably, the take-over zone is reached without any previous contact between the rapiers themselves and between the rapiers and the weft yarn.

[0015] In this patent application, the take-over position is considered being the position in the take-over zone where the contact between the donor and the gripper rapier may be realized.

[0016] Preferably, the gripper rapier is adjusted such that its hook does not touch the weft yarn, because the rapier guide has been adjusted such that the gripper rapier is not moving entirely parallel to the donor rapier, but, preferably, is taken back to the donor rapier under the influence of the magnet or the actuator and will take along the weft yarn on its way back without any difficulties. This has the advantage that more delicate weft yarns and weft yarns to be woven more difficultly, may be used.

[0017] In order to further clarify the characteristics of the present invention and to point out its additional advantages and particulars, a more detailed description of a gripper device will now follow. It may be obvious that nothing in the following description may be interpreted as a restriction of the protection of this invention demanded for in the claims.

[0018] By means of reference numbers, in this description, reference is made to the attached drawings in which:

- figure 1 is a top view of a donor and a gripper rapier;
- figure 2 is a side view of the donor and the taker rapier in free position;
- figure 3 is a side view of the gripper rapier being pushed away with respect to the gripper rapier after having collided with the weft yarn;
- figure 4 is a side view of the situation in which the gripper and the donor rapier are in the take-over position.

[0019] Figure 1 is a top view of the rapier device according to the invention, comprising a donor rapier (2) designed to present a weft yarn (3) to the gripper rapier (1), designed to take over the weft yarn (3). The donor rapier (2) is provided with a permanent magnet (4) in order to realize thereby, in the take-over zone, a magnetic attractive force between the donor rapier (2) and the gripper rapier which is, entirely or partly, made of a material that can be attracted by a magnet.

[0020] The donor (2) and or the gripper rapier (1) may also be provided with a magnetic actuator exercising a force, because of which the donor and the gripper rapier are mutually attracted.

[0021] In a preferred embodiment, the rapier device may be designed such that the attraction between donor (2) and gripper rapier (1) is realized only after the hook (5) of the gripper rapier (1) has been pushed away, for instance for a distance X2 because of the collision with the weft yarn (3). This may be caused, for instance, by building in a permanent magnet (4) or an actuator in the donor rapier (2) in a place where, at the operational speed, the magnet is only exercising an attraction force on the gripper rapier (1) after the hook (5) of the gripper rapier (1) has collided with the weft yarn (3) in the donor rapier (2) and has been pushed away in consequence.

[0022] In figure 4, donor (2) and gripper rapier (1) are represented in the take-over position, the gripper rapier being in contact with the donor rapier because of the attractive force of the permanent magnet (4) or of the magnetic actuator in the donor rapier (2), so that, at the return motion of gripper (1) and donor rapier (2), the hook (5) and clip of the gripper rapier (1) is taking over the weft yarn (3) from the donor rapier (2).

[0023] The rapier device according to the invention may be used both on single rapier weaving machines and multiple rapier weaving machines.

Claims

1. Rapier device for a weaving machine comprising a donor rapier (2) designed to present a weft yarn (3) to a gripper rapier (1) designed to take up the weft yarn (1), **characterized in that** the donor rapier (2) and/or the gripper rapier (1) are provided with means to realize a magnetic attractive force between the two rapiers (1, 2) in a take-over zone.

2. Rapier device according to claim 1, **characterized in that** said means comprise a permanent magnet (4) or a magnetic actuator.

3. Rapier device according to any one of the claims 1 or 2, **characterized in that** one rapier is provided with a permanent magnet or a magnetic actuator, while the other rapier, at least partly, is made of material which can be attracted by the magnet or the actuator.

4. Rapier device according to any one of the preceding claims, **characterized in that** the device is designed to realize a contact between the two rapiers (1, 2),

when the rapiers are situated in the take-over zone, next to one another, at least partly, the contact being the consequence of the said attractive force.

5. Rapier device according to any one of the claims 1 up to and including 4, **characterized in that** the path of motion of the donor (2) and the gripper rapier (1) has been determined such that the donor (2) and the gripper rapier (1) in the take-over zone will come into a take-over position, in which the rapiers (1, 2) on their respective paths of motion will be situated, at least partly, next to one another and **in that** the device is designed to realize a magnetic attractive force between the two rapiers (1, 2) when the rapiers (1, 2) are situated in the take-over zone.

6. Rapier device according to claim 5, **characterized in that** the take-over position is attained without any previous mutual contact between the rapiers (1, 2) and between the gripper rapier (1) and the weft yarn (3).

Patentansprüche

1. Greifervorrichtung für eine Webmaschine, umfassend einen Gebergreifer (2), der dazu ausgebildet ist, einen Schussfaden (3) einem Nehmergreifer (1) zu präsentieren, der dazu ausgebildet ist, den Schussfaden (1) aufzunehmen, **dadurch gekennzeichnet, dass** der Gebergreifer (2) und/oder der Nehmergreifer (1) mit Mitteln zum Realisieren einer magnetischen Anziehungskraft zwischen den beiden Greifern (1, 2) in einem Übernahmebereich versehen sind.

2. Greifervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Mittel einen Permanentmagneten (4) oder einen magnetischen Aktuator umfassen.

3. Greifervorrichtung nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** ein Greifer mit einem Permanentmagneten oder einem magnetischen Aktuator versehen ist, während der andere Greifer wenigstens teilweise aus einem Material gefertigt ist, welches von dem Magneten oder dem Aktuator angezogen werden kann.

4. Greifervorrichtung nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Vorrichtung dazu ausgebildet ist, einen Kontakt zwischen den beiden Greifern (1, 2) zu realisieren, wenn sich die Greifer in dem Übernahmebereich wenigstens teilweise nebeneinander befinden, wobei der Kontakt die Folge der Anziehungskraft ist.

5. Greifervorrichtung nach einem der Ansprüche 1 bis zu und einschließlich 4, **dadurch gekennzeichnet, dass** die Bewegungsbahn des Gebergreifers (2) und des Nehmergreifers (1) derart bestimmt worden ist, dass der Gebergreifer (2) und der Nehmergreifer (1) im Übernahmebereich in eine Übernahmeposition kommen, in der sich die Greifer (1, 2) auf ihren jeweiligen Bewegungsbahnen wenigstens teilweise nebeneinander befinden, und **dadurch**, dass die Vorrichtung zum Realisieren einer magnetischen Anziehungskraft zwischen den beiden Greifern (1, 2), wenn sich die Greifer (1, 2) in dem Übernahmebereich befinden, ausgebildet ist.

6. Greifervorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** die Übernahmeposition ohne jeglichen vorhergehenden gegenseitigen Kontakt zwischen den Greifern (1, 2) und zwischen dem Nehmergreifer (1) und dem Schussfaden (3) erreicht wird.

Revendications

1. Dispositif de transfert de trame à griffes pour un métier à tisser, comprenant une griffe porteuse (2) conçue pour présenter un fil de trame (3) à une griffe tireuse (1) conçue pour saisir le fil de trame (1), **caractérisé en ce que** la griffe porteuse (2) et/ou la griffe tireuse (1) est (sont) pourvue(s) d'un moyen pour créer une force d'attraction magnétique entre les deux griffes (1, 2) dans une zone de transfert.

2. Dispositif de transfert de trame à griffes selon la revendication 1, **caractérisé en ce que** ledit moyen comprend un aimant permanent (4) ou un actionneur magnétique.

3. Dispositif de transfert de trame à griffes selon l'une quelconque des revendications 1 ou 2, **caractérisé en ce qu'**une griffe est pourvue d'un aimant permanent ou d'un actionneur magnétique, alors que l'autre griffe est constituée au moins partiellement d'une matière qui peut être attirée par l'aimant ou l'actionneur.

4. Dispositif de transfert de trame à griffes selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif est conçu pour établir un contact entre les deux griffes (1, 2), lorsque les griffes sont situées dans la zone de transfert, l'une à côté de l'autre, au moins partiellement, le contact étant la conséquence de ladite force d'attraction.

5. Dispositif de transfert de trame à griffes selon l'une quelconque des revendications 1 à 4 incluse, **caractérisé en ce que** le chemin de déplacement de la griffe porteuse (2) et de la griffe tireuse (1) a été déterminé de telle sorte que la griffe porteuse (2) et

la griffe tireuse (1) dans la zone de transfert adopteront une position de transfert, dans laquelle les griffes (1, 2) sur leur chemin respectif seront situées, au moins partiellement, l'une à côté de l'autre, et **en ce que** le dispositif est conçu pour créer une force d'attraction magnétique entre les deux griffes (1, 2) lorsque les griffes (1, 2) sont situées dans la zone de transfert.

6. Dispositif de transfert de trame à griffes selon la revendication 5, **caractérisé en ce que** la position de transfert est atteinte sans aucun contact mutuel préalable entre les griffes (1, 2) et entre la griffe tireuse (1) et le fil de trame (3).

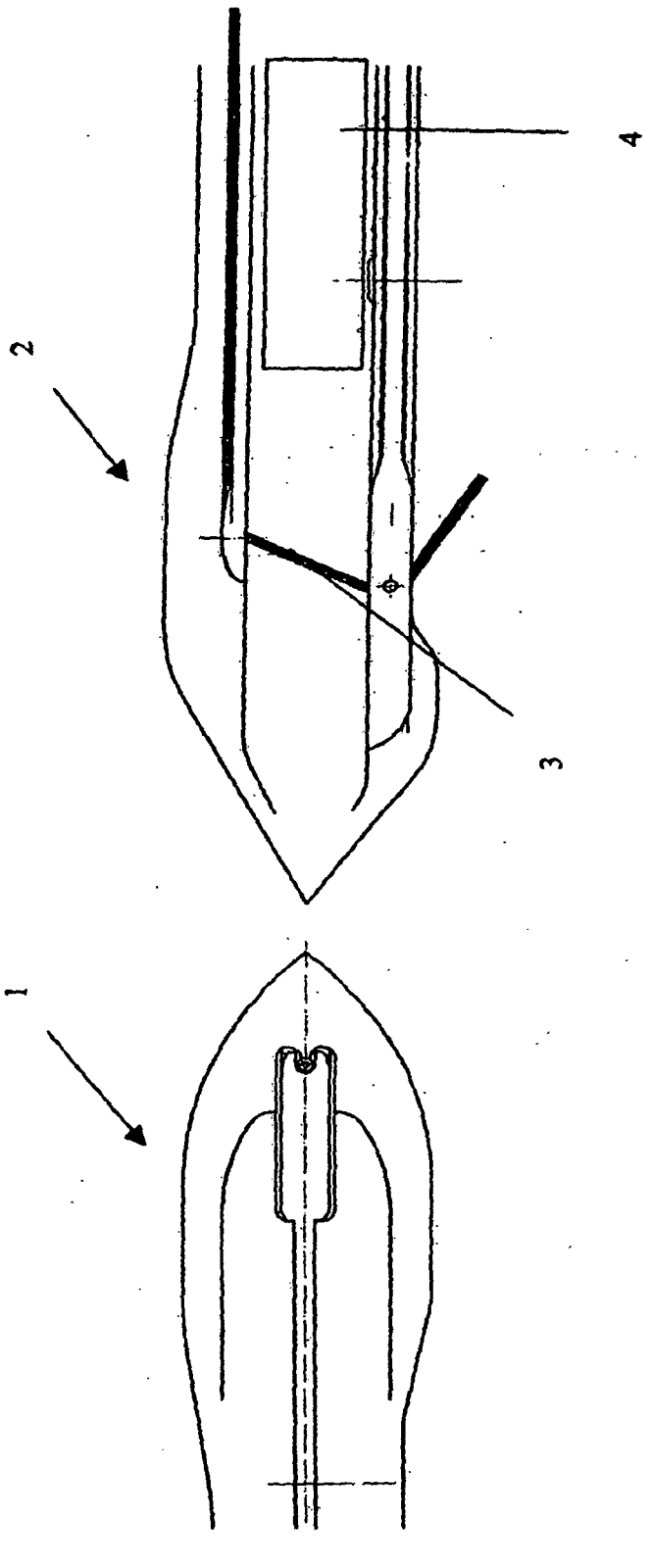


Fig. 1

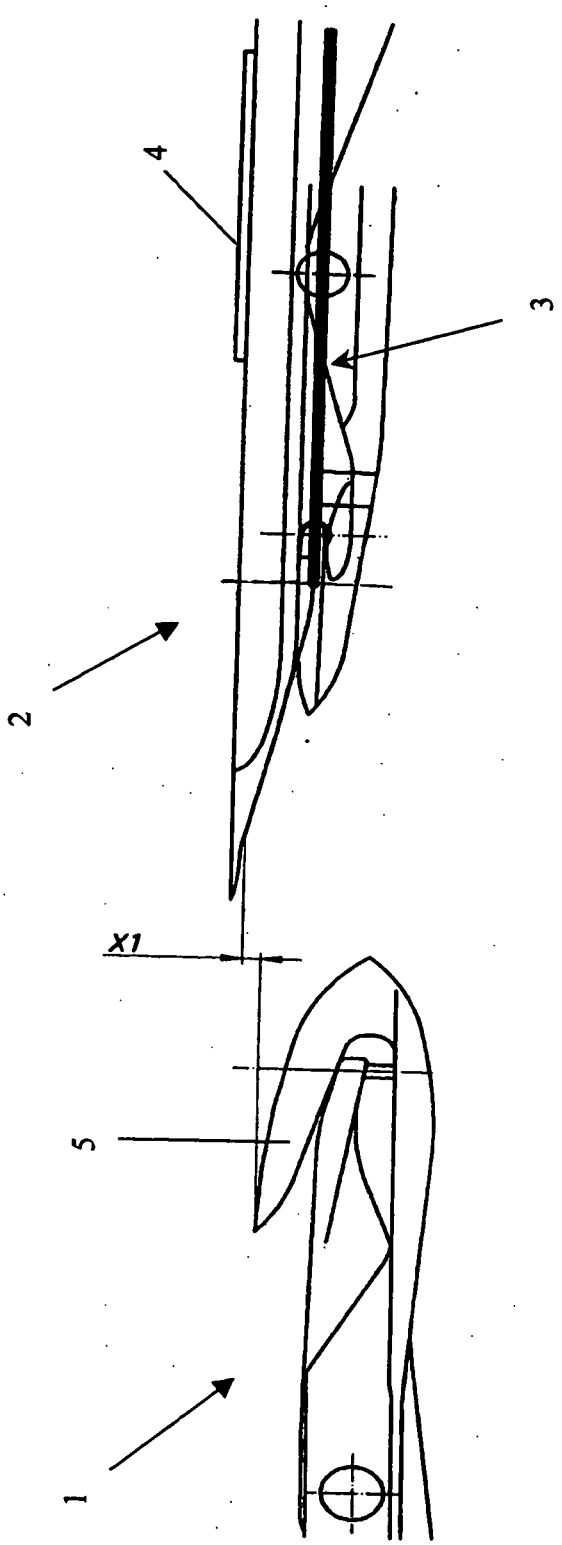


Fig. 2

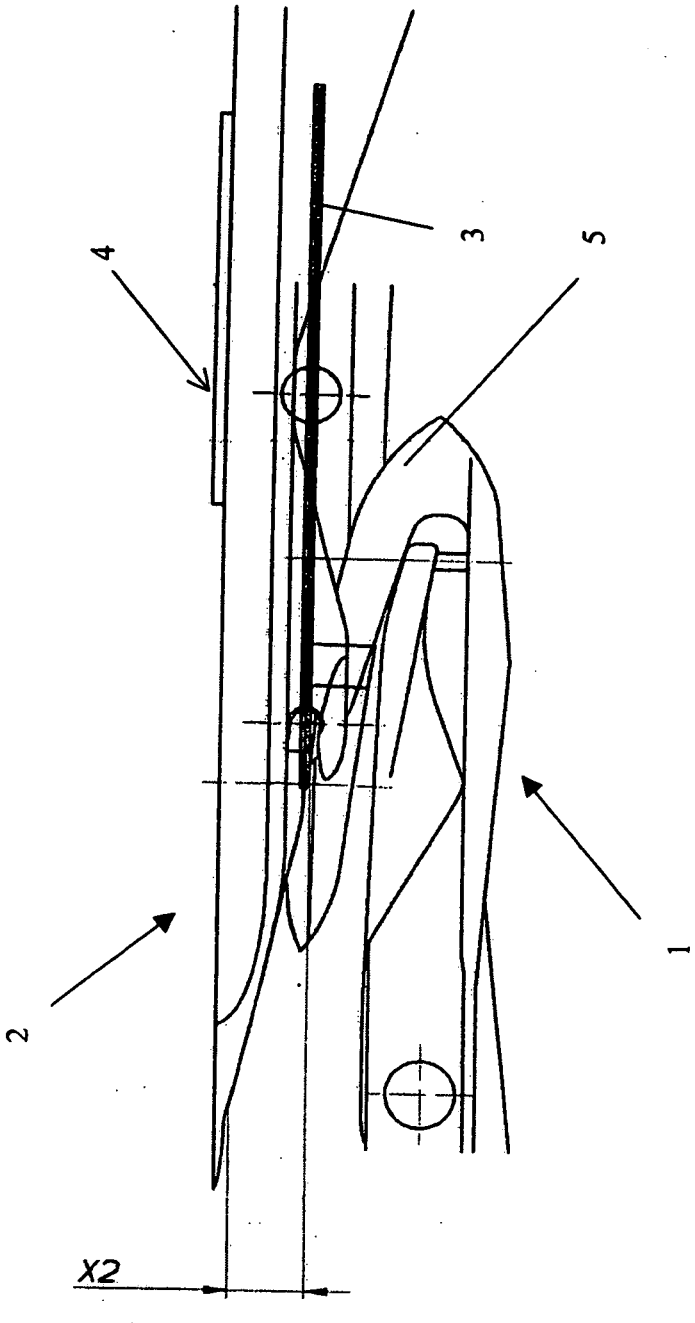


Fig. 3

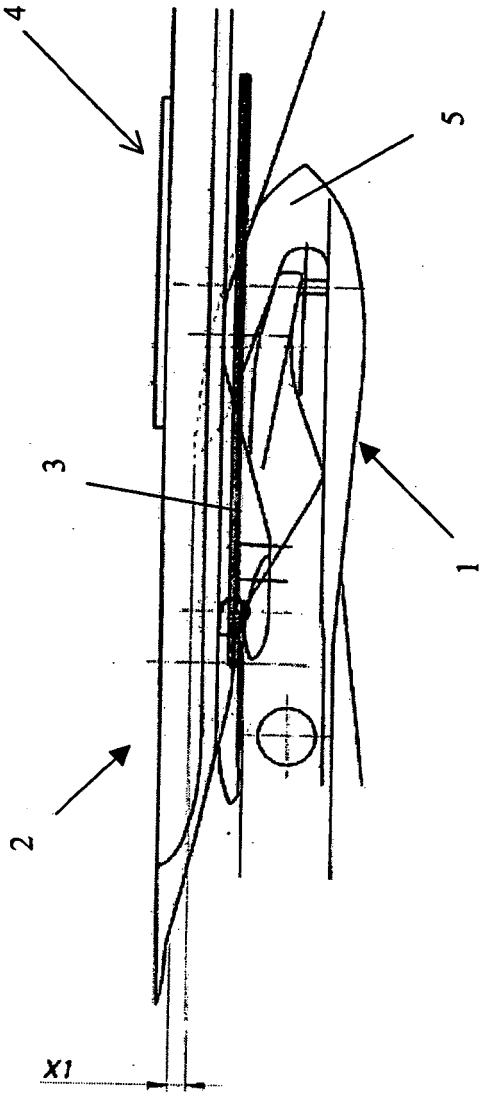


Fig. 4