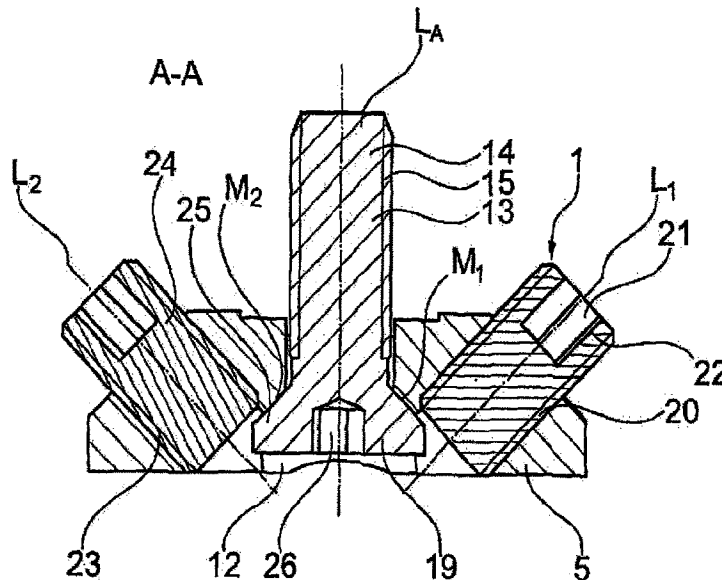




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(54) **Title: PROFILE CONNECTOR AND PROFILE ASSEMBLY**



(57) **Abrégé/Abstract:**

A profile connector for connecting a first and a second profile bar composed of a light metal alloy, having a body that can be received in an undercut longitudinal groove of the second profile bar, at least one support leg, an armature screw which has a screw head for fixing the profile connector to the first profile bar, and a first clamping screw which serves to adjust the body along the armature screw away from the armature screw head in the direction of the first profile bar. On the body, there is a moulding-in geometry designed and arranged to mould into the first profile bar by virtue of the first clamping screw being tightened to produce positive locking between the body and the first profile bar.



ABSTRACT

A profile connector for connecting a first and a second profile bar composed of a light metal alloy, having a body that can be received in an undercut longitudinal groove of the second profile bar, at least one support leg, an armature screw which has a screw head for fixing the profile connector to the first profile bar, and a first clamping screw which serves to adjust the body along the armature screw away from the armature screw head in the direction of the first profile bar. On the body, there is a moulding-in geometry designed and arranged to mould into the first profile bar by virtue of the first clamping screw being tightened to produce positive locking between the body and the first profile bar.

DESCRIPTION

Profile connector and profile assembly

TECHNICAL FIELD

The invention relates to a profile connector for connecting two profile bars, each of which is made in particular from a light metal alloy, and each most particularly preferably having at least one undercut elongated groove.

BACKGROUND OF THE INVENTION

The profile bars themselves are not part of the profile connector, but they can be attached to each other at right angles to one another with the connector. The profile connector comprises a body preferably in the form of a cold extruded part, most particularly preferably made of steel, with a side preferably consisting of a comb bar and which when fitted faces towards the first profile bar, preferably a bearing side for bearing on a first profile bar, particularly on a face side of a first profile bar, wherein the body may be accommodated in an undercut elongated groove, particularly a T-groove, of a second profile bar. The body has at least one bracing leg for bracing against an undercut in the undercut elongated groove of the second profile bar (to enable a force in the direction of the first profile bar to be applied to the second profile bar). Inside the body, a through opening is provided that preferably has no internal thread and extends perpendicularly both to a longitudinal extension of the body and to the second elongated groove of the second profile bar, and in which an anchor bolt with a screw head is seated, with which the profile connector may be fixed on the first profile bar, in particular on the

frontal face thereof, still more preferably in a centric internal threaded opening. It is particularly preferable if the screw head can be countersunk completely in the body. A first inner internal threaded opening, in which a first clamping screw, preferably in the form of a grub screw is fitted, extends inside the body at a slant, that is to say at an angle to a longitudinal centre line of the through opening. This is designed and arranged to displace the body along the anchor bolt away from the screw head, towards the first profile bar, by tightening the clamping screw in the internal thread, in other words by screwing the clamping screw towards the anchor bolt and at the same time bracing the clamping screw on the anchor bolt, which to this extent serves as a thrust bearing. The clamping screw is actuated from the outside through the groove opening of the undercut elongated groove of the second profile bar. The invention further relates to a profile assembly..

DE 41 27 284 C1 describes a profile connector for connecting two aluminium profile bars. The known profile connector comprises a body with two openings, a through opening for accommodating an anchor bolt for anchoring the profile connector in a first profile bar, and an internal threaded opening extending at an angle thereto, in which a grub screw can be screwed in the direction of the anchor bolt to apply load to and so displace the body, and therewith also a second profile bar that accommodates the body in an undercut elongated groove, towards the first profile bar. In the known profile connector, this pressing force is not applied evenly over the full area of the undercut elongated groove of the second profile

connector, but rather along a bearing line, since the tightening of the clamp screw causes the body to be tilted relative to the anchor bolt. In order to ensure that the second profile bar can be pressed against the body which is held in place on the first profile bar, the anchor bolt of the known profile connector must not be tightened until it is immovable, because otherwise the undercuts of the undercut elongated groove of the second profile connector cannot be pushed between the bracing leg of the body and the face side of the first profile bar. In practice, if an anchor bolt is tightened too far, it is often necessary to loosen it before the second profile body is slid onto the body.

This problem is also the reason why there is no defined bearing or bracing area for the first clamping screw on the anchor bolt. It is also disadvantageous that, despite the non-positive connection between the first and second profile bars, it is still or remains possible for the profile bars to twist about the longitudinal centre line of the anchor bolt.

An alternative profile connector including two clamping screws as well as an anchor bolt is described in EP 1 141 562 B1, but in this case the clamping screws are aligned parallel to the anchor bolt and are braced on the body, not on the anchor bolt. The internal threaded openings for accommodating the clamping screws are not provided on the body, but in clamping shoes that are separate from the body. This disadvantage of the known profile connector is the fact that it consists of many separate parts. Moreover, a problem this known profile connector is that

the anchor bolt cannot be tightened until it is immovable, to enable the second profile bar to be pushed on.

A profile connector with a flat bracing surface is known from DE 196 41 500 A1. In this case too, a defined preassembly is not possible.

EP 1 141 562 B1 describes a profile connector with two clamping screws arranged parallel to and at a distance from the anchor bolt, wherein the known profile connector can be braced on a profile bar with flat bracing surfaces. Defined preassembly is not possible.

Document EP 2 717 870 A1 describes a profile connector comprising two clamping screws arranged biangularly, preferably perpendicularly to one another, wherein said clamping screws are braced against the anchor bolt. A defined pre-assembly of the profile connector frontally on a profile bar is not possible.

SUMMARY OF THE INVENTION

Against the background of the state of the art as described in the preceding text, the object underlying the invention is to describe an alternative profile connector for connecting two profile bars to each other, particularly bars made from a light metal alloy. It should preferably be easily possible to fit the profile connector on a first profile bar beforehand, particularly on the front face thereof. In addition or alternatively thereto, the profile connector should be designed such that in the fixed state it is possible to reliably prevent

the profile bars attached to each other from twisting relative to one another about the longitudinal centre line of the anchor bolt. In addition or alternatively thereto, the profile connector should consist of the smallest possible number of parts and bear over a large expanse on the at least one undercut of the undercut elongated groove of the second profile bar, thereby also enabling a force to be applied over a large area to the second profile bar in the direction of the first profile bar. In addition or alternatively thereto, the profile connector should be designed such that the transmission of force from the at least one clamping screw to the anchor bolt is optimised, and in particular a defined clamping situation and bearing situation on the anchor bolt is assured. Moreover, the object consists in describing a profile assembly that is manufactured or manufacturable with a profile bar that has been constructed according to the concept of the invention, and which in addition to the profile connector is also furnished with two profile bars arranged at right angles to each other, and made from a light metal alloy, wherein at least the second profile bar has at least one undercut elongated groove. Preferably, both profile bars have at least one, preferably multiple undercut elongated grooves.

This object is solved with a profile connector, and with a profile assembly. Advantageous refinements of the invention are described. The scope of the invention extends to all combinations of at least two of the features disclosed in the description, and/or the figures.

The invention relates to a profile connector for connecting a first and a second profile bar, made in particular from a light metal alloy, with a body which can be accommodated in an undercut elongated groove in the second profile bar and has at least one bracing leg for bracing against an undercut of the undercut elongated groove of the second profile bar, and an anchor bolt which is accommodated in a through opening that is created in the body and extends at right angles to a longitudinal extension of the body;

wherein the anchor bolt has an anchor bolt head and fixes the profile connector particularly frontally, on the first profile bar, and with a first clamping screw accommodated in an internal threaded opening provided inside the body and extending at an angle to a longitudinal centre line (L_A) of the through opening, wherein the clamping screw serves to displace the body along the anchor bolt away from the anchor bolt head towards the first profile bar by tightening the first clamping screw in the internal thread of the first internal threaded opening, thereby bracing the first clamping screw on the anchor bolt; and

wherein a forming geometry is conformed and arranged on the body for shaping particularly frontally into the first profile bar by tightening the first clamping screw to create a positive locking connection between the body and the first profile bar.

It is particularly favourable if the forming geometry is shaped particularly as a wedge that tapers in a direction away from the body.

It has been found to be particularly advantageous if the forming geometry is elongated and/or extends parallel to a lengthwise extension of the body or perpendicularly thereto.

Moreover it is particularly favourable if the longitudinal centre line (L_1) of the first clamping screw, and/or the longitudinal centre line (L_2) of a second clamping screw, or a combination thereof, is arranged orthogonally with an axis extending in the bracing surface, particularly a surface line (M_1 and/or M_2) extends at a conical angle to the longitudinal centre line (L_A) of the anchor bolt.

Additionally it is particularly favourable if the body is designed with a T-shaped cross-section, and wherein the bracing legs are preferably inclined away from the T-shape.

The invention also relates to a profile assembly comprising a profile connector as defined above, a first profile bar, and a second profile bar arranged perpendicularly to the first profile bar and having an undercut elongated groove, wherein;

the profile connector is fixed by its anchor bolt in particular frontally on the first profile bar, in particular in a central interior threaded opening; and

the second profile bar, is, and/or can be, placed under tension by tightening the at least one clamping screw against the first profile bar.

It is particularly favourable if the forming geometry of the profile connector is formed particularly frontally into the

material of the first profile bar, and in this way the body of the profile connector is connected in a positive locking, particularly torsion-proof manner to the first profile bar.

Moreover, it is particularly favourable if an overall height extension of the body with the forming geometry oriented parallel to the lengthwise extension (L_A) of the anchor bolt is chosen such that, when the body of the profile connector is seated in the undercut elongated groove, and preferably frontally with the forming geometry thereof resting against the first profile bar, the second profile bar of the profile connector is displaceable relative to the body and to the first profile bar along the lengthwise extension (L_A) of the undercut elongated groove.

It has been found to be particularly advantageous if the first clamping screw, and/or a second clamping screw, or a combination thereof, is/are braced against an inclined bracing surface of the anchor bolt.

The invention is based on the underlying idea of providing a forming geometry to the side of the body that faces the profile connector when the profile connector is in the assembled state, preferably to a bearing surface of the body for frontal bearing on the first profile bar, which geometry is designed and arranged such that the displacement of the body towards the first profile connector, particularly towards a face side of the first profile connector (brought about by tightening the clamping screw), causes said geometry to mould with the profile connector material of the profile connector, that is to say to produce a form-congruent recess in the first profile bar, so

that a positive locking fit is created thereby between the body and the first profile bar. During forming, material of the first profile bar is reshaped by the pressure applied to the material of the first profile bar because of the forming geometry, so as to produce a recess to accommodate the forming geometry in the face side of the first profile bar. In a profile assembly that has been produced with profile connectors according to the concept of the invention, this positive locking fit prevents the profile bars from twisting relative to each other about the longitudinal centre line of the anchor bolt. In addition, an electrically conductive connection may be produced between the body and the first profile bar via the forming geometry. It is most particularly preferable if the profile connector in a profile assembly that has been produced with a profile connector according to the invention is made from a harder material, particularly steel, than the material used to produce the first profile bar, which is preferably made from a light metal alloy, particularly an aluminium alloy. Most particularly preferably, the forming geometry tapers towards the first profile bar. Also preferably, the forming geometry has a smaller width dimension than a comb bar that is preferably provided to support the forming geometry of the body with preferably T-shaped cross-section, or than an outer diameter of an anchor bolt shaft.

As will be explained later with regard to the profile assembly according to the invention, the forming geometry makes it possible for the first time to preassemble the profile connector for producing a profile assembly in a defined way, for which purpose the profile connector, particularly the body thereof, is dimensioned such that the anchor bolt can be tightened until

the body of the profile connector with its forming geometry lies flush against the face side of the first profile bar, i.e., is braced there (still without having been formed into the face side of the first profile bar), and in this state the gap or distance between the at least one bracing leg and the face side of the first profile connector is larger, in particular larger by a clearance dimension, than the thickness or height extension of the at least one undercut of the undercut elongated groove of the second profile bar measured in the same direction, thus making it possible in this respect, when the profile connector is in the preassembled state with the anchor bolt tightened, for the second profile bar to be pushed onto the preassembled profile connector, more precisely onto the body thereof, so that the second profile bar can then be shifted farther towards the first face side of the first profile bar by tightening the at least one clamping screw at the desired shifted position (with the forming geometry into the material of the first profile bar), in order to fix the profile bars to one another (permanently and in torsion-proof manner) and at the same time shape the forming geometry of the body of the first profile connector into the material of the first profile bar. Expressed another way, it is provided in a refinement of the invention that an overall height extension of the body aligned parallel to the lengthwise extension of the anchor bolt is chosen with the forming geometry such that when the body of the profile connector is seated in the undercut elongated groove of the second profile bar the second profile bar is displaceable relative to the body and to the first profile bar along the lengthwise extension of the undercut elongated groove of the second profile bar. In the preassembled state, the body of the

first profile bar is reliably prevented from twisting by the frictionally engaged contact on the face side of the first profile bar.

As was stated earlier, it is particularly favourable if the forming geometry includes at least one forming geometry section that tapers away from the body (towards the first profile bar). This is preferably wedge-shaped at least in sections thereof. It is particularly favourable if the forming geometry is elongated, in particular having the shape of an elongated wedge, wherein the elongated forming geometry may extend in the direction of the longitudinal extension of the body, i.e. in the direction of the longitudinal extension of the undercut elongated groove of the second profile bar, or also perpendicularly thereto. The forming geometry does not necessarily have to be wedge-shaped. If the shape is correspondingly thin or has low width, the geometry does not have to taper towards the first profile bar in order to assure a forming effect.

An embodiment in which the forming geometry does not have only a single forming section, but rather at least or exactly two forming sections, preferably spread over the two lengthwise sides of the body that are set apart by the through opening for the anchor bolt so that a positive locking fit may be created between the body and the first profile bar on two opposite sides of the anchor bolt is particularly preferred.

It has been found to be particularly advantageous if the profile connector is furnished on at least one end with a countersunk

section, which may protrude into an undercut elongated groove in the first profile bar when the profile connector is in the assembled state, thus serving as a further anti-torsion means. At least one forming section of the forming geometry is located preferably between the countersunk section and the through opening in the direction of the longitudinal extension of the profile connector.

It has been found to be particularly advantageous, particularly for an embodiment of the profile connector in which the anchor bolt head may be countersunk at least partly, preferably completely within the body preferably in a widened end section of a through opening, if the first internal threaded opening (and preferably also an optional, second internal threaded opening, which will be explained later in this document), which is/are inclined with respect to the through opening extend(s) at an angle thereto open(s) into the through opening, so that the clamping screw in the threaded opening may be braced on the anchor bolt inside the body. In this way, a particularly rugged profile connector is obtained which is optimised for the installation space and can also be assembled relatively easily.

In a refinement of the invention, it is advantageously provided that the profile connector has not only a single internal threaded opening extending at an angle to the through opening, but two such internal threaded openings, so that besides the first clamping screw a second clamping screw is also adjustable towards the anchor bolt, particularly towards the anchor bolt head. In this context, the internal threaded openings are arranged such that the clamping screw arranged therein can be

operated and/or tightened through the groove opening in the undercut elongated groove of the second profile bar. Such an embodiment has the advantage that it is possible to prevent the body from being canted relative to the anchor bolt by tightening the two clamping screws evenly against the anchor bolt, and thereby obtaining the effect of flat bearing of the profile connector body, particularly of the at least one bracing leg, preferably of two bracing legs on the at least one, preferably on two parallel undercuts of the undercut elongated groove of the second profile bar. In this way, it is possible to reliably prevent the canting that occurs with the profile connector known from DE 41 27 284 C1. Unlike the profile connector known from EP 1 141 562 B1, a profile connector constructed according to the concept of the invention requires far fewer parts to perform its function, it is of simpler design, and particularly robust due to the bracing of both clamping screws on the anchor bolt, preferably in an area inside the body.

It is particularly practical if the internal threaded openings are arranged onto opposite sides of the through opening in the direction of the longitudinal extension of the body and/or the undercut elongated groove of the second profile bar. In such case, it is further preferable if the longitudinal centre lines of the two clamping screws and the longitudinal centre line of the anchor bolt are arranged in a common plane.

It has proven to be particularly advantageous if the longitudinal centre line of the first clamping screw and the longitudinal centre line of the second clamping screw form the

same angle in terms of amount with the longitudinal centre line of the anchor bolt, in particular at least approximately 45°.

In a refinement of the invention, it is advantageously provided that the anchor bolt has a (defined) inclined bracing surface for bearing on and bracing against the first (and a second if provided) clamping screw, wherein in this context inclined means that the bracing surface is at an angle not equal to 90° with respect to the longitudinal centre line of the anchor bolt and at an angle not equal to 90° with respect to a radial plane of the anchor bolt, which extends perpendicularly to the longitudinal centre line of the anchor bolt. The bracing surface is preferably arranged at an angle between 20° and 70°, preferably between 30° and 60°, more preferably between 40° and 50°, and most particularly preferably at least approximately 45° relative to the longitudinal centre line of the anchor bolt. With the provision of a defined inclined bracing surface for the at least one clamping screw, the bracing situation, and the magnitude of the axial force component generated for displacing the body along the anchor bolt is not arbitrary as is the case in the related art, but defined, which is particularly advantageous for an embodiment according to which the at least one internal threaded opening for the at least one clamping screw opens into the through opening for the anchor bolt inside the body, so that the clamping screw may be braced inside the body on the anchor bolt, particularly on the anchor bolt head.

It has proven particularly advantageous for producing such an inclined bracing surface if the screw head of the anchor bolt is constructed preferably as a countersunk head which can be

sunk into the body, wherein in this case the bracing surface is preferably formed by a conical surface of the countersunk head which tapers towards the front end of the screw.

It has proven particularly practical if the longitudinal centre line of the first clamping screw, and if provided a longitudinal centre line of a second clamping screw, extend(s) at right angles to an axis extending in the bracing surface (and continuing beyond it), i.e. which not only touches and intersects said surface, in particular of a surface line of a conical bracing surface extending at a cone angle to the longitudinal centre line of the anchor bolt. In such, it is still more preferable if a face side of the first clamping screw, and if provided a face side of the second clamping screw as well are flat, i.e., extend in a radial plane with the respective longitudinal centre line of the clamping screw, to provide the largest possible bearing surface for bracing against the bracing surface of the anchor bolt. This configuration does not necessarily mean that the full expanse of face side of the first - and if provided the second - clamping screw(s) must lie flush against the bracing surface, or that the longitudinal centre line(s) of the one or more clamping screws meet the bracing surface. The essential point is first that the one or more longitudinal centre lines of the one or more clamping screws form(s) an angle of 90° with the axis that extends in the bracing surface and notionally extends beyond said bracing surface, wherein the intersection point between the one or more longitudinal centre lines and the respective axis of the bracing surface may also lie outside the bracing surface, particularly if the clamping screw is only braced

against the bracing surface with a peripheral section of the face side.

It has proven particularly practical if the longitudinal centre line of the first clamping screw and/or the longitudinal centre line of an optional second clamping screw and/or the longitudinal centre line of the associated internal threaded openings form(s) an angle with the longitudinal centre line of the anchor bolt from an angular range between 20° and 70° , preferably between 30° and 60° , more preferably between 40° and 50° , most particularly preferably (at least approximately) 45° . A flat face side of the one or both clamping screw(s), forming the basis for the bracing surface preferably extends parallel to an axis that extends within the bracing surface.

One embodiment of the profile connector has proven to be particularly advantageous, in which a leg forming geometry particularly (but not necessarily) in a wedge shape is provided on the at least one bracing leg on a side facing the undercuts of the undercut elongated groove of the second profile bar, for shaping into the undercuts of the undercut elongated groove of the second profile bar and thereby creating a positive locking fit by tightening of the at least one clamping screw. In this way, an external electrically non-conductive layer that may be provided on the second profile bar may be perforated, so creating an electrically conductive connection between the body and the second profile bar. Most particularly preferably, the forming geometry provided according to the invention is provided for this purpose on the bearing side of the body for forming into the first profile bar, since this enables an

electrically conductive connection to be produced between the profile bars via the body. For the purposes of the specific configuration of the leg forming geometry, there are a number of different options. Preferably, several line-shaped forming geometries, in particular wedge geometries, which are tapered towards the undercuts of the undercut elongated groove of the second profile bar are provided, in order to make forming easy, by tightening the clamping screws.

Particularly preferred is an embodiment of the body in which the body has two lateral bracing legs, each designed to bear on one of two parallel undercuts of the undercut elongated groove, preferably a T-groove, of the second profile bar, wherein the bracing legs are surpassed in the direction of the first profile bar by a comb bar that forms the side facing the first profile bar. Such a configuration results in a construction of the body in the shape of a "T" when viewed in cross section, wherein the comb bar protrudes into the region between the parallel undercuts of the undercut elongated grooves towards the first profile bar, and preferably continues on both sides of the through opening. The comb bar preferably forms a bearing surface for bracing on the face side of the profile bar, particularly with forming geometry that is formed into the first profile bar.

The forming geometry is most particularly preferably arranged on a comb bar as described previously, which extends beyond the at least one bracing leg in the direction of the first profile bar and which faces towards the first profile bar when installed correctly.

It is most particularly favourable if the two bracing legs of the body "T" shape are chamfered on a(n) (under)-side of the body which is facing away from the first profile bar and from the base of the undercut elongated groove of the second profile bar, particularly so that they may be adapted to some degree to an at least approximately shape-congruent groove configuration.

The invention also relates to a profile assembly with a profile connector produced according to the concept of the invention. Besides the profile connector, the profile assembly also includes the two profile bars arranged at right angles to each other, made in particular from a light metal alloy, preferably an aluminium alloy, wherein the profile connector is fixed to the first profile bar by means of the anchor bolt, particular by screwing the anchor bolt into a central internal threaded opening in the first profile bar, wherein the internal thread may be prepared, that is to say it may be provided before the anchor bolt is screwed in, or alternatively the anchor bolt may be constructed as a thread-forming, particularly self-tapping screw. Alternatively, it is possible to fix the anchor bolt with its thread in a threaded sleeve, which is then fixable or fixed in a preferably provided undercut elongated groove of the first profile bar. In a preassembled profile assembly, the body of the profile connector is then seated in an undercut elongated groove of the second profile bar, and is braced with one bracing leg against an undercut of the undercut elongated groove in order to apply a force to the second profile bar in the direction of the first profile bar along the longitudinal extension of the anchor bolt, by tightening, i.e. turning the

first clamping screw tighter, and preferably an optional second clamping screw as well, against the anchor bolt, preferably against an inclined bracing surface of the anchor bolt, inside the associated internal threaded opening.

In the assembled and tightened state, the body of the profile connector creates a positive locking fit with the first profile bar, preferably by virtue of its forming geometry, as the forming geometry of the profile connector is shaped into the material of the first profile bar, particularly on the front side. This preferably also gives rise to a torsion-proof connection, which reliably prevents the profile bars from twisting about the longitudinal centre line of the anchor bolt. Most particularly preferably, the formed geometry is moulded into a peripheral wall or a section of a peripheral wall of the first profile bar, which surrounds a centric internal threaded opening for receiving the anchor bolt.

In order to ensure that for the first time the profile connector can be preassembled in defined manner to produce a profile assembly, in a refinement of the invention it is provided that the profile connector, particularly the body, is dimensioned such that the anchor bolt may be tightened until the body of the profile connector is braced with its forming geometry on the face side of the first profile connector, and in this condition the gap or distance between the at least one bracing leg and the face side of the first profile connector larger (particularly larger by a clearance dimension) than the thickness or height extension of the at least one undercut of the undercut elongated groove (measured in the direction of the

depth extension of the elongated groove) of the second profile bar, thus making it possible in this respect, when the profile connector is in the preassembled state as described previously with the anchor bolt tightened, for the second profile bar to be pushed onto the preassembled profile connector, more precisely onto the body thereof, so that the second profile bar can then be shifted farther towards the first face side of the first profile bar by tightening the at least one clamping screw at the desired shifted position (with the forming geometry into the material of the first profile bar), in order to fix the profile bars to one another and at the same time shape the forming geometry of the body of the first profile connector into the material of the first profile bar. In other words, in a refinement of the invention it is provided that in order to enable the profile connector to be preassembled it is provided that an overall height extension of the body aligned parallel to the lengthwise extension of the anchor bolt (preferably with anchor bolt shaft already countersunk therein) is chosen with the forming geometry such that when the body of the profile connector is seated in the undercut elongated groove of the second profile bar the second profile bar is displaceable relative to the body and to the first profile bar along the lengthwise extension of the undercut elongated groove. In this state, the forming geometry has preferably not begun to form into the material of the first profile connector, or at least is not yet fully formed.

Most particularly preferably, in order to ensure that the profile connector can be readily preassembled on the first profile bar, a total height extension of the body (with the

anchor bolt head already seated therein) aligned parallel to the longitudinal extension of the anchor bolt is larger, in particular larger by an assembly clearance, than the distance measured parallel to the anchor bolt of the longitudinal extension between an external elongated groove opening of the undercut elongated groove of the second profile bar and the base of said elongated groove.

In this context, it has proven particularly advantageous if a total height extension of a body preferably having a T-shaped cross section and the forming geometry aligned parallel to the longitudinal extension of the anchor bolt and a comb bar (preferably perforated in the middle by the through opening and/or continuing on both sides of the through opening) extending beyond the bracing leg of the body in the direction of the first profile bar is larger than a height extension of the undercuts of the undercut elongated groove of the second profile bar measured in the same direction.

According to a particularly preferred embodiment, as was described in the introduction, the profile connector has a countersunk section for frontal countersinking in an undercut elongated groove of the first profile bar. Most particularly preferably, two countersunk sections are provided at a distance from each other along the longitudinal extension of the profile connector. The at least one countersunk section in a completed profile assembly is preferably accommodated in an undercut elongated groove of the first profile bar, thereby ensuring additional torsion-proofing.

In the event that the profile connector to be used for the profile assembly has an inclined bracing surface, particularly a cone surface, and more preferably said surface is on the anchor bolt head, for the purposes of an advantageous configuration of the profile assembly it is preferred if the first clamping screw, and a second clamping screw if provided, is/are braced on its/their preferably flat frontal face(s) against the inclined bracing surface of the anchor bolt, most particularly preferably inside the body of the profile connectors, which also more preferably accommodates the anchor bolt head, at least a section thereof, preferably entirely, inside itself, in particular in a widened section of the through opening.

Particularly for an embodiment of the profile assembly with a profile connector that consists of two clamping screws, it is advantageous if both clamping screws are tightened in such manner that the body of the profile assembly, when viewed in the direction of the longitudinal extension of the body is braced on both sides (lengthwise sides) of the anchor bolt against the face side of the first profile bar and bears thereon. Moreover, it is most particularly preferable if at least one bracing leg of the body bears in planar manner, i.e. not linearly, on the undercuts of the undercut elongated groove of the second profile bar.

Particularly preferred is an embodiment of the profile assembly in which when the first clamping screw and the second clamping screw (if two clamp screws are present) is/are tightened a longitudinal centre line of the body is positioned orthogonally

to the longitudinal centre line of the first profile bar and extends parallel to a longitudinal extension or lengthwise axis of the undercut elongated groove of the second profile bar, in which the body is seated.

Further advantages, features and particularities of the invention will become apparent from the following description of preferred embodiments with reference to the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1: shows a lengthwise cross section through the representation of a profile connector according to Fig. 2,

Fig. 2: is a plan view of the profile connector of Fig. 1,

Fig. 3: is a view of a profile connector produced according to the concept of the invention in the direction of its lengthwise extension (accurate projection of the representation of Fig. 2),

Fig. 4: is a perspective view of a profile connector constructed according to the concept of the invention,

Fig. 5

to

Fig. 8: various partially cut away illustrations of a profile assembly produced with a profile connector

constructed according to the concept of the invention, wherein a second profile bar, which will be explained subsequently, is seated in the undercut elongated groove of the second profile bar but, contrary to a usual arrangement, it is not fully seated, which would be/is preferred, to better illustrate the invention.

In the figures, identical elements and elements with the same function are identified with the same reference signs.

DETAILED DESCRIPTION

As is made evident by figures 5 to 8, the profile connector of figures 1 to 4 is used to produce a profile assembly 2 which besides profile connector 1 also comprises a first profile rod 3 and a second profile rod 4 aligned orthogonally thereto.

From figures 1 to 4, it may be seen that profile connector 1 comprises a body 5 as a cold extruded part made from steel, which in the cross sectional view of figure 3 is in the shape of a "T". Body 5 is equipped with an elevated comb bar 6 (in the direction of the first profile bar), which surpasses the two lateral bracing legs 7, 8, each of which is braced against the underside of an undercut 9, 10 of an undercut elongated groove 11 in second profile bar 4 in a profile assembly, in this way tightening second profile bar 4 towards first profile bar 3 and applying a tensile force thereto.

A through opening 12 is provided in body 5, or more precisely in the comb bar 6 that extends beyond bracing legs 7, 8, in

this case preferably in the centre or middle thereof, and serves as seating for an anchor bolt 13 in the form of a countersunk screw with a shaft 14 which is furnished with an external thread 15 which can be screwed together with internal thread 16 of a centric internal thread opening 17 (in this case an uninterrupted channel) in face side 18 of first profile bar 3 and is screwed together in a profile assembly.

Through opening 12 has a stepped design to prevent an anchor bolt 13 with an anchor bolt head 19 from slipping.

In addition, two internal thread openings are formed to the side of and extending or passing at an angle to the longitudinal extension of anchor bolt 13 in comb bar 6, each of which accommodates a clamping screw. For specific purposes, this is a first internal thread opening 20 accommodating a first clamping screw 22 in the form of a grub screw and having a frontal drive face 21.

On the side that is separated by means of anchor bolt 13 there is a second internal thread opening 23 with a second clamping screw 24, also in the form of a grub screw. Figure 1 shows that the longitudinal centre lines of first and second clamping screws L_1 , L_2 each extend at an angle of about 45° to a longitudinal centre line L_A of anchor bolt 13. All of the longitudinal centre lines L_1 , L_2 , L_A are in a common plane, which also accommodates a longitudinal centre line L_K of body 5 shown in figure 2.

In order to shift body 5 together with the second profile bar 4 away from the anchor bolt head 19 and towards first profile bar 3, at least one of the clamping screws 22, 24, preferably both clamping screws 22, 24 are tightened, that is to say screwed farther into body 5, against a bracing surface 25, here in the form of a conical surface, of anchor bolt 13, which in the embodiment shown is formed by anchor bolt head 19 with a countersunk head. It should be noted that a surface line M_1 of bracing surface 25 is orientated orthogonally to longitudinal centre line L_1 of first clamping screw 22, and a further surface line M_2 is orientated perpendicularly to longitudinal centre line L_2 of second clamping screw 24. Thus, the flat face sides of the clamping screws 22, 24 extend parallel to the respectively associated surface lines.

The first and second internal thread openings 20, 23 also open into the stepped through opening 12 inside body 5, so that the clamping screws 22, 24 may be braced on the conical bracing surface of anchor bolt 13 inside body 5.

Figure 1 shows that the side of anchor bolt 13 facing away from first profile bar 3 has an anchor bolt drive face 26, which is used for preassembling profile connector 1 with first profile bar 3.

To this end, anchor bolt 13 is tightened via drive face 26 until, as illustrated for this embodiment, a forming geometry 29 consisting of two forming geometry sections 27, 28, which are substantially linear and tapered in a wedge-like arrangement towards the first profile bar 3 is braced against

face side 18 of first profile bar 3, more precisely against a peripheral wall 30 that surrounds centric internal thread opening 17.

The height extension of comb bar 6, that is to say of the body section that extends beyond bracing legs 7, 8 including the height extension of forming geometry 29 is dimensioned such that in this preassembled condition the second profile bar 4 can be slid over body 5 in the direction of the longitudinal extension of undercut elongated groove 11. In other words, the height extension of comb bar 6 including forming geometry 29 is (slightly) greater than the height extension H of the undercuts of the undercut elongated groove 11 which accommodates body 5.

In order to finally fix the two profile bars 3, 4 to each other, clamping screws 22, 24 are tightened further, so that the forming geometry 29 is formed further into the material of first profile bar 3, more precisely into peripheral wall 30, with the result that a torsion-proof connection is created at the same time.

The figures also show that in addition to the forming geometry 29 two countersunk section 31, 32 separated by anchor bolt 13 are provided, forming the end sections of comb bar 6, and which engage in respective undercut elongated grooves 33, 34 in first profile bar on two opposing sides of centric internal thread opening 17 when the profile assembly is fixed, thereby providing additional rotation protection.

As was indicated in the introduction, an embodiment of profile connector 1 having only one internal thread opening 20 and/or only one clamping screw 22 can also be produced. However, the provision of the two clamping screws 22, 24 enables bracing legs 7, 8 to bear flat on undercuts 9, 10 of the undercut elongated groove 11.

Figures 2 and 3 show that a leg bracing geometry 35, in this case in the form of multiple wedge-shaped sections, is provided on bracing legs 7, 8 on the side facing undercuts 9, 10 and/or the bracing surfaces 25 of undercut 9, 10, which are shaped into the material of the second profile bar 4 when clamping screws 22, 24 are tightened, thereby creating an electrically conductive connection between body 5 and second profile bar 4. If the forming geometry 29 is already provided, as is preferred, an electrically conductive connection may be created between the profile bars 3, 4 by combining it with the leg forming geometry 35.

As may be seen in figure 2, the elongated forming geometry sections 27, 28 extend in the direction of the longitudinal extension of body 5. An alternative arrangement perpendicular to this is also possible as an alternative (or additionally).

List of reference signs

- 1 Profile connector
- 2 Profile assembly
- 3 First profile bar
- 4 Second profile bar
- 5 Body
- 6 Comb bar
- 7 Bracing leg
- 8 Bracing leg
- 9 Undercut
- 10 Undercut
- 11 Undercut elongated groove of the second profile bar
- 12 Through opening
- 13 Anchor bolt
- 14 Shaft
- 15 External thread
- 16 Internal thread of the internal threaded opening in the first profile bar
- 17 Internal threaded opening (central opening) in the first profile bar
- 18 Face side of the first profile bar
- 19 Anchor bolt head
- 20 First internal threaded opening in the body
- 21 Drive face
- 22 First clamping screw
- 23 Second internal threaded opening in the body
- 24 Second clamping screw
- 25 Inclined bracing surface
- 26 Anchor bolt drive face

27	Forming geometry section
28	Forming geometry section
29	Forming geometry
30	Peripheral wall
31	Countersunk section
32	Countersunk section
33	Undercut elongated groove of the first profile bar
34	Undercut elongated groove of the second profile bar
35	Leg forming geometry
L ₁	Longitudinal centre line of the first internal thread opening or the first clamping screw
L ₂	Longitudinal centre line of the second internal thread opening or the second clamping screw
L _A	Longitudinal centre line of the anchor bolt or the through opening
L _K	Longitudinal centre line of the body
M ₁	First surface line
M ₂	Second surface line
H	Undercut height

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A profile connector for connecting a first and a second profile bar, made from a light metal alloy, with a body which can be accommodated in an undercut elongated groove in the second profile bar and has at least one bracing leg for bracing against an undercut of the undercut elongated groove of the second profile bar, and an anchor bolt which is accommodated in a through opening that is created in the body and extends at right angles to a longitudinal extension of the body;
wherein the anchor bolt has an anchor bolt head and fixes the profile connector frontally, on the first profile bar, and with a first clamping screw accommodated in an internal threaded opening provided inside the body and extending at an angle to a longitudinal centre line (L_A) of the through opening, wherein the clamping screw serves to displace the body along the anchor bolt away from the anchor bolt head towards the first profile bar by tightening the first clamping screw in the internal thread of the first internal threaded opening, thereby bracing the first clamping screw on the anchor bolt; and
wherein a forming geometry is conformed and arranged on the body for shaping frontally into the first profile bar by tightening the first clamping screw to create a positive locking connection between the body and the first profile bar.

2. The profile connector according to claim 1, wherein the forming geometry is shaped as a wedge that tapers in a direction away from the body.
3. The profile connector according to claim 1 or 2, wherein the forming geometry is elongated or extends parallel to a lengthwise extension of the body or perpendicularly thereto.
4. The profile connector according to any one of claims 1 to 3, wherein the forming geometry has two forming geometry sections which are separated in the direction of the lengthwise extension of the body by the through opening.
5. The profile connector according to any one of claims 1 to 4, wherein a countersunk section of the body is separated from the through opening in the direction of the lengthwise extension of the body by the forming geometry; and wherein the countersunk section can be sunk in a face side of an undercut elongated groove of the first profile bar by tightening the clamping screw.
6. The profile connector according to any one of claims 1 to 5, wherein besides the first clamping screw, a second clamping screw is provided and accommodated in a second internal threaded opening created in the body and extending at an angle to the longitudinal centre

line (L_A) of the through opening inside the body, wherein the second clamping screw serves to displace the body along the anchor bolt away from the bolt head towards the first profile bar by tightening the second clamping screw in the internal thread of the second internal threaded opening, thereby bracing the second clamping screw on the anchor bolt.

7. The profile connector according to any one of claims 1 to 6, wherein the bolt head of the anchor bolt has an inclined bracing surface that is orientated at an angle different from 90° with respect to the longitudinal centre line (L_A) of the anchor bolt and orientated at an angle different from 90° with respect to a radial plane extending at right angles to the longitudinal centre line (L_A) of the anchor bolt, on which the clamping screw can bear.
8. The profile connector according to any one of claims 1 to 7, wherein the first internal thread opening, or a second internal thread opening, or a combination thereof, opens into the through opening.
9. The profile connector according to any one of claims 1 to 8, wherein the longitudinal centre lines (L_1 , L_2) of the clamping screws and the longitudinal centre line (L_A) of the anchor bolt are arranged in a common plane.
10. The profile connector according to any one of claims 1 to 9, wherein the longitudinal centre line (L_1) of the

first clamping screw and the longitudinal centre line (L_2) of the second clamping screw form angles respectively with the longitudinal centre line (L_A) of the anchor bolt that are identical in terms of quantity.

11. The profile connector according to any one of claims 1 to 10, wherein the anchor bolt head of the anchor bolt is in the form of a countersunk head with a conical surface tapering towards the leading anchor bolt end as bearing surface.
12. The profile connector according to any one of claims 1 to 11, wherein the longitudinal centre line (L_1) of the first clamping screw, or the longitudinal centre line (L_2) of a second clamping screw, or a combination thereof, is arranged orthogonally with an axis extending in the bracing surface, wherein a surface line (M_1 or M_2) extends at a conical angle to the longitudinal centre line (L_A) of the anchor bolt.
13. The profile connector according to any one of claims 1 to 12, wherein the longitudinal centre line (L_1) of the first clamping screw, or the longitudinal centre line (L_2) of a second clamping screw, or a combination thereof, forms an angle with the longitudinal centre line (L_A) of the anchor bolt from an angular range between 20° and 70° .

14. The profile connector according to claim 13, wherein the angular range is between 30° and 60°.
15. The profile connector according to claim 13, wherein the angular range is between 40° and 50°.
16. The profile connector according to claim 13, wherein the angular range is 45°.
17. The profile connector according to any one of claims 1 to 16, wherein a leg forming geometry is conformed onto the bracing leg for forming into the undercut of the undercut elongated groove of the second profile bar by tightening the first clamping screw, or a second clamping screw, or a combination thereof.
18. The profile connector according to any one of claims 1 to 17, wherein the body has two lateral bracing legs, in each case for bearing against one undercut of the undercut elongated groove of the second profile bar and that the bracing legs are overhung by a comb bar which forms the bearing face for bearing against the first profile bar.
19. The profile connector according to claim 18, wherein the through opening, and the first internal thread opening, or a second internal thread opening, or a combination thereof, are provided in the comb bar which extends beyond the bracing legs.

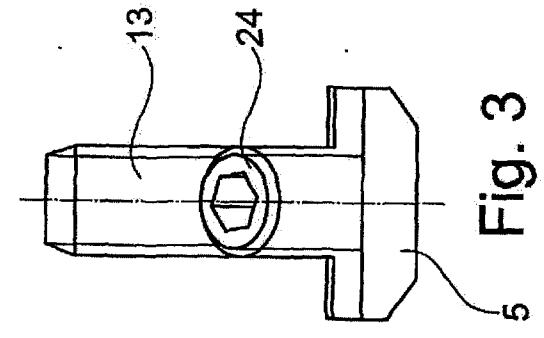
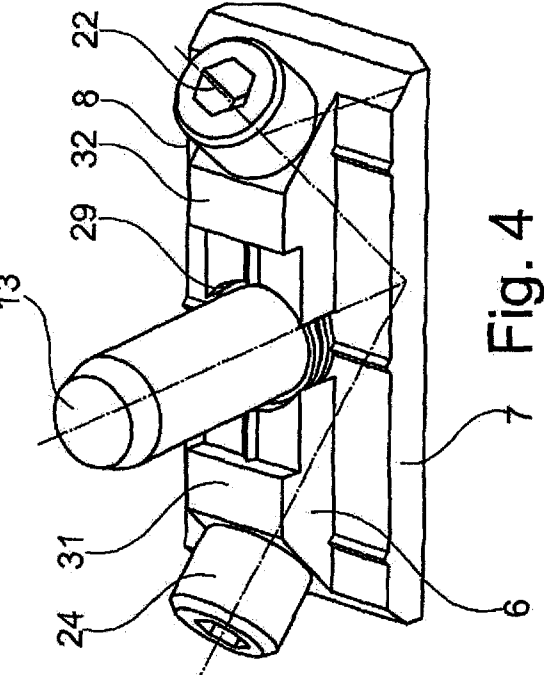
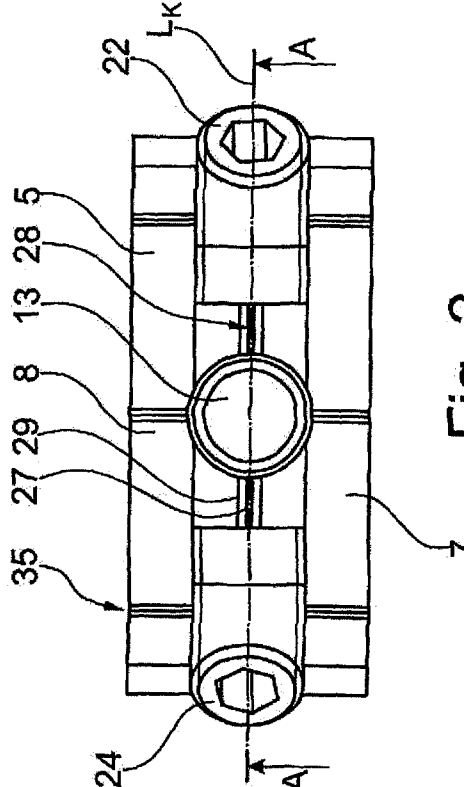
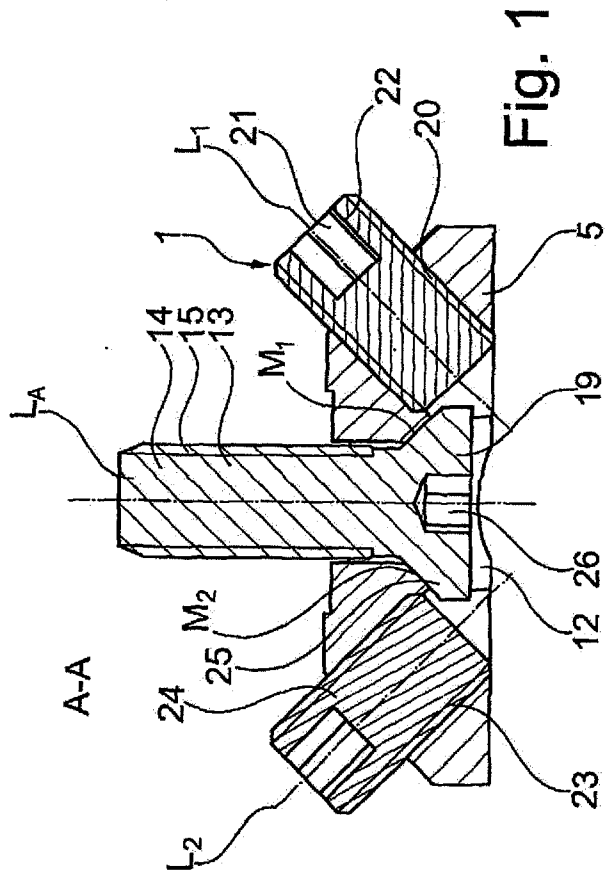
20. The profile connector according to any one of the claims 1 to 19, wherein the body is designed with a T-shaped cross-section, and wherein the bracing legs are inclined away from the T-shape.
21. A profile assembly comprising the profile connector as defined in any one of claims 1 to 20, a first profile bar, and a second profile bar arranged perpendicularly to the first profile bar and having an undercut elongated groove, wherein;
the profile connector is fixed by its anchor bolt frontally on the first profile bar, in a central interior threaded opening; and
the second profile bar, is, or can be, placed under tension by tightening the at least one clamping screw against the first profile bar.
22. The profile assembly according to claim 21, wherein a lengthwise side of the second profile bar is, or can be, placed under tension.
23. The profile assembly according to claim 21 or 22, wherein the forming geometry of the profile connector is formed frontally into the material of the first profile bar, and in this way the body of the profile connector is connected in a positive locking, torsion-proof manner to the first profile bar.

24. The profile assembly according to claim 23, wherein the material of the first profile bar is a light metal alloy.
25. The profile assembly according to any one of claims 21 to 24, wherein the forming geometry is formed frontally in positive locking manner into a peripheral wall of the first profile bar, which encloses a central interior threaded opening that receives the anchor bolt.
26. The profile assembly according to any one of claims 21 to 25, wherein an overall height extension of the body with the forming geometry oriented parallel to the lengthwise extension (L_A) of the anchor bolt is chosen such that, when the body of the profile connector is seated in the undercut elongated groove, and frontally with the forming geometry thereof resting against the first profile bar, the second profile bar of the profile connector is displaceable relative to the body and to the first profile bar along the lengthwise extension (L_A) of the undercut elongated groove.
27. The profile assembly according to any one of claims 21 to 26, wherein an overall height extension of the body with the forming geometry oriented parallel to the lengthwise extension (L_A) of the anchor bolt is greater than the distance, measured parallel to the lengthwise extension of the anchor bolt, between an outer longitudinal groove extension of the undercut

elongated groove of the second profile bar and the elongated groove base of this elongated groove.

28. The profile assembly according to any one of claims 21 to 27, wherein an overall height extension, oriented parallel to the lengthwise extension (L_A) of the anchor bolt, of a comb bar which extends beyond the bracing leg in the direction of the first profile bar, of the body, and of the forming geometry is greater than a height extension (H) of the undercut of the undercut elongated groove of the second profile bar, measured in the same direction.
29. The profile assembly according to claim 28, wherein the body is T-shaped in cross section.
30. The profile assembly according to any one of claims 21 to 29, wherein a countersunk section, which is spaced apart from the through opening along the lengthwise extension of the body by way of the forming geometry, is frontally seated in an undercut elongated groove of the first profile bar when the second profile bar is placed under tension against the first profile bar.
31. The profile assembly according to any one of claims 21 to 30, wherein the first clamping screw, or a second clamping screw, or a combination thereof, is braced against an inclined bracing surface of the anchor bolt.

32. The profile assembly according to claim 31, wherein the inclined bracing surface is a conical surface of the anchor bolt head.
33. The profile assembly according to any one of claims 21 to 32, wherein the body, viewed along the lengthwise extension of the body, rests against the first profile bar on both sides of the anchor bolt.
34. The profile assembly according to any one of claims 21 to 32, wherein the body, viewed along the lengthwise extension of the body, rests frontally against the first profile bar.
35. The profile assembly according to any one of claims 21 to 32, wherein when the first clamping screw and the second clamping screw are tightened, a longitudinal centre line (L_K) of the body is arranged orthogonally to the longitudinal centre line of the first profile bar.



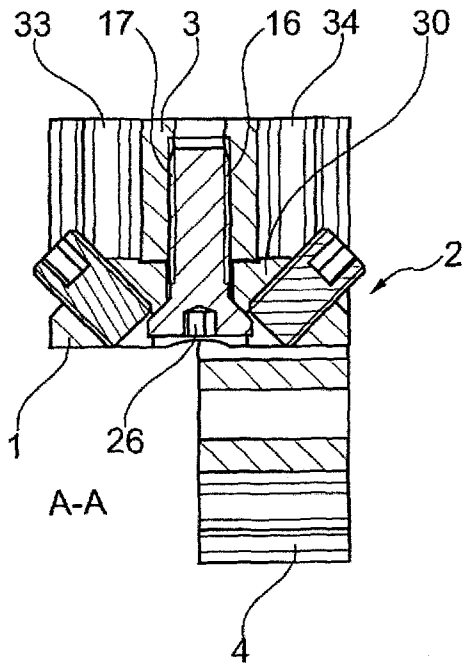


Fig. 5

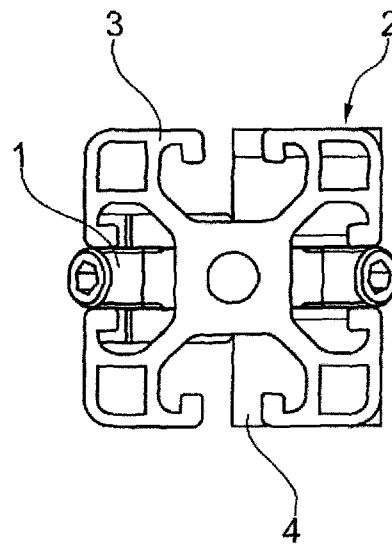


Fig. 6

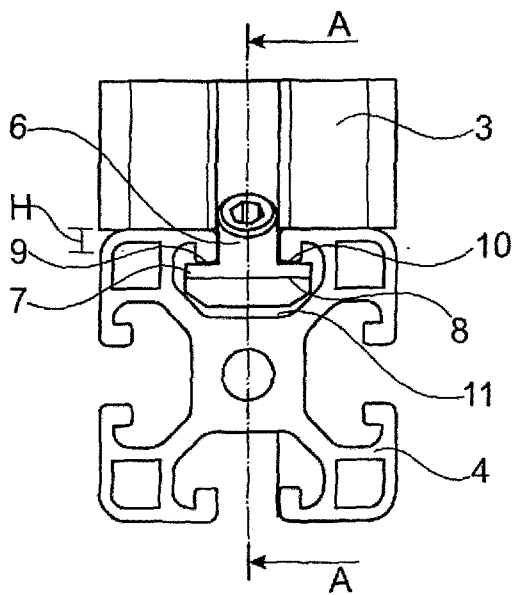


Fig. 7

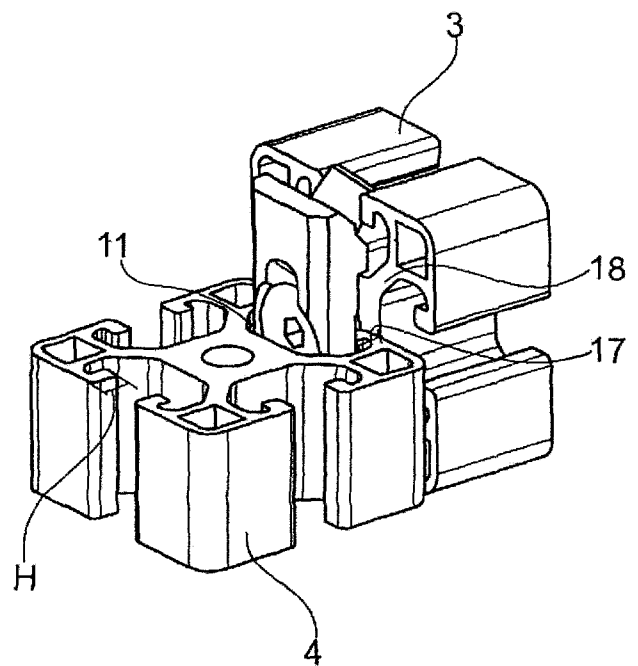


Fig. 8

