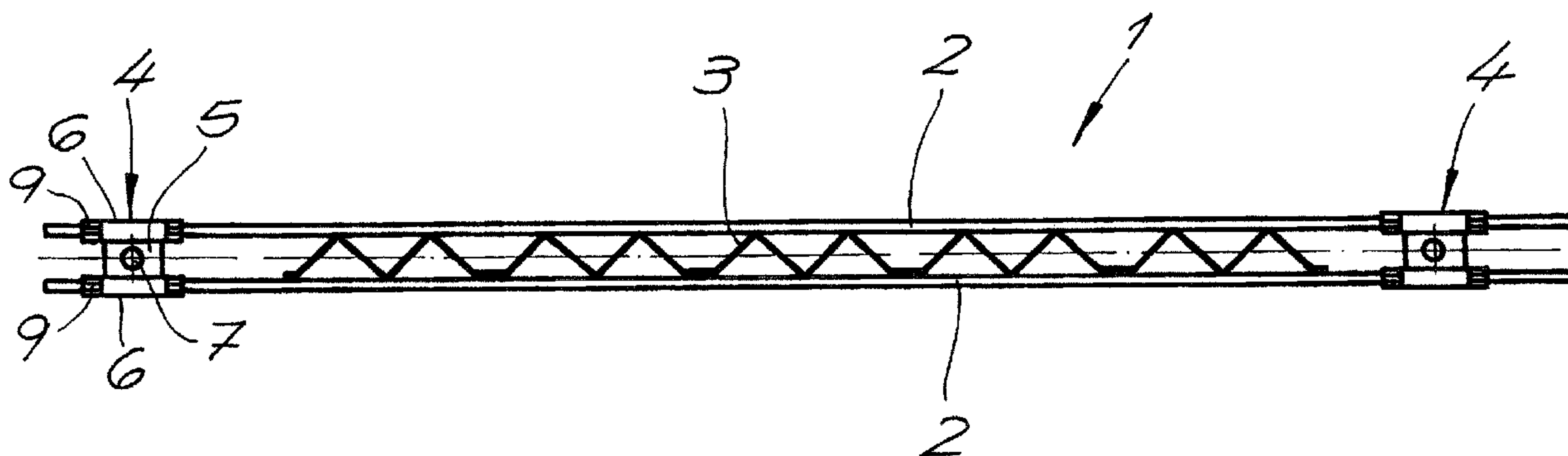




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(54) Titre : POUTRE PARALLELE, EN PARTICULIER POUR APPUIS DE MINE ET DE TUNNEL
 (54) Title: PARALLEL GIRDER, IN PARTICULAR, FOR MINE AND TUNNEL SUPPORTS



(57) Abrégé/Abstract:

The invention pertains to a parallel girder with two parallel chord members and anchoring slides on its ends, wherein the anchoring slides respectively contain an anchoring plate and pipe sections arranged on both sides thereof, in this case, the anchoring plates contain openings for accommodating rock bolts, and the pipe sections can be pushed on the chord members and fixed thereon in the aligned position of the slide.

Abstract:

The invention pertains to a parallel girder with two parallel chord members and anchoring slides on its ends, wherein the anchoring slides respectively contain
5 an anchoring plate and pipe sections arranged on both sides thereof. In this case, the anchoring plates contain openings for accommodating rock bolts, and the pipe sections can be pushed on the chord members and fixed thereon in the aligned position of the slide.

10 To be published with Figure 1.

PARALLEL GIRDER, IN PARTICULAR, FOR MINE AND TUNNEL SUPPORTS**Description:**

The invention pertains to a parallel girder, in particular, for mine and tunnel supports.

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In the mining industry and in the construction of tunnels, it is common practice to utilize a support that is composed of support sections and provided with a concrete backfill. This concrete backfill is normally reinforced with the aid of lattice girders and anchored in the rock. The lattice girders are usually realized
10 in the form of triangular girders. Independently of the girder shape, one encounters roads with an arc-shaped cross section and roads with a rectangular cross section in the mining industry and in the construction of tunnels. Supports in roads with a rectangular cross section consist of a drift set with a roof member and props of wood or steel, wherein the roof member
15 assigned to the top or roof is subjected to significant bending stresses. This is where the invention is utilized.

The invention is based on the objective of developing a parallel girder that is suitable for securing the top/roof in roads with a rectangular cross section and in
20 roads with an arc-shaped cross section, wherein the parallel girder according to the invention is not only adaptable to already set rock bolts, but also to the surface in the top/roof region.

According to the invention, this objective is attained with a parallel girder, in
25 particular, for mine and tunnels supports with two parallel chord members and crossbars that connect the chord members, e.g., diagonal braces, and with anchoring slides that are arranged at least in the end regions of the girder and

respectively comprise an anchoring plate with pipe sections arranged on both sides, wherein the anchor plates respectively contain at least one opening or hole for accommodating a rock bolt, and wherein the pipe sections are pushed on the chord members and can be fixed thereon in the aligned position of the slide. The parallel girder according to the invention can be used as a support in roads with rectangular cross section and consequently a drift set and as a support in roads with an arc-shaped cross section, namely in the form of a partial support on the periphery and/or in the longitudinal direction of the road. It is preferably utilized in securing the top/roof. In addition, the parallel girder according to the invention is also suitable for preventing rock slides in the mountains, on embankments or in the construction of roads. The anchoring slides on its ends make it possible to adapt the parallel girder according to the invention to already set rock bolts and the thusly defined spacing between the bolts. If several anchoring slides are arranged over the length of the chord members, such a parallel girder can also be anchored at almost any location within the supply lengths. The ends of the parallel girder according to the invention are placed on already set rock bolts in the region of the anchoring slides and mounted with anchoring nuts. While the anchoring nuts are tightened, tensile forces are generated in the chord members such that a polygon-like stress similar to an equilibrium polygon results. If so required, additional rock bolts can be set about equidistantly over the length of the chord members between the end anchors that, in case of a drift set support, are functionally set at an angle referred to the longitudinal axis of the parallel girder according to the invention. Consequently, the parallel girder according to the invention also fulfills a hammock function in this case.

Other essential characteristics of the invention are discussed below. For example, the chord members preferably are realized in the form of threaded rods, and the anchoring slides can be fixed thereon by means of screw nuts arranged to both sides of the pipe sections. This allows a simple and precise
5 adaptation to already set rock bolts and consequently a flawless alignment of the parallel girder. The scope of the invention also includes an embodiment with an endless parallel girder that can be variably adapted to the respective support means. According to the invention, this is achieved with a connecting device for extending the parallel girder which comprises a butt strap and four pipe sections
10 that are mounted in pairs on both sides of the butt strap, wherein two respectively aligned pipe sections on one side and on the other side of the butt strap are spaced apart from one another by a predetermined distance in order to attach screw nuts, wherein one pair of pipe sections can be pushed on the threaded rods of one parallel girder and the other pair of pipe sections can be
15 pushed on the chord members of the parallel girder to be connected, and wherein a tension-proof and, if so required, compression-proof connection can be produced in the aligned position by means of screw nuts that are screwed on the chord members on one or both sides of the pipe sections. When producing a tension-proof connection, the screw nuts are only screwed on the chord
20 members on one side of the pipe sections, wherein screw nuts are screwed on the chord members on both sides of the pipe sections in the direction of the tensile and/or compressive force when a compression-proof connection is produced. Several parallel girders of identical or different lengths can be non-positively connected to one another in this fashion. In this case, the butt straps
25 may be provided with one or more openings such that they can be used as anchoring plates to be connected to rock bolts. According to another embodiment, the connecting device for extending the parallel girder contains

two offset connecting rods that are connected to one another, for example, by means of welding at least in the region of their offset. In this case, four pipe sections are mounted in pairs on both sides of the connecting rods in their non-offset regions, wherein two respectively aligned pipe sections on one
5 connecting rod and on the other connecting rod are spaced apart from one another by a predetermined distance in order to attach screw nuts, wherein one pair of pipe sections can, as in the previously described embodiment, be pushed on the threaded rods of one parallel girder and the other pair of pipe sections can be pushed on the chord members of the parallel girder to be
10 connected, and wherein a tension-proof and, if so required, compression-proof connection can be produced in the aligned position by means of screw nuts that are screwed on the chord members on one or both sides of the pipe sections. In this case, the two connecting rods may be connected to one another on their non-offset ends by of means stabilizing webs.

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Openings for accommodating rock bolts are arranged between the offset and the connecting rods. The scope of the invention also includes embodiments with three parallel girders that form a triangular girder, four parallel girders that form a square girder and a series of parallel girders that form a polygonal girder. The
20 parallel girder according to the invention may consist of steel or plastic. In the latter instance, it is preferred to utilize plastic that is reinforced with glass fibers or carbon fibers. This embodiment is also suitable for securing a coal face because a plastic construction of this type can be easily cut into small pieces by mining machines running over the construction during the coal mining process.
25 These small plastic pieces can then be easily separated from the coal in the washery.

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One embodiment of the invention is illustrated in the figures and described in greater detail below. The figures show:

Figure 1, a top view of a parallel girder;

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Figure 2, the object shown in Figure 1 in the form of a roof member in a drift set support;

Figure 3, an enlarged detail of the object shown in Figure 1 in the region of an anchoring slide;

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Figure 4, the object shown in Figure 3 viewed from the direction of the arrow X;

Figure 5, a top view of a connecting device for the object shown in Figure 1;

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Figure 6, a top view of a modified embodiment of the object shown in Figure 5, and

Figure 7, an installation sequence for the object shown in Figure 6.

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The figures show a parallel girder 1, in particular, for mining and tunnel supports which comprises two parallel chord members 2 and crossbars 3, e.g., diagonal rods, for connecting the chord members 2. Anchoring slides 4 are provided at least in the end regions of the girder, wherein said anchoring slides respectively
25 comprise an anchoring plate 5 with pipe sections 6 arranged on both sides thereof, and wherein the anchoring plates 5 contain at least one opening 7 or hole for accommodating a rock bolt 8. The pipe sections 6 are pushed on the

chord members 2 and can be fixed thereon in the aligned position of the slide. The chord members 2 are realized in the form of threaded rods. The anchoring slides 4 can be fixed by means of screw nuts 9 arranged on one or both sides of the pipe sections 6. Several anchoring slides 4 may be provided over the length
5 of the chord members 2. However, this is not illustrated in the figures and merely indicated in Figure 2 by the rock bolts 8.

A connecting device 10 is provided for extending the parallel girder 1. A first
10 embodiment of this connecting device contains two offset connecting rods 12 that are welded to one another at least in the region of their offset 11. Four pipe sections 6 are mounted in pairs on the outer sides of the connecting rods 12, namely in their non-offset regions, wherein two respectively aligned pipe sections 6a, 6b on one connecting rod and on the other connecting rod 12 are spaced apart from one another by a predetermined distance in order to attach
15 screw nuts 9, wherein one pair of pipe sections 6a can be pushed on the chord members or threaded rods 2 of one parallel girder 1 and the other pair of pipe sections 6b can be pushed on the chord members or threaded rods of the parallel girder 1a to be connected, and wherein a tension-proof and, if so required, compression-proof connection can be produced in the aligned position
20 by means of screw nuts 9 that are screwed on the chord members 2 on one or both sides of the pipe sections 6. A tension-proof connection is illustrated in the figures, wherein the compression-proof connection is indicated by screw nuts 9 drawn with broken lines. The two connecting rods are welded to one another on their non-offset rod ends by means of stabilizing webs 13. Due to this measure,
25 openings 7a for rock bolts 8 are formed between the non-offset rod ends.

- In another embodiment, the connecting device 10 comprises a butt strap 14 and four pipe sections 6a, 6b that are mounted in pairs on both sides of the butt strap 14, wherein two respectively aligned pipe sections 6a, 6b on one side and on the other side of the butt strap 14 are spaced apart from one another by a predetermined distance in order to attach screw nuts 9. In this case, one pair of pipe sections 6a can also be pushed on the chord members of one parallel girder 1 and the other pair of pipe sections 6b can be pushed on the chord members 2 of the parallel girder 1a to be connected. In the aligned position, a connection between the chord members and the pairs of pipe sections 6a, 6b of the connection device 10 can be produced by means of screw nuts 9 that are screwed on the chord members on one or both sides of the pipe sections 6. The butt strap 14 contains one or more openings 7 such that it can be used as an anchoring plate.
- 15 The parallel girder 1 and the connecting device 10 may consist of steel or plastic.

Claims:

1. A parallel girder for mining and tunnel supports, consisting of two parallel chord members and crossbars for connecting the chord members, as well as anchoring slides that are arranged at least in end regions of the girder, wherein said anchoring slides respectively comprise an anchoring plate with pipe sections arranged on both sides thereof, wherein the anchoring plate contains at least one opening for accommodating a rock bolt, and wherein the pipe sections are pushed on the chord members and are fixed thereon in an aligned position of the anchoring slides,

wherein the chord members are realized in the form of threaded rods, and wherein the anchoring slides are fixed on the threaded rods by means of screw nuts arranged on one or both sides of the pipe sections.

2. The parallel girder according to claim 1, characterized in that several anchoring slides are arranged over a length of the chord members.

3. The parallel girder according to claim 1 or 2, further comprising a connecting device for extending the parallel girder, which comprises a butt strap and four of the pipe sections that are mounted in pairs on both sides of the butt strap, wherein two respectively aligned pipe sections on one side and on another side of the butt strap are spaced apart from one another by a predetermined distance in order to attach screw nuts, wherein one pair of said respectively aligned sections is pushed on the chord members of the parallel girder and another pair of said respectively aligned pipe sections is pushed on the chord members of a second parallel girder to be connected, and wherein a connection is produced in the aligned position by means of the screw nuts that are screwed on the chord members on one or both sides of the pipe sections.

4. The parallel girder according to any one of claims 1 to 3, characterized in that the butt strap contains one or more of said openings such that it is used as the anchoring plate.

5. The parallel girder according to claim 1 or 2, further comprising a connecting device for extending the parallel girder which comprises two offset connecting rods that are connected to one another, at least in a region of their offset, wherein four pipe sections are respectively mounted in pairs on both sides of the connecting rods in their non-offset regions, wherein two respectively aligned pipe sections on one of said connecting rods and on another of said connecting rods are spaced apart from one another by a predetermined distance in order to attach screw nuts, wherein one pair of pipe sections are pushed on the chord members of the parallel girder and another pair of pipe sections are pushed on the chord members of a second girder to be connected, and wherein a connection is produced in the aligned position by means of the screw nuts that are screwed on the chord members on one or both sides of the pipe sections.
6. The parallel girder according to claim 5, wherein the two offset connecting rods are connected to one another by means of welding.
7. The parallel girder according to claim 5 or 6, characterized in that the two connecting rods are connected to one another on their non-offset rod ends by means of stabilizing webs.
8. The parallel girder according to claim 1 or 2, characterized in that three parallel girders are assembled into a triangular girder or four parallel girders can be assembled into a square girder.
9. The parallel girder according to any one of claims 1 to 8, characterized in that it consists of steel or plastic.
10. The parallel girder according to any one of claims 3 to 9, characterized in that the connecting device consists of steel or plastic.

Fig. 1

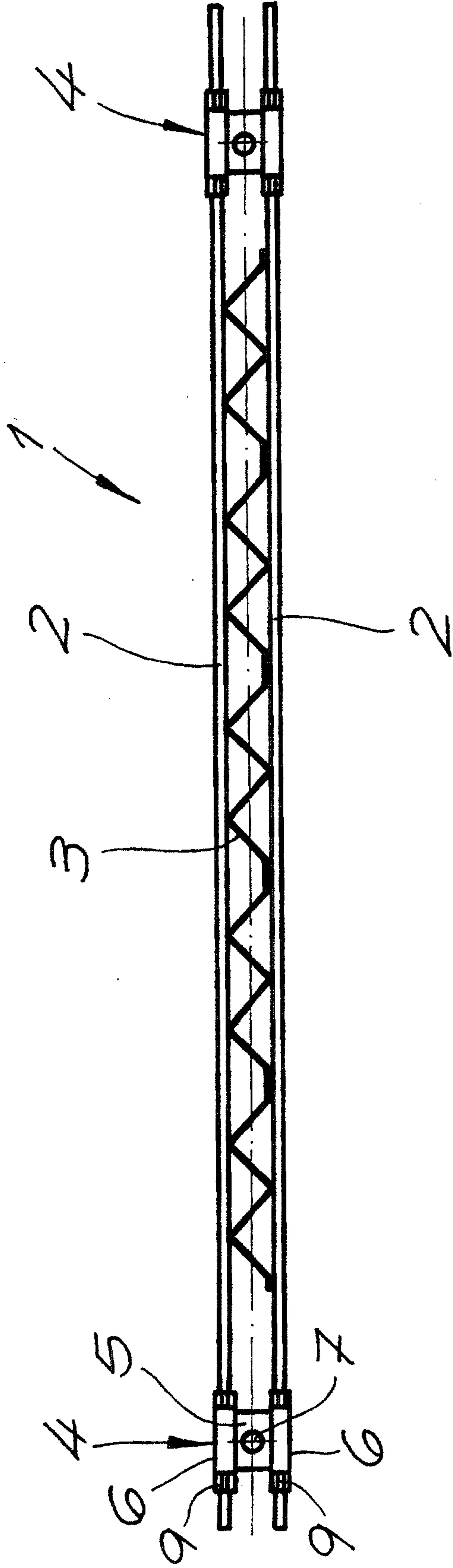


Fig. 3

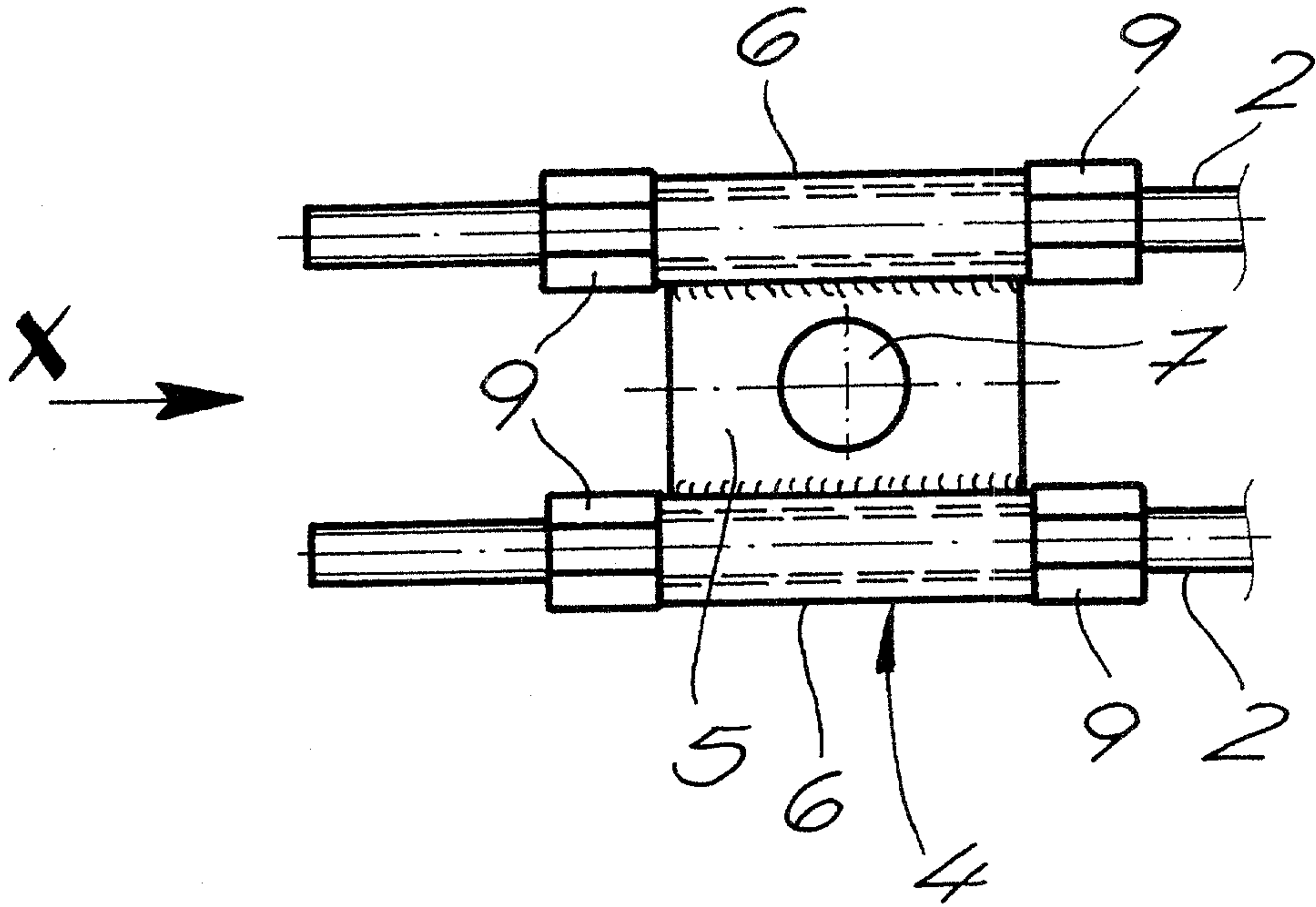


Fig. 4

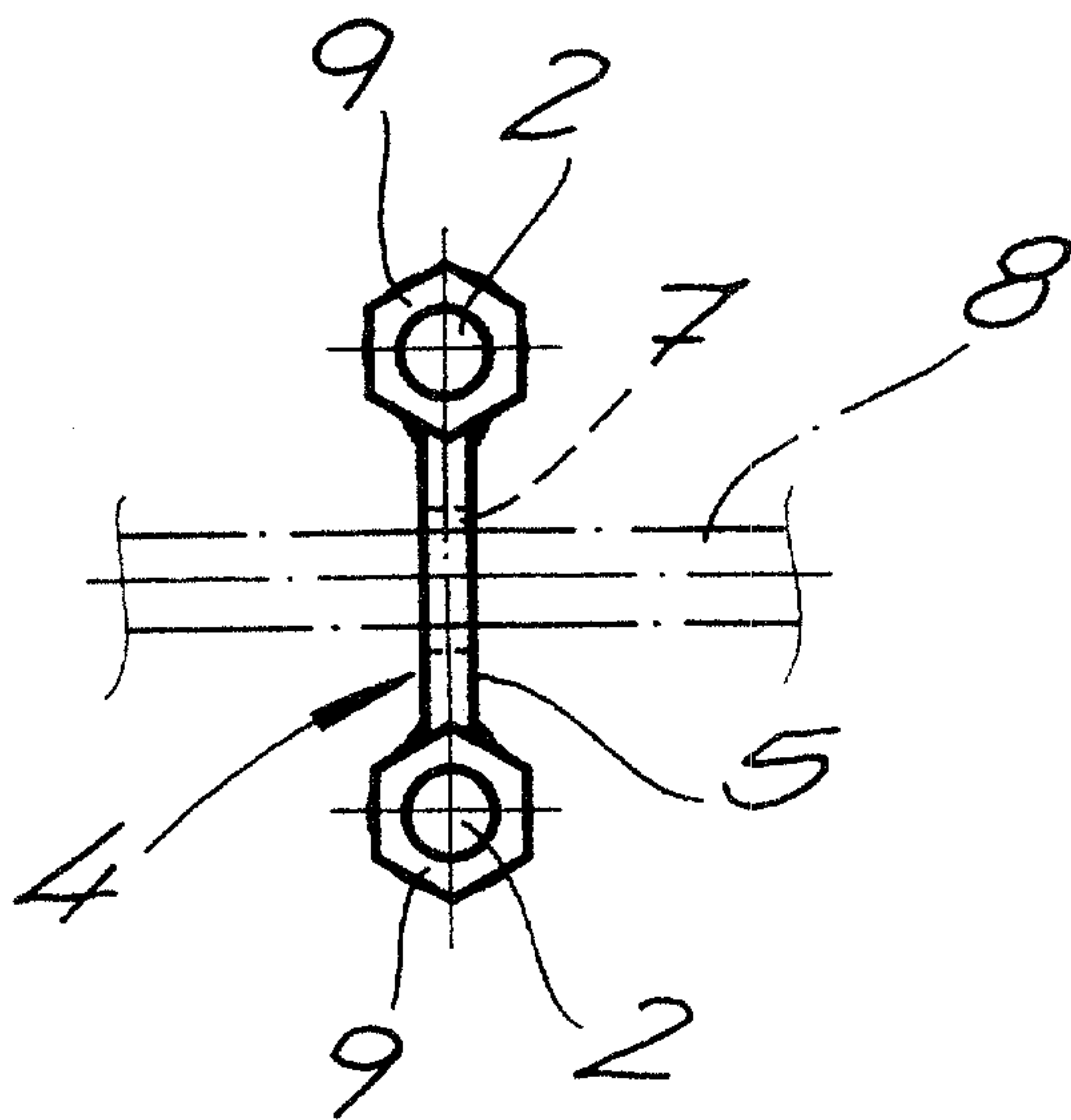


Fig. 6

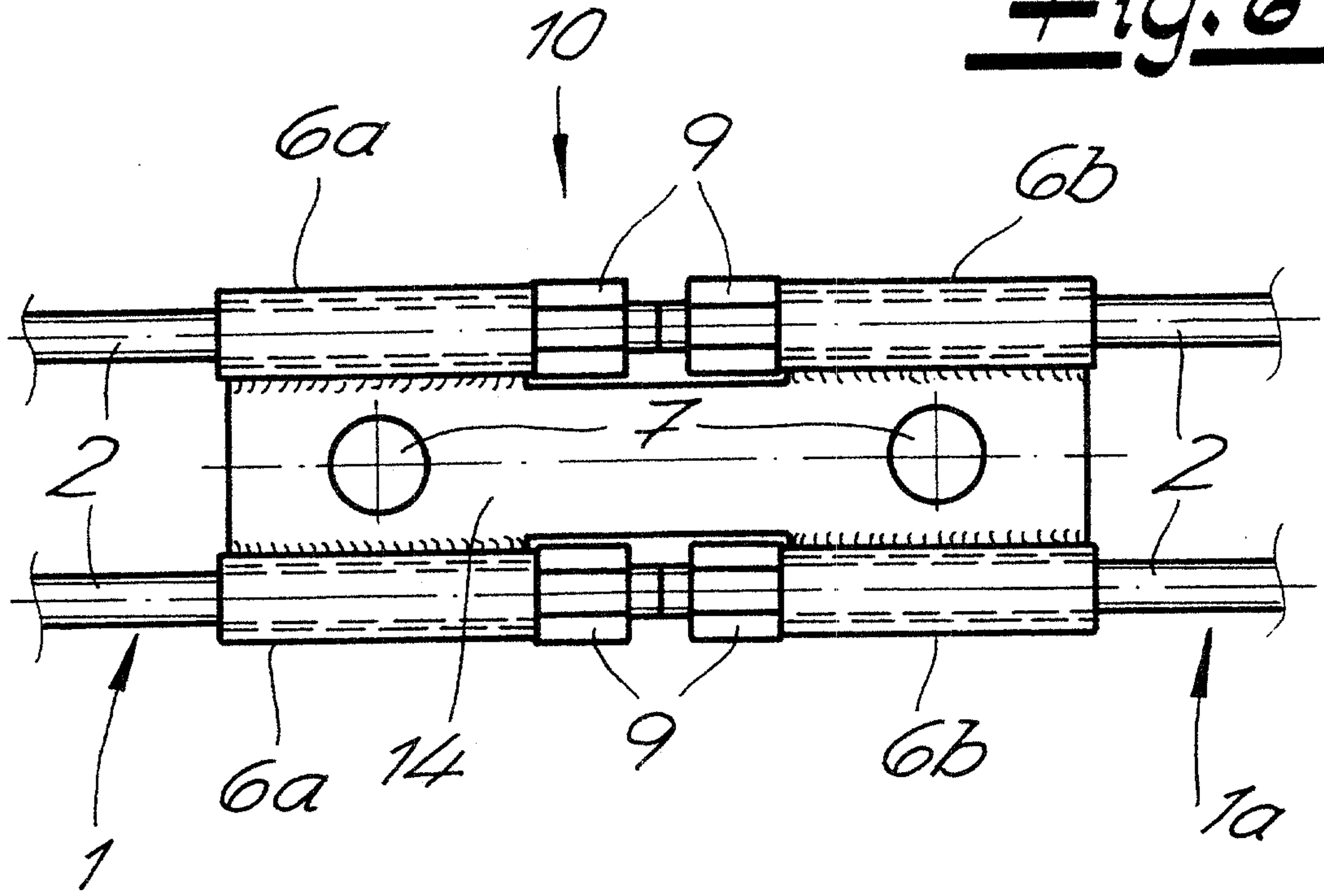


Fig. 7

