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(54) **LISTEL A GOUJONS POUR ARMATURES RELEVEES**
(54) **DOWEL PIN FOR WEB REINFORCEMENTS**

(57) L'invention concerne un listel à goujons pour armatures relevées, qui comprend plusieurs goujons (3) parallèles, disposés à distance les uns des autres. Lesdits goujons sont fixés par liaison de forme ou par soudage par points, par une tête (5, 6) à une de leurs extrémité, sur un rail de retenue commun (2).

(57) The invention relates to a dowel pin for web reinforcements for reinforced concrete slabs, with several dowels (3) arranged parallel with and at a distance from each other. Said dowels are fixed with a dowel head (5, 6) at one end to a single dowel anchor channel (2) with a positive fit or by spot welding.

(54) Title: DOWEL PIN FOR WEB REINFORCEMENTS

(57) Abstract

The invention relates to a dowel pin for web reinforcements for reinforced concrete slabs, with several dowels (3) arranged parallel with and at a distance from each other. Said dowels are fixed with a dowel head (5, 6) at one end to a single dowel anchor channel (2) with a positive fit or by spot welding.

[Drawing]

DOWEL STRIP FOR WEB REINFORCEMENT

Description

The invention relates to a dowel strip (strip of dowels) for web reinforcements having several dowels arranged parallel and at a distance from each other. Said dowels are provided at both ends of their dowel shaft with a disk-shaped widened dowel head, for example, and said dowels are attached at one end to a common dowel anchor channel by means of at least one connection piece molded onto the face of said dowel head.

The web reinforcements constructed with dowel strips serve to absorb existing shearing forces, which are the result of the load-bearing forces, in steel reinforced concrete slabs or beams in the region of the load-bearing points, and said web reinforcements form thereby a punched-through reinforcement.

To simplify the manufacturing of dowel strips, it is known from EP 0 744 508 A1, to detachably mount the dowels to the dowel anchor channel by screwing them thereto, for example. To make it unnecessary to use screws or tools for fastening the dowels to the dowel anchor channel, it is suggested thereby in an additional version, to mold a T-shaped piece onto the face of the dowel, which is pushed through an opening and subsequently rotated so that its lateral arms engage in the dowel anchor channel.

This positive-locking connection process between the dowel and the dowel anchor channel may be performed in a simple manner indeed, for example at a construction site, however; said positive-locking may just as easy be disconnected or become loose by itself. Therein there is the danger that some or several dowels may be intentionally removed from the dowel anchor channel at the construction site or they may become loose or fall off unnoticed or unwanted. The web reinforcement does then no longer meet the requirements for the design based on static calculations. Such deviation from the intended design cannot be seen after covering of the reinforced slab with concrete. To eliminate this risk of insufficient reinforcement it is therefore necessary to monitor the installation of the reinforcement element all the way to the concrete pouring process so it is ensured that no dowels become loose or are removed from the dowel anchor channel.

In another known dowel strip of the type mentioned at the beginning and as disclosed in EP 0 495 334 B1, the dowels are welded to the dowel anchor channel. The heating necessary for such a welded construction may have the result that the dowel anchor channel is deformed and would therefore have to be re-aligned afterwards. In addition, the material may be altered at the dowel head during the welding process when performed in the traditional manner, which would lead to a decrease in stability under load.

It is therefore the object of the invention to design a dowel strip of the type mentioned in the beginning in such a manner that it may be manufactured very simple, more cost-effective and more dependable, which means without lessening of functions of the dowel

anchor channel and/or dowel, but whereby subsequent changes by loosening of individual dowels is made impossible.

This object is generally achieved in a dowel strip of the type mentioned in the beginning in that the connection piece on the face of the dowel head is deformed by a cold forming process to obtain a positive fit with the dowel anchor channel.

The present object is achieved in a first preferred embodiment of the invention in that the positive-locking connection piece, which is fitted into the opening of the dowel anchor channel, consists of a rivet stud molded onto the face of the dowel head whereby said rivet stud protrudes through the opening of the dowel anchor channel where it is subsequently riveted.

The molding of the connection piece onto the face of the dowel is not absolutely necessary. The type of suggested spot welding causes no detrimental deforming of the dowel anchor channel and causes no decrease in stability of the connection, as it would be the case in the above-mentioned traditional solid welding process. There is an additional advantage in that the welded spots provided in the opening do not protract in relation to the thickness of the dowel anchor channel.

It is an advantage if the welding spots fill the openings of the dowel anchor channel at least on one side or essentially to the full extent to further improve the absorption of (stress) forces.

With this and other embodiments of the invention, the dowel anchor channel may engage into a cross slot on the face of the dowel head to avoid turning.

It is of great advantage if the dowel anchor channel is made of flat steel.

Additional goals, characteristics, advantages and application possibilities of the invention are shown in the following description of embodiment examples with reference to the drawings. Thereby all described and/or illustrated characteristics represent by themselves or in any combination the object of the invention, independent from their inclusion in individual claims or in reference to these claims.

Fig. 1 shows a segment of a dowel strip in a side view according to a first embodiment of the invention.

Fig. 2 shows an enlarged partial view of a dowel and a segment of the dowel anchor channel of Fig. 1 before assembly.

Fig. 3 shows an enlarged cross-sectional view along the line III-III in Fig. 1.

Fig. 4 shows in a cross-sectional view of Fig. 3 a second embodiment of a dowel strip according to the invention.

Fig. 5 shows another embodiment of the dowel strip in a cross-sectional view corresponding to Fig. 3.

Fig. 6a through 6c show in a side view, frontal view and top view a segment of a dowel strip according to yet another embodiment of the invention.

The dowel strip 1 illustrated in Fig. 1 is used in the construction of a web reinforcement with several such dowel strips located in a steel reinforced concrete slab or in a similar steel reinforced concrete part. The dowel strip 1 consists of a dowel anchor channel 2 with several dowels 3 arranged parallel and at a distance from each other. Each dowel 3 has an elongated dowel shaft 4, which may be smooth or may be provided with ribs. At both ends of the dowel shaft 4 there are attached by positive fit or by spot welding a disk-shaped widened dowel head 5 or 6 with a flat or substantially flat surface 11 to rest against the dowel anchor channel 2.

Each dowel head 5 is attached by positive fit to the dowel anchor channel 2. The dowel anchor channel 2 is a plate metal channel made of flat steel whereby said dowel anchor channel rests against the face of the dowel heads 5.

At the predetermined locations for the dowel arrangement there is an opening 7 drilled or punched in the dowel anchor channel 2 (Fig. 2). On the dowel head 5 there is molded onto the front side and protruding from the face 11 a connection piece 8 designed as a rivet stud 8', which is pushed through the opening during assembly of the dowel strip 1 and which is provided with a rivet head 9 by riveting (Fig. 3).

In Fig. 4 it is shown that in the area of the front molded-on rivet stud, a cross slot 10 may be provided on the face 11 of the dowel head 5 to prevent turning by fitting said cross slot 10 onto the dowel anchor channel 2.

The version in Fig. 5 is essentially different from the previously versions in that it is without a rivet stud 8 and an opening 5. The dowel anchor channel 2 made of flat steel is fitted into the cross slot 10 on the face of the dowel head 5. The edges 10a of the cross slot 10 are stamped and forced toward the center so that they firmly hold the dowel anchor channel 2 in place.

A non-detachable anchoring is shown in the embodiment example of Fig. 6a through 6c whereby the dowels 3 are provided with ribs 13 on the dowel shaft 4 and which also includes a dowel anchor channel 2 made of flat steel. The anchoring is achieved in a manner whereby the dowel anchor channel 2 is provided with an opening 7 at a predetermined location for the arrangement of a dowel 3 and whereby the dowel 3 is interlocked with a positive fit at its front with the dowel anchor channel 2 by a welding spot 12 in the opening 7. The diameter of the opening, which is completely filled by the welding spot 12 for this purpose, is a little smaller that the diameter of the dowel shaft 4. Even in this embodiment, the dowel anchor channel 2 may engage into a cross slot on the face 11 of the dowel head 5 to prevent turning.

Amended page

Patent Claims

1. A process for manufacturing a dowel strip for web reinforcements in steel reinforced concrete slabs comprising several dowels (3) arranged parallel and at a distance from each other, whereby said dowels are provided at both ends of their dowel shaft (4) with a disk-shaped widened dowel head (5, 6), for example, and said dowels are attached at one end to a common dowel anchor channel (2) by means of at least one connection piece (8) molded onto the face of said dowel head; characterized in that said front connection piece (8) of the dowel head (5,6) has been deformed by a cold forming process to provide a positive-locking connection engaging with the dowel anchor channel (2).

2. A process for manufacturing a dowel strip, whereby the connection piece (8) engages by positive-locking into an opening (7) of the dowel anchor channel (2), wherein a rivet stud (8') is pushed through the opening (7) of the dowel anchor channel (2) to serve as a connection piece and whereby said rivet head is subsequently riveted.

3. A process for manufacturing a dowel strip according to claim 1 or 2, wherein the dowel anchor channel (2) is fitted into a cross slot (10) on the face of the dowel head (5) and wherein the connection piece (8) consists of the two edges (10a) of the cross slot (10), which is stamped to press against the sides of the dowel anchor channel (2).

4. A process for manufacturing a dowel strip for web reinforcements in steel reinforced concrete slabs, comprising several dowels (3) arranged parallel and at a distance from each other, whereby said dowels are provided at both ends of their dowel shaft (4) with a disk-shaped widened dowel head (5,6), for example, and said dowels are attached at one end to a common dowel anchor channel (2) by means of at least one weld, wherein the dowel anchor channel (2) is provided with predetermined openings for the dowels (3)
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5. A dowel strip according to claim 4, wherein the welding spots (12) completely or substantially fill the openings (7) in the dowel anchor channel (2).

6. A dowel strip according to one of the claims 1, 2, 4, or 5, wherein the dowel anchor channel (2) is fitted into a cross slot (10) on the face of the dowel head (5).

7. A dowel strip according to one of the previous claims, wherein the dowel anchor channel (2) consists of flat steel.

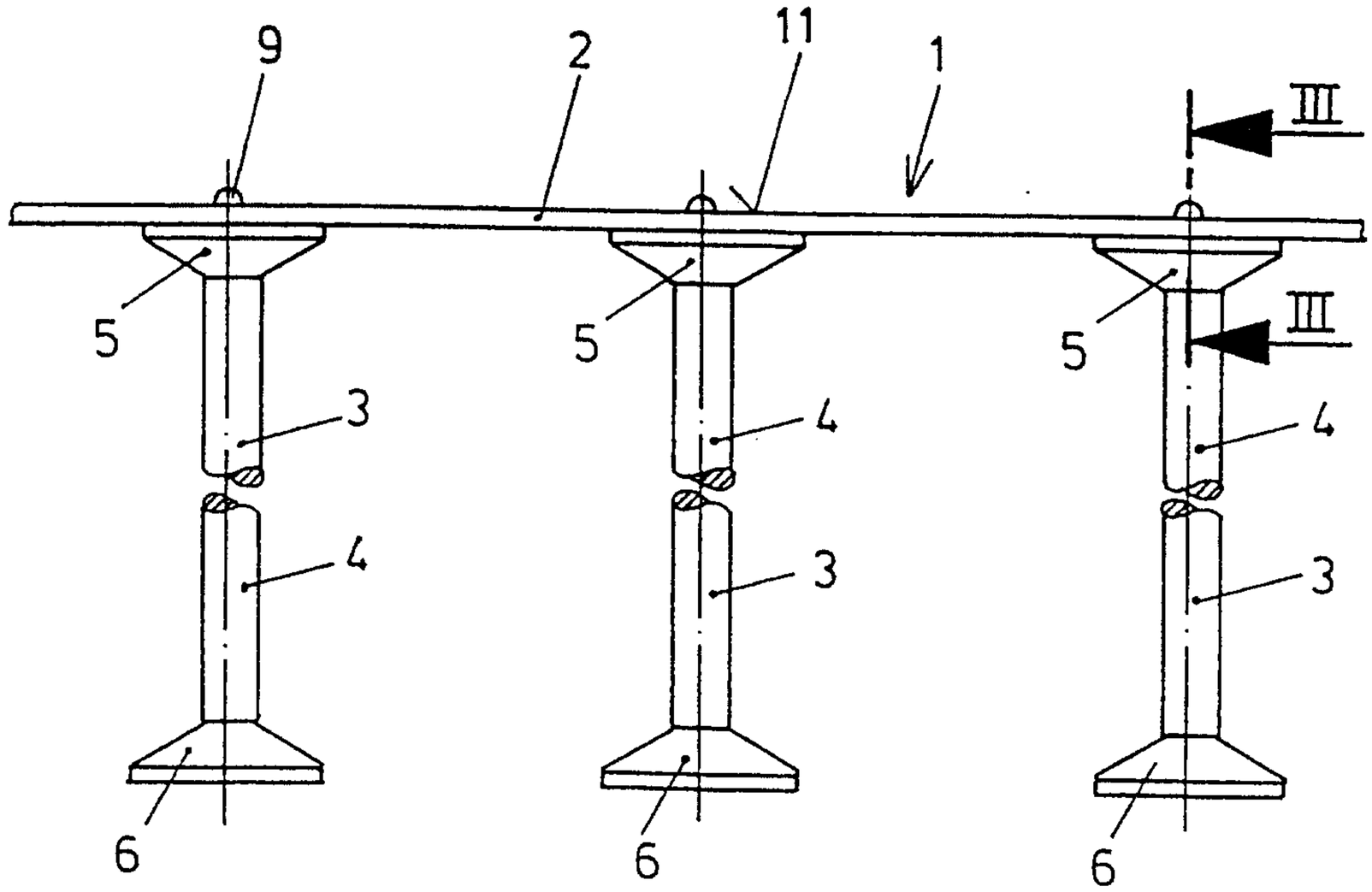

Fig. 1

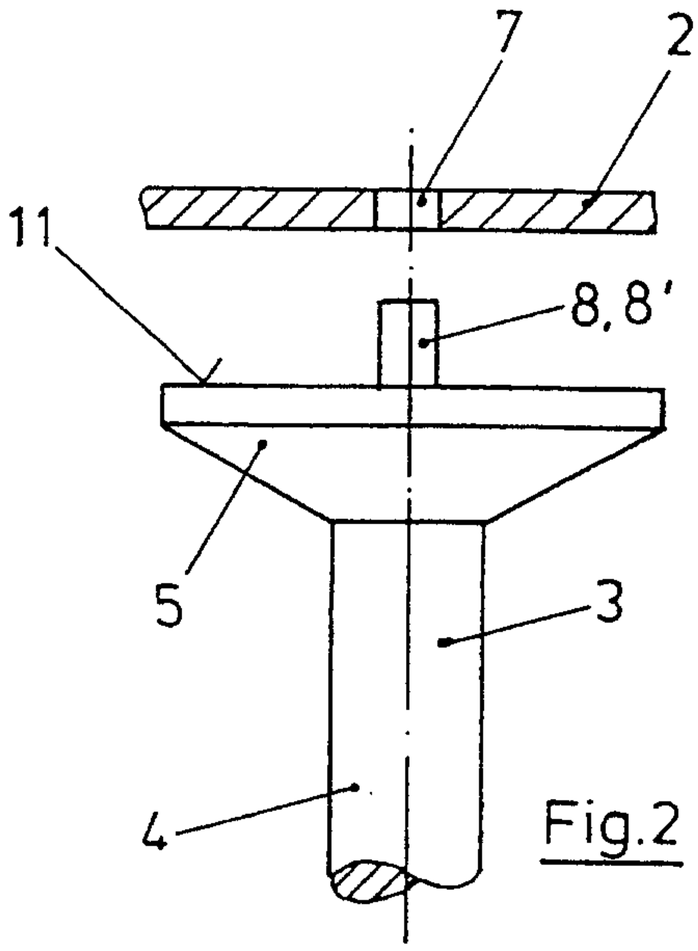

Fig.2

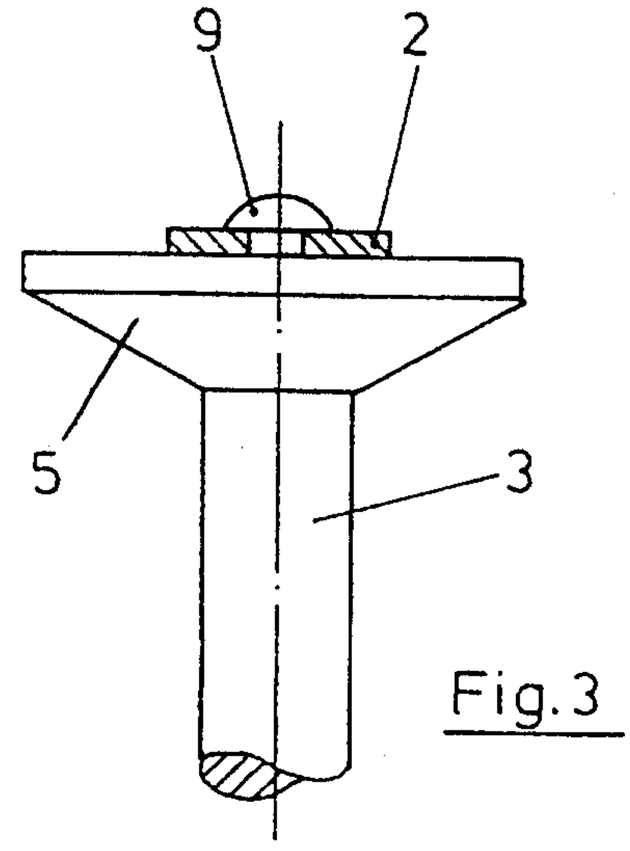

Fig.3

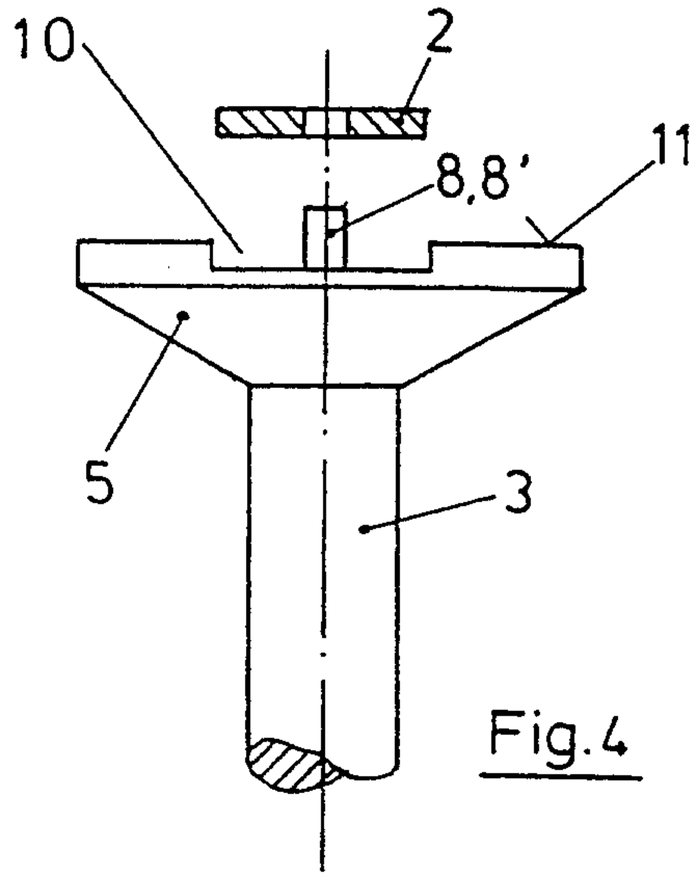

Fig.4

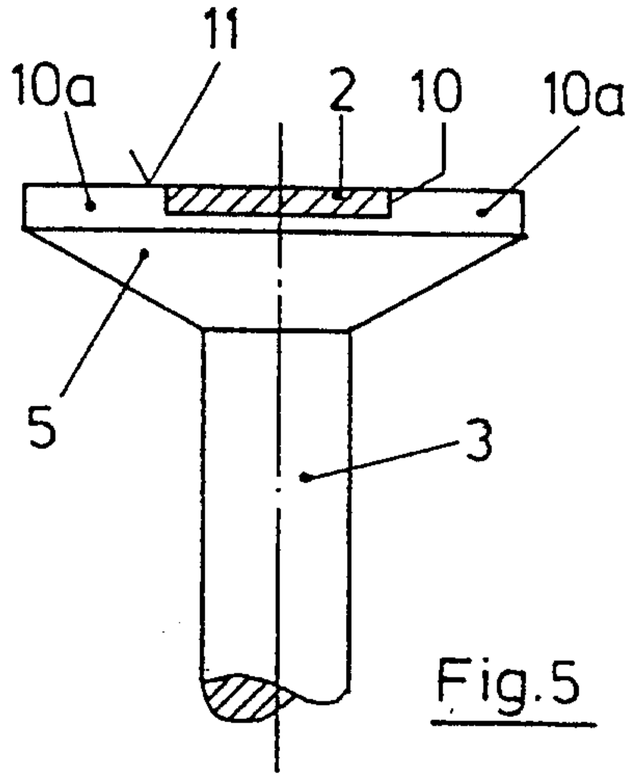

Fig.5

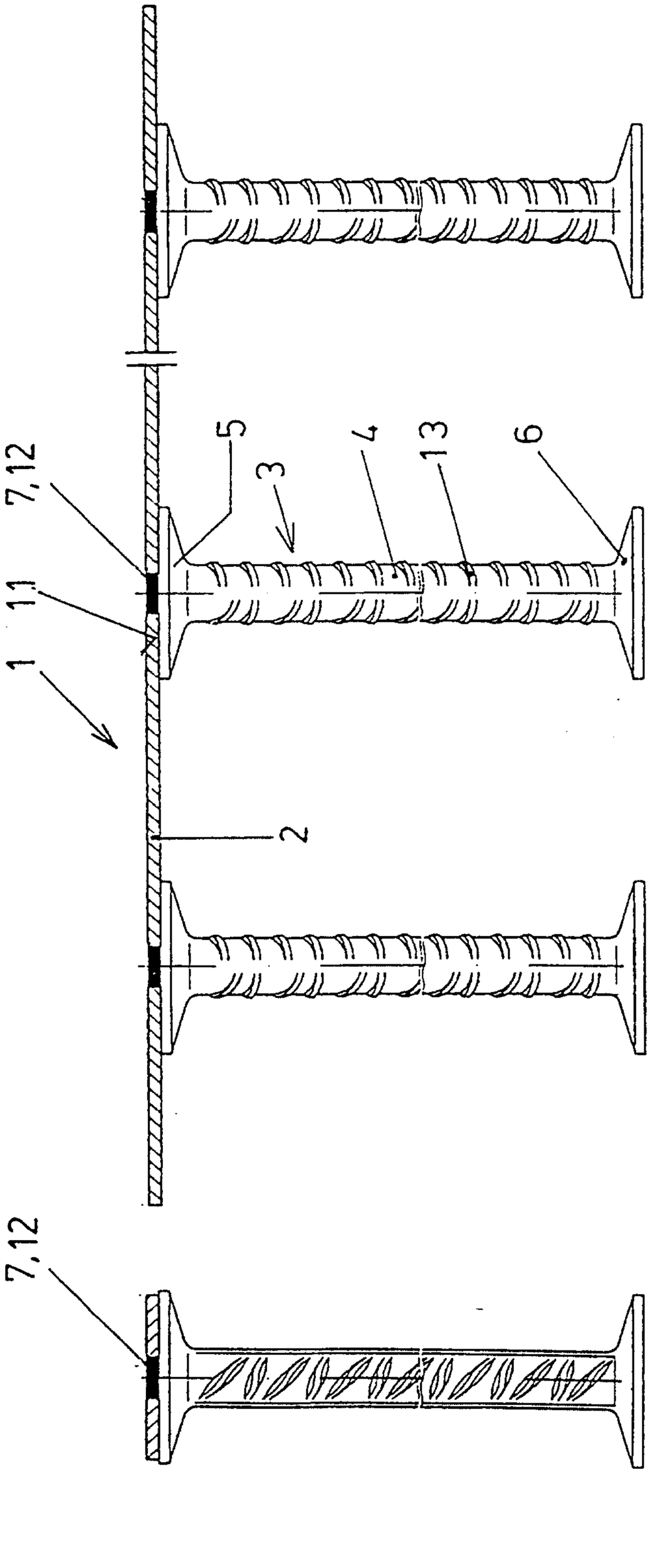

Fig. 6a

Fig.6b

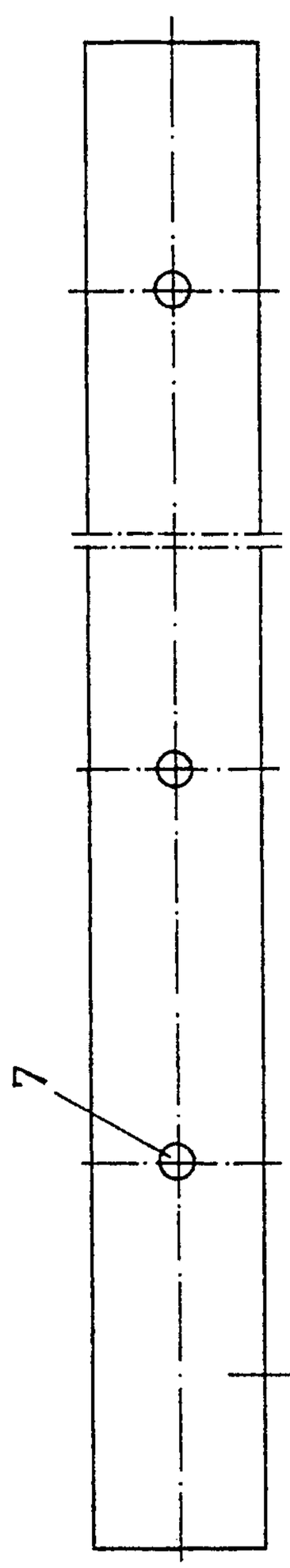

Fig.6c