(19) LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

(11) N° de publication : **LU505151**

(12) **BREVET D'INVENTION** **B1**

(21) N° de dépôt: LU505151

(51) Int. Cl.:
B28B 23/02, B28B 23/04, B28B 7/00

(22) Date de dépôt: 24/03/2023

(30) Priorité:
14/10/2022 CN 202211261314.8

(43) Date de mise à disposition du public: 15/04/2024

(47) Date de délivrance: 15/04/2024

(73) Titulaire(s):
CHINA RAILWAY SEVENTH GROUP CO., LTD – 450016 Zhengzhou, Henan (Chine), ZHENGZHOU ENGINEERING CO., LTD OF CHINA RAILWAY SEVENTH GROUP – 450052 Zhengzhou, Henan (Chine)

(72) Inventeur(s):
SUN Meng – Chine, ZHENG Hemin – Chine, SHI Lei – Chine, LIU Tongbin – Chine, SHI Haojie – Chine, HUA Mengjie – Chine, ZHANG Chenyang – Chine, YIN Aiguo – Chine, ZHOU Liang – Chine, CHANG Zhihao – Chine, LI Kuishuang – Chine, GUO Zhongwen – Chine, ZHANG Yalei – Chine, LI Dongyuan – Chine, QI Yabei – Chine, LIU Jiaxin – Chine, ZHANG Fan – Chine, ZHANG Shaopeng – Chine, TIAN Liuzhu – Chine

(74) Mandataire(s):
OFFICE FREYLINGER S.A. – L-8001 STRASSEN (Luxembourg)

(54) **CONSTRUCTION METHOD OF POSITIONING REINFORCING STEEL BAR MESH OF PRESTRESSED DUCT.**

(57) The present invention relates to a construction method of positioning reinforcing steel bar mesh of the prestressed duct, and which relates to the technical field of prefabrication construction of a high-speed railway box girder, the positioning reinforcing steel bar mesh of the prestressed duct comprises two bottom plate positioning reinforcing steel bars parallel to the box girder bottom plate and two web positioning reinforcing steel bars parallel to the web, and one end of the bottom plate positioning reinforcing steel bar is fixedly connected with the bottom of the web positioning reinforcing steel bar; a plurality of bottom plate prestressed duct meshes are arranged between two bottom plate positioning reinforcing steel bars, and a plurality of web plate prestressed duct meshes are arranged between two web plate positioning reinforcing steel bars. According to the construction method of the positioning reinforcing steel bar mesh based on the prestressed duct, which can make the prestressed reinforcing steel bar mesh accurately positioned, firmly fixed and with high construction efficiency.

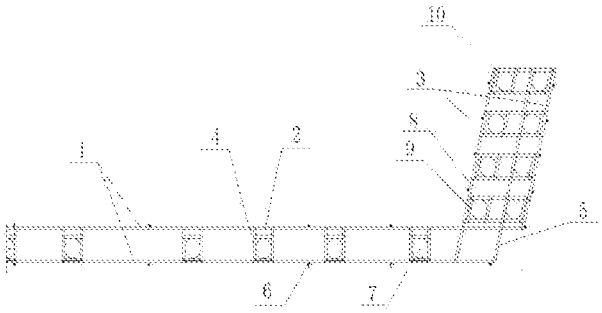

Fig. 1

CONSTRUCTION METHOD OF POSITIONING REINFORCING STEEL BAR MESH OF PRESTRESSED DUCT

BACKGROUND

Field of Invention

The present invention relates to the technical field of prefabrication construction of a high-speed railway box girder, in particular relates to a construction method of positioning reinforcing steel bar mesh of the prestressed duct.

Background of the Invention

There are many recognized problems to be solved in the installation of prestressed duct of post-tensioned prestressed box girder, such as the unstable fixation of prestressed steel mesh of prefabricated box girder and the displacement of prestressed duct. The bottom web reinforcing steel bars are not firmly positioned, and it is easy to be loosened and floated by construction disturbance, and its density is uneven and uneven, which affects the quality of box girder itself. The displacement position and amplitude of prestressed duct are random, which causes different degrees of tension loss and has a great influence on the consistency of mass production tension quality of box girder.

SUMMARY

The present invention aims to provide a construction method of positioning reinforcing steel bar mesh of the prestressed duct, so as to solve the problems in the prior art, which can make the prestressed reinforcing steel bar mesh accurately positioned, firmly fixed and with high construction efficiency.

In order to achieve the above purpose, the present invention provides the following solution:

The present invention provides a construction method of the positioning reinforcing steel bar mesh of the prestressed duct comprises the following steps:

placing the positioning reinforcing steel bar meshes above the lower-layer through long bar of the bottom plate;

aligning the longitudinal center line of the positioning reinforcing steel bar mesh with the center line of the mould, and meanwhile, adjusting the vertical direction to be consistent with the vertical direction of the reinforcing steel bar in the clamping groove in the mould;

directly integrating binding or spot welding with the U-shaped ribs of the beam body;

after binding the framework of the beam body reinforcing steel bar with the positioning reinforcing steel bar meshes, the rubber rods thread into the design coordinate meshes from the two ends of the framework of the beam body reinforcing steel bar in the span direction, and the front end is manually guided into the preset prestressed duct meshes during installing and threading,

the positioning reinforcing steel bar mesh of a prestressed duct, and the section of the prefabricated box girder are arranged in a profiling mode, which can be used as an auxillary steel bar to control the thickness of the bottom plate and the web of the box girder, and can be quickly, accurately and accurately installed to achieve the purpose of accurate positioning, comprising two bottom plate positioning reinforcing steel bars parallel to the bottom plate of the box girder bottom plate and two web positioning reinforcing steel bars parallel to the web, and one end of the bottom plate positioning reinforcing steel bar are fixedly connected with the bottom of the web positioning reinforcing steel bar to improve the stability of the prestressed reinforcing steel bar mesh structure; a plurality of bottom plate prestressed duct meshes are arranged between two bottom plate positioning reinforcing steel bars, and a plurality of web plate prestressed duct meshes are arranged between two web plate positioning reinforcing steel bars. The meshes of the present invention increases the auxiliary positioning function, quickly positions and accurately installs itself, and meanwhile accurately controls the thickness of the bottom web. While ensuring its own stability, compared with traditional design and some design models, it reduces the number of longitudinal long reinforcing steel bars in the web, saves the cost of raw materials by using a large number of short reinforcing steel bars, facilitates rapid installation, reduces the operation intensity and time, improves the operation quality, and improves the qualification rate of the prefabricated box girder prestressed mesh once installed,

the bottom plate vertical reinforcing steel bars are symmetrically arranged on both sides of the prestressed duct mesh of the bottom plate, and both ends of the bottom plate vertical reinforcing steel bars are fixedly connected to the bottom plate positioning reinforcing steel bars; the bottom

plate prestressed duct mesh is symmetrically arranged with bottom plate horizontal reinforcing steel bars at both ends, and both ends of the bottom plate horizontal reinforcing steel bars are fixedly connected to the bottom plate vertical reinforcing steel bars; the positioning reinforcing steel bars of the bottom plate are welded with a plurality of the bottom plate horizontal reinforcing steel bars and vertical the bottom plate reinforcing steel bars to form a positioning reinforcing steel bar mesh with a prestressed duct mesh in the bottom plate; the thickness of the bottom plate is controlled by adjusting the length of the vertical reinforcing steel bars of the bottom plate prestressed duct mesh; the bottom plate prestressed duct mesh can be adjusted by adjusting the bottom plate horizontal reinforcing steel bar and the bottom plate vertical reinforcing steel bar, and the width and height of the mesh are the same as the diameter of the prestressed duct.

Optionally, the web horizontal reinforcing steel bars are symmetrically arranged at the upper end and the lower end of the web prestressed duct mesh, and the two ends of the web horizontal reinforcing steel bars are fixedly connected with the web positioning reinforcing steel bars; the web inclined reinforcing steel bars are symmetrically arranged on the two sides of the web prestressed duct mesh, the two ends of the web inclined reinforcing steel bars are fixedly connected with the web horizontal reinforcing steel bars, and the web inclined reinforcing steel bars are arranged parallel with the web positioning reinforcing steel bars, the web positioning reinforcing steel bars are welded with a plurality of web horizontal reinforcing steel bars and a plurality of web inclined reinforcing steel bars with the same inclination angle as the web positioning reinforcing steel bars to form the web positioning reinforcing steel bar mesh with prestressed duct meshes, the thickness of the web is controlled by adjusting the length of the web horizontal reinforcing steel bar of the web prestressed mesh, and the web prestressed duct mesh can be adjusted by adjusting the web horizontal reinforcing steel bar and the web inclined reinforcing steel bar with the same inclination angle as the web positioning reinforcing steel bar, and the width and height of the mesh are the same as the diameter of the prestressed duct; and the positioning reinforcing steel bar meshes of the prestressed duct are welded into an integrated connecting net through the positioning reinforcing steel bar meshes of the bottom plate prestressed duct and the positioning reinforcing steel bar meshes of the web prestressed duct.

The present invention has the functions of positioning the thickness of the bottom web and the mesh of the prestressed duct, during installation, placing the positioning reinforcing steel bar meshes above the lower-layer through long bar of the bottom plate; aligning the longitudinal center line of the positioning reinforcing steel bar mesh with the center line of the mould, and meanwhile, adjusting the vertical direction to be consistent with the vertical direction of the reinforcing steel bar in the clamping groove in the mould; directly integrating binding or spot welding with the U-shaped ribs of the beam body. It can reduce the inclination and displacement of prestressed reinforcing steel bars caused by the working angle when workers operate, and while effectively improve the working efficiency of workers. It can control the thickness of the upper and lower layers of the bottom plate and the thickness of the web accurately while ensuring the accuracy of the prestressed duct mesh.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic structural diagram of the positioning reinforcing steel bar mesh of the prestressed duct of the present invention;

Fig. 2 is a schematic structural diagram of the positioning steel mesh of the prestressed duct after adjusting the thickness of the web in different examples;

Fig. 3 is a schematic structural diagram of the positioning reinforcing steel bar mesh of the prestressed duct of the present invention after adjusting the thickness of the bottom plate and the web in different examples;

Description of figurers: 1. bottom plate positioning reinforcing steel bar, 2, bottom plate horizontal reinforcing steel bar, 3, web positioning reinforcing steel bar, 4, bottom plate vertical reinforcing steel bar, 5, web supporting reinforcing steel bar, 6, bottom plate lower-layer through long bar, 7, bottom plate prestressed duct mesh, 8, web plate horizontal reinforcing steel bar, 9, web plate inclined reinforcing steel bar, 10, web plate prestressed duct mesh.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The present invention aims to provide a construction method of positioning reinforcing steel bar mesh of the prestressed duct, so as to solve the problems in the prior art, which can make the

prestressed reinforcing steel bar mesh accurately positioned, firmly fixed and with high construction efficiency.

As shown in Fig. 1, the present invention provides a positioning reinforcing steel bar mesh of a prestressed duct, which comprises two bottom plate positioning reinforcing steel bars 1 parallel to the bottom plate of the box girder bottom plate and two web positioning reinforcing steel bars 3 parallel to the web, and one end of the bottom plate positioning reinforcing steel bar 1 is fixedly connected with the bottom of the web positioning reinforcing steel bar 3 to improve the stability of the prestressed reinforcing steel bar mesh structure; a plurality of bottom plate prestressed duct meshes 7 are arranged between the two bottom plate positioning reinforcing steel bars 1, and a plurality of web prestressed duct meshes 10 are arranged between the two web positioning reinforcing steel bars 3; and the web supporting reinforcing steel bar 5 with the bottom fixedly connected with the bottom plate positioning reinforcing steel bars 1 are arranged between the two web positioning reinforcing steel bars 3, and the web supporting reinforcing steel bars 5 and the web positioning reinforcing steel bars 3 are arranged in parallel and used for reinforcing web support. The meshes of the present invention increases the auxiliary positioning function, quickly positions and accurately installs itself, and meanwhile accurately controls the thickness of the bottom web. While ensuring its own stability, compared with traditional design and some design models, it reduces the number of longitudinal reinforcing steel bars in the web, saves the cost of raw materials by using a large number of short reinforcing steel bars, facilitates rapid installation, reduces the operation intensity and time, improves the operation quality, and improves the qualification rate of the prefabricated box girder prestressed mesh once installed.

The bottom plate vertical reinforcing steel bars 4 are symmetrically arranged on both sides of the circular ring of the bottom plate prestressed duct mesh 7, the bottom plate horizontal reinforcing steel bars 2 are symmetrically arranged at the upper end and the lower end of the circular ring of the bottom plate prestressed duct mesh 7, and the two ends of the bottom plate horizontal reinforcing steel bars 2 are fixedly connected with the bottom plate vertical reinforcing steel bars 4; the bottom plate positioning reinforcing steel bar 1 is welded with a plurality of bottom plate horizontal reinforcing steel bars 2 and the bottom plate vertical reinforcing steel bars 4 to form a positioning reinforcing steel bar mesh sheet with a prestressed duct mesh. Web horizontal reinforcing steel bars

8 are symmetrically arranged at the upper end and the lower end of the circular ring of the web prestressed duct mesh 10, and the two ends of the web horizontal reinforcing reinforcing steel bars 8 are fixedly connected with the web positioning reinforcing steel bars 3; web inclined reinforcing steel bars 9 are symmetrically arranged on the two sides of the circular ring of the web prestressed duct mesh 10, the two ends of the web inclined reinforcing steel bars 9 are fixedly connected with the web horizontal reinforcing steel bars 8, the web inclined reinforcing steel bars 9 and the web positioning reinforcing steel bars 3 are arranged in parallel, and the web positioning reinforcing reinforcing steel bars 3 are welded with a plurality of web horizontal reinforcing reinforcing steel bars 8 and a plurality of web inclined reinforcing reinforcing steel bars 9 which are consistent with the web positioning reinforcing reinforcing steel bars 3 to form the positioning reinforcing steel bar mesh of the web prestressed duct with the prestressed duct meshes.

As shown in Fig. 2 and Fig. 3, in different examples, the thickness of the bottom plate is controlled by adjusting the length of the vertical reinforcing steel bars 4 of the bottom plate prestressed duct mesh 7; the bottom plate prestressed duct mesh 7 can be adjusted by adjusting the horizontal reinforcing steel bar 2 and the bottom plate vertical reinforcing steel bar 4, and the width and height of the mesh are the same as the diameter of the prestressed duct, the thickness of the web is controlled by adjusting the length of the web horizontal reinforcing steel bar 8 of the web prestressed duct mesh 10, and the web prestressed duct mesh 10 can be adjusted by adjusting the web horizontal reinforcing steel bar 8 and the web inclined reinforcing steel bar 9 with the same inclination angle as the web positioning reinforcing steel bar 3, and the width and height of the mesh are the same as the diameter of the prestressed duct; and the positioning reinforcing steel bar meshes of the prestressed duct are welded into an integrated connecting net through the positioning reinforcing steel bar meshes of the bottom plate prestressed duct and the positioning reinforcing steel bar meshes of the web prestressed duct.

When the positioning reinforcing steel bar mesh of the prestressed duct is processed, firstly, the positioning reinforcing steel bar mesh tire fixture with a plurality of prestressed ducts is manufactured in a reinforcing steel bar processing plant area, the positioning reinforcing steel bar mesh tire fixture of the prestressed duct is made of 40×40×4 mm angle steel, and the open groove is a semicircular notch with the diameter of 13 mm. The center position of each mesh of the

positioning reinforcing steel bar mesh tire fixture of the prestressed duct coincides with the center position of the prestressed duct in the design drawing.

The 80 mm prestressed duct adopts a 85 mm circular ring, and a 90 mm prestressed duct adopts a 95 mm circular ring. The machining error of the up-down or left-right notch distance (inner to inner) of the prestressed duct is 0-4 mm. The center of the semicircular notches of the bottom plate positioning reinforcing steel bars 1 and the web positioning reinforcing steel bars 3 are arranged in a profiling mode with the section of the prefabricated box girder, the 35 mm protective layer and the 18 mm threaded reinforcing steel bars are reserved according to the size of the box girder and 12 mm of the threaded reinforcing steel bars, the outer edge of the center of the semicircular notch is 71 mm, which can be used as an auxiliary reinforcing steel bar to control thickness of the bottom plate and the web of the box girder.

The web positioning reinforcing steel bars 3 are welded to the bottom plate positioning reinforcing steel bars 1, which is arranged in a profiling mode with the sections of the prefabricated box grider, according to the size of the box girder, the center distance between the web positioning reinforcing steel bar 3 and the bottom plate positioning reinforcing steel bar 1 is 71mm from the outer edge. The center position of each mesh of the prestressed steel mesh tire fixture coincides with the center position of the prestressed duct in the design drawing, and the web supporting reinforcing steel bar 5 is welded to the bottom plate positioning reinforcing steel bar 1, so that the positioning reinforcing steel bar mesh support of the web prestressed duct is reinforced. The bottom plate prestressed duct mesh 7 adopts the circular ring to accurately weld the bottom plate horizontal reinforcing steel bar 2 and the bottom plate vertical reinforcing steel bar 4, and the web prestressed duct mesh 10 adopts the circular ring to accurately weld web horizontal reinforcing steel bars 8 and web inclined reinforcing steel bars 9. All precision meshes are made of HPB300φ12 round steel supports. On the basis of the above mesh structure, the present invention further provides a construction method of the positioning reinforcing steel bar mesh of the prestressed duct. During installation, placing the positioning reinforcing steel bar meshes above the lower-layer through long bars 6 of the bottom plate; aligning the longitudinal center line of the positioning reinforcing steel bar mesh with the center line of the mould, and meanwhile, adjusting the vertical direction to be consistent with the vertical direction of the reinforcing steel bar in the clamping groove in the mould;

and directly integrating binding or spot welding. It can reduce the inclination and displacement of prestressed reinforcing steel bars caused by the working angle when workers operate, and while effectively improve the working efficiency of workers. After the framework of the beam body reinforcing steel bar and the positioning net sheet are bound, the rubber rod can thread into the design coordinate hole of the accurate ring from the two ends of the framework to the span. The front end needs to be manually guided into a preset positioning ring hole during installing and threading. Be careful not to use too much force when threading, so as not to damage the rubber rod.

CLAIMS

1. A construction method of the positioning reinforcing steel bar mesh of the prestressed duct, characterized by comprising the following steps:

placing the positioning reinforcing steel bar meshes above the lower-layer through long bar of the bottom plate;

aligning the longitudinal center line of the positioning reinforcing steel bar mesh with the center line of the mould, and meanwhile, adjusting the vertical direction to be consistent with the vertical direction of the reinforcing steel bar in the clamping groove in the mould;

directly integrating binding or spot welding with the U-shaped ribs of the beam body;

after binding the framework of the beam body reinforcing steel bar with the positioning reinforcing steel bar meshes, the rubber rods thread into the design coordinate meshes from the two ends of the framework of the beam body reinforcing steel bar in the span direction, and the front end is manually guided into the preset prestressed duct meshes during installing and threading,

the positioning reinforcing steel bar mesh of the prestressed duct comprises: two bottom plate positioning reinforcing steel bars parallel to a box girder bottom plate and two web positioning reinforcing steel bars parallel to a web, and one end of the bottom plate positioning reinforcing steel bar is fixedly connected with the bottom of the web positioning reinforcing steel bar; a plurality of bottom plate prestressed duct meshes are arranged between two bottom plate positioning reinforcing steel bars, and a plurality of web prestressed duct meshes are arranged between two web positioning reinforcing steel bars,

the bottom plate vertical reinforcing steel bars are symmetrically arranged on both sides of the prestressed duct mesh of the bottom plate, and both ends of the bottom plate vertical reinforcing steel bars are fixedly connected to the bottom plate positioning reinforcing steel bars; the bottom plate prestressed duct meshes are symmetrically arranged with bottom plate horizontal reinforcing steel bars at both ends, and both ends of the bottom plate horizontal reinforcing steel bars are fixedly connected to the bottom plate vertical reinforcing steel bars.

2. The construction method of the positioning reinforcing steel bar mesh of the prestressed duct according to claim 1, characterized in that web horizontal reinforcing steel bars are symmetrically arranged at the upper end and the lower end of the web prestressed duct mesh, and the two ends of the web horizontal reinforcing steel bars are fixedly connected with the web positioning reinforcing steel bars; web inclined reinforcing steel bars are symmetrically arranged on the two sides of the web prestressed duct mesh, the two ends of the web inclined reinforcing steel bars are fixedly connected with the web horizontal reinforcing steel bars, and the web inclined reinforcing steel bars are arranged parallel with the web positioning reinforcing steel bars.

3. The construction method of the positioning reinforcing steel bar mesh of the prestressed duct according to claim 1, characterized in that a web supporting reinforcing steel bar with the bottom fixedly connected with the bottom plate positioning reinforcing steel bar is arranged between the two web positioning reinforcing steel bars, and the web supporting reinforcing steel bar is arranged parallel with the web positioning reinforcing steel bar.

ANSPRÜCHE

1. Ausführungsverfahren eines Positionierstahlgitters eines vorgespannten Lochkanals, dadurch gekennzeichnet, dass es die folgenden Schritte umfasst:

Platzieren des Positionierstahlgitters über Längssehne in der unteren Schicht einer Bodenplatte;

Einstellen zum Übereinstimmen einer vertikalen Richtung mit einer vertikalen Richtung eines Stahlstabs in einer Klemmnut auf einer Form während eines Ausrichtens einer Längsmittellinie des Positionierstahlgitters mit der Mittellinie der Form;

Integriertes Binden oder Punktschweißen direkt mit einer U-förmigen Sehne eines Trägerkörpers;

nach Binden des Trägerkörperstahlskeletts und des Positionierstahlgitters, Einleiten einer Gummistange von beiden Enden eines Trägerkörperstahlskeletts zur Spannweite in Konstruktionskoordinatenloch, Einführen in voreingestellte vorgespannte Lochkanalmasche durch Frontend-Arbeiter bei Installation und Zuführung,

wobei das Positionierstahlgitter des vorgespannten Lochkanals zwei Bodenplatten-Positionierstahlsehnen parallel zur Kastenträgerbodenplatte und zwei Bahnplatten-Positionierstahlsehnen parallel zur Bahnplatte umfasst, wobei ein Ende der Bodenplatten-Positionierstahlsehnen fest mit einem Boden der Bahnplatten-Positionierstahlsehnen verbunden ist, wobei mehrere vorgespannte Bodenplatten-Lochkanalmaschen zwischen den beiden Bodenplatten-Positionierstahlsehnen angeordnet sind, wobei mehrere vorgespannte Bahnplatten-Lochkanalmaschen zwischen den zwei Bahnplatten-Positionierstahlsehnen angeordnet sind;

wobei die vorgespannten Bodenplatten-Lochkanalmaschen auf beiden Seiten symmetrisch mit vertikalen Bodenplatten-Stahlsehnen versehen sind, und beide Enden der vertikalen Bodenplatten-Stahlsehnen fest mit den

Bodenplatten-Positionierstahlsehnen verbunden sind, wobei die die vorgespannten Bodenplatten-Lochkanalmaschen auf oberen und unteren Enden symmetrisch mit horizontalen Bodenplatten-Stahlsehnen versehen sind, und beide Enden der horizontalen Bodenplatten-Stahlsehnen fest mit den vertikalen Bodenplatten-Stahlsehnen verbunden sind.

2. Ausführungsverfahren eines Positionierstahlgitters eines vorgespannten Lochkanals nach Anspruch 1, dadurch gekennzeichnet, dass die vorgespannten Bahnplatten-Lochkanalmaschen auf oberen und unteren Enden symmetrisch mit horizontalen Bahnplatten-Stahlsehnen versehen sind, die beiden Enden der horizontalen Bahnplatten-Stahlsehnen fest mit Bahnplatten-Positionierstahlsehnen verbunden sind; die vorgespannte Lochkanalmasche auf beiden Seiten symmetrisch mit einer schrägen Bahnplatten-Stahlsehne versehen ist, wobei die beiden Enden der schrägen Bahnplatten-Stahlsehne fest mit horizontaler Bahnplatten-Stahlsehne verbunden ist, wobei die schräge Bahnplatten-Stahlsehne parallel zur Bahnplatten-Positionierstahlsehne angeordnet ist.

3. Ausführungsverfahren eines Positionierstahlgitters eines vorgespannten Lochkanals nach Anspruch 1, dadurch gekennzeichnet, dass eine Bahnstützenstahlsehne, deren Boden fest mit der Bodenplatten-Positionierstahlsehne verbunden ist, zwischen zwei Bahnplatten-Positionierstahlsehnen angeordnet ist, wobei die Bahnstützenstahlsehne parallel zur Bahnplatten-Positionierstahlsehne angeordnet ist.

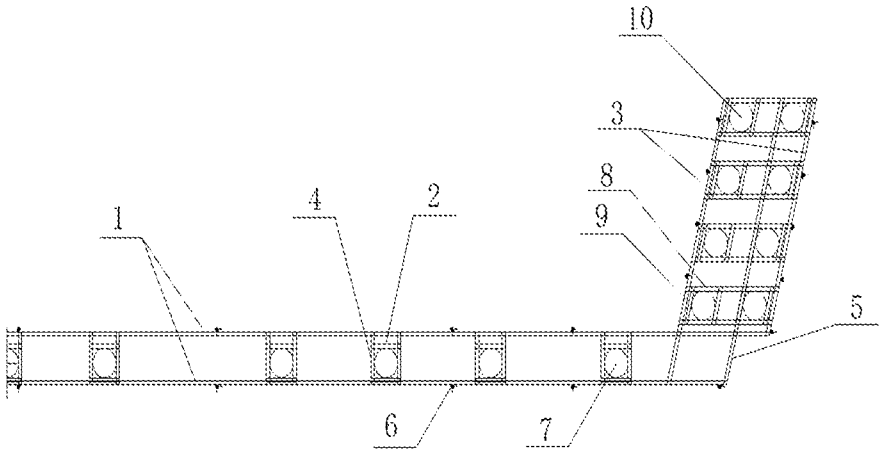

Fig. 1

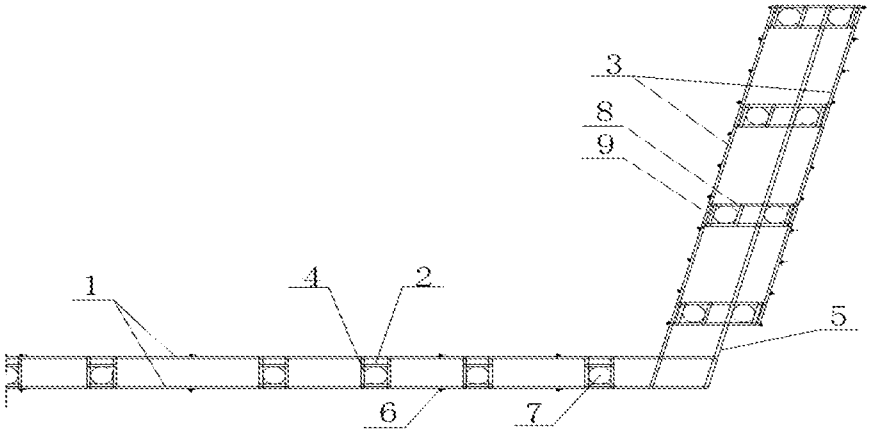

Fig. 2

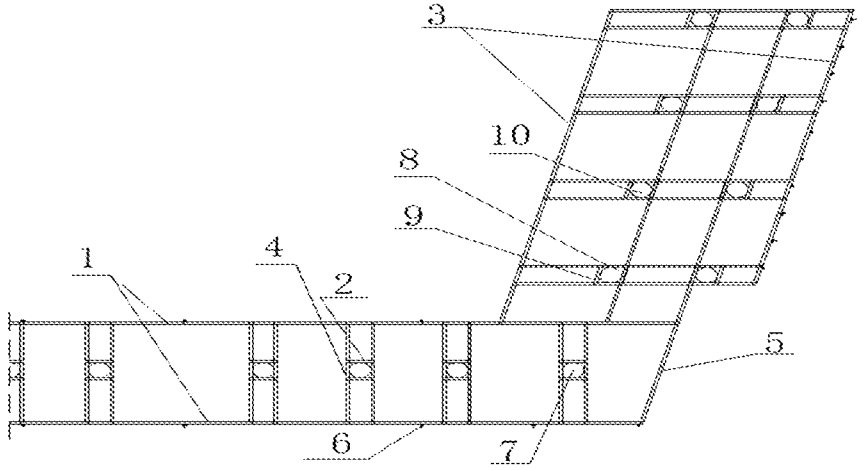

Fig. 3