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(54) **TRUSS FOOTING CUTTING DEVICE**

(57) A truss footing cutoff device includes a rack (1); a fixed blade holder (2) fixed on the rack (1), where two fixed blades (3) are symmetrically arranged on the fixed blade holder (2), the fixed blade holder (2) is configured to support a truss (10), and each fixed blade (3) is configured to support a truss footing (100) of the truss (10); two cutoff arms (4) symmetrically mounted on the rack (1), wherein each cutoff arm (4) is provided with a movable blade (5); and a driving member (6) mounted on the rack (1) and configured to drive the two cutoff arms (4) to move, so that the two cutoff arms (4) drives two movable blade (5) to get close to the corresponding fixed blades (3), and then the two movable blade (5) cooperate with the two fixed blades (3) to cut off the truss footings (100).

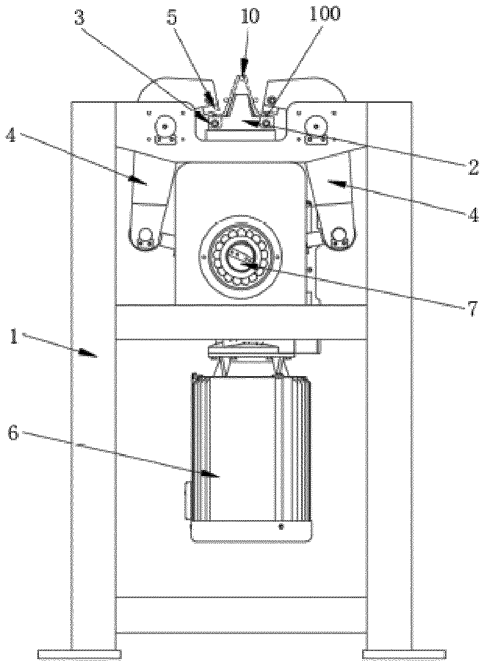

FIG. 2

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Description

[0001] This application claims priority to Chinese Patent Application No. 202011502836.3 filed with the China National Intellectual Property Administration (CNIPA) on Dec. 18, 2020, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present application relates to the field of truss processing techniques and, in particular, to a truss footing cutoff device.

BACKGROUND

[0003] The steel bar truss deck is formed by welding a bottom plate to a steel bar truss, and the steel bar truss is formed by welding an upper chord rib 101, a lower chord rib 102 and a truss footing 100 connecting the upper and lower chord ribs (shown in FIG. 1). The truss footing 100 is made of wave-shaped rebars. At present, the truss cutoff operation is involved in the truss production line, and typically, avoids the position of the truss footing. However, in the case where there exist special needs or the truss must be cut off from the position of the truss footing, the truss footing is usually cut off by manually using a toothless saw or the like. Such cutoff manner has some problems, for example, the length precision of the steel bar truss is difficult to control, and the production efficiency is low. Moreover, the labor intensity of the operator is too high, and there is a potential safety hazard.

SUMMARY

[0004] The present application provides a truss footing cutoff device to solve problems of low production efficiency and high labor intensity existing in the existing truss footing cutoff manner.

[0005] To achieve this object, the present application adopts technical solutions described below.

[0006] The truss footing cutoff device includes a rack; a fixed blade holder; two cutoff arms and a driving member.

[0007] The fixed blade holder is fixed on the rack. Two fixed blades are symmetrically arranged on the fixed blade holder, the fixed blade holder is configured to support a truss, and each of the two fixed blades is configured to support a truss footing of the truss.

[0008] The two cutoff arms are symmetrically arranged on the rack. Each of the two cutoff arms is provided with a movable blade.

[0009] The driving member is mounted on the rack and is configured to drive the two cutoff arms to move, so that the each of the two cutoff arms drives the movable blade to get close to a respective one of the two fixed blades, and the movable blade cooperates with the respective one of the two fixed blades to cut off the truss footing.

[0010] Optionally, the two cutoff arms are rotatably mounted on the rack, the driving member is capable of driving the two cutoff arms to rotate, and the movable blade is mounted at one end of the each of the two cutoff arms and is capable of being driven by the each of the two cutoff arms to rotate.

[0011] Optionally, the truss footing cutoff device further includes a transmission assembly. The transmission assembly includes a crankshaft rotatably mounted on the rack and two connecting arms mounted on the crankshaft and capable of only rotating relative to the crankshaft, each of the two connecting arms is rotatably connected to a respective one of the two cutoff arms, the driving member is drivingly connected to the crankshaft and is capable of driving the crankshaft to rotate, and the crankshaft is capable of driving the two connecting arms to stretch out and draw back synchronously when the crankshaft rotates.

[0012] Optionally, the crankshaft includes a first connecting part and a second connecting part, a central axis of the first connecting part and a central axis of the second connecting part are symmetrically arranged with respect to a centerline of the crankshaft, one of the two connecting arms is rotatably connected to the first connecting part and the other one of the two connecting arms is rotatably connected to the second connecting part.

[0013] Optionally, the transmission assembly further includes a connecting rod, one end of the connecting rod is rotatably connected to the each of the two connecting arms, and the other end of the connecting rod is rotatably connected to the respective one of the two cutoff arms.

[0014] Optionally, two driving members are provided, and each of the two driving members is drivingly connected to a respective one of the two cutoff arms.

[0015] Optionally, the two driving members synchronously operate so as to drive the two cutoff arms to synchronously rotate.

[0016] Optionally, the two cutoff arms are slidably mounted on the rack, the driving member is capable of driving the two cutoff arms to slide, and the movable blade is mounted at one end of the each of the two cutoff arms and is capable of being driven by the each of the two cutoff arms to move towards the fixed blade.

[0017] Optionally, the driving member is an air cylinder or an oil cylinder, and an output end of the air cylinder or the oil cylinder is connected to the two cutoff arms.

[0018] Optionally, the fixed blade holder includes a supporting part and two mounting parts located at two sides of the supporting part, the supporting part is configured to support the truss, and the two fixed blades are fixedly mounted on the two mounting parts respectively.

BRIEF DESCRIPTION OF DRAWINGS

[0019]

FIG. 1 is a structure view of a truss provided by the

present application;
FIG. 2 is a front view of a truss footing cutoff device provided by the present application;
FIG. 3 is a side view of a truss footing cutoff device provided by the present application;
FIG. 4 is a structure view of a truss footing cutoff device, with a rack and a driving member hidden, provided by the present application; and
FIG. 5 is a structure view showing cooperation of a transmission member and a cutoff arm provided by the present application.

Reference list:

[0020]

1	rack
2	fixed blade holder
21	supporting part
22	mounting part
3	fixed blade
4	cutoff arm
5	moveable blade
6	driving member
7	transmission assembly
71	crankshaft
711	first connecting part
712	second connecting part
72	connecting arm
73	connecting rod
10	truss
100	truss footing
101	upper chord rib
102	lower chord rib

DETAILED DESCRIPTION

[0021] The present application is further described hereinafter in detail in conjunction with drawings and embodiments. It is to be understood that the embodiments described herein are intended to explain the present application and not to limit the present application. Additionally, it is to be noted that for ease of description, only part, not all, of the structures related to the present application are illustrated in the drawings.

[0022] In the description of the present application, unless otherwise expressly specified and limited, the term "connected to each other", "connected" or "secured" is to be construed in a broad sense, for example, as securely connected, detachably connected or integrated; mechanically connected or electrically connected; directly connected to each other or indirectly connected to each other via an intermediary; or internally connected between two components or interaction relations between two components. For those of ordinary skill in the art, specific meanings of the preceding terms in the present application may be understood based on specific situations.

[0023] In the present application, unless otherwise expressly specified and limited, when a first feature is described as "above" or "below" a second feature, the first feature and the second feature may be in direct contact or be in contact via another feature between the two features. Moreover, when the first feature is described as "on", "above", or "over" the second feature, the first feature is right on, above, or over the second feature or the first feature is obliquely on, above, or over the second feature, or the first feature is simply at a higher level than the second feature. When the first feature is described as "under", "below", or "underneath" the second feature, the first feature is right under, below, or underneath the second feature or the first feature is obliquely under, below, or underneath the second feature, or the first feature is simply at a lower level than the second feature.

[0024] In the description of this embodiment, the orientation or position relationships indicated by terms "above", "below", "right" and the like are based on the orientation or position relationships shown in the drawings, merely for ease of description and simplifying an operation, and these relationships do not indicate or imply that the referred device or element has a specific orientation and is constructed and operated in a specific orientation, and thus it is not to be construed as limiting the present application. In addition, the terms "first" and "second" are used only to distinguish between descriptions and have no special meaning.

[0025] The present application provides a truss footing cutoff device, which can achieve the automatic cutoff of a truss footing 100 of a truss 10 without the manual cutoff, and thus has a higher automation degree, improves the production efficiency, and reduces the labor intensity of the operator and the potential safety hazard.

[0026] As shown in FIGS. 2 to 5, the truss footing cutoff device includes a rack 1, a fixed blade holder 2, a fixed blade 3, a cutoff arm 4, a movable blade 5, a driving member 6 and a transmission assembly 7.

[0027] The rack 1 is configured to carry the fixed blade holder 2, the fixed blade 3, the cutoff arm 4, the movable blade 5, the driving member 6 and the transmission as-

sembly 7 to achieve the cutoff operation of the truss footing 100.

[0028] The fixed blade holder 2 is fixed to the rack 1 and is optionally placed at a top position of the rack 1. A shape of the fixed blade holder 2 is adapted to a shape of the truss 10. As shown in FIGS. 2 and 4, the fixed blade holder 2 includes a supporting part 21 and mounting parts 22 located at two sides of the supporting part 21. The supporting part 21 is substantially in an inverted trapezoidal structure, and the truss 10 can be placed on and supported by the support part 21. The mounting part 22 is configured to fix and mount the fixed blade 3, and when the truss 10 is placed on the support part 21, the truss footing 100 can be placed on the fixed blade 3.

[0029] The cutoff arm 4 is mounted on the rack 1 and is rotatable relative to the rack 1.As shown in FIG. 4, an upper-middle position of the cutoff arm 4 is rotatably connected to the rack 1 through a rotary shaft. The movable blade 5 is mounted at one end of the cutoff arm 4 close to the rotary shaft, and the movable blade 5 can get close to or move away from the fixed blade 3 with the rotation of the cutoff arm 4. When the cutoff arm 4 drives the movable blade 5 to get close to the fixed blade 3, the movable blade 5 and the fixed blade 3 cooperate to cut the truss footing 100.

[0030] Exemplarily, in this embodiment, two cutoff arms 4 are symmetrically arranged on the rack 1, and correspondingly, two movable blades 5 and two fixed blades 3 are also symmetrically arranged, thereby achieving the cutoff of truss footings 100 on two sides of the truss 10.

[0031] The driving member 6 is configured to drive the cutoff arm 4 to rotate relative to the rack 1. The driving member 6 may be a motor or a deceleration motor. Two driving members 6 may be provided, where each driving member 6 drives one cutoff arm 4 to rotate so as to cut off the truss footing 100. Optionally, the two driving members 6 synchronously operate to synchronously cut off the truss footings 100 on two sides of the truss 10 at a same position, thereby improving the cutoff efficiency.

[0032] Considering the production cost, in this embodiment, , only one driving member 6 may be provided, and in this case, the driving member 6 drives the cutoff arms 4 to rotate through the transmission assembly 7. Referring to FIGS. 2 and 5, the above transmission assembly 7 includes a crankshaft 71, connecting arms 72 and connecting rods 73.

[0033] The crankshaft 71 is rotatably mounted on the rack 1 and can be driven by the driving member 6 to rotate. The crankshaft 71 is provided with a first connecting part 711 and a second connecting part 712. One connecting arm 72 is rotatably connected to the first connecting part 711 and the other connecting arm 72 is rotatably connected to the second connecting part 712. One end of each connecting arm 72 is rotatably connected to one end of a respective connecting rod 73, the other end of the respective connecting rod 73 is rotatably connected to one cutoff arm 4. In this way, when the connecting arm 72 is driven by the crankshaft 71 to stretch out or draw back, the connecting arm 72 can drive the cutoff arm 4 to rotate, and then the cutoff arm 4 drives the movable knife 5 to get close to or move away from the fixed blade 3.

[0034] Exemplarily, a central axis of the first connecting part 711 and a central axis of the first connecting part 712 are symmetrically arranged with respect to a centerline of the crankshaft 71. The central axis of the first connecting part 711 and the central axis of the second connecting part 712 are symmetrically arranged with respect to the centerline of the crankshaft 71 so that when the crankshaft 71 rotates, the two connecting arms 72 can be driven to stretch out at the same time and then the two cutoff arms 4 and the two movable blades 5 can be driven to get close to the fixed blades 3 at the same time, so as to achieve the synchronous cutoff of the truss footings 100 on two sides of the truss 10; or the two connecting arms 72 can be driven to draw back at the same time and then the two cutoff arms 4 and the two movable blades 5 can be driven to move away from the fixed blades 3 at the same time.

[0035] When the truss footing cutoff device in this embodiment works, first, the truss 10 is placed on the supporting part 21 of the fixed blade holder 2, and the truss footing 100 is located on the fixed blade 3; then, the crankshaft 71 is driven by the driving member 6 to rotate, the crankshaft 71 drives the two connecting arms 72 to stretch out, and each connecting arm 72 drives the respective cutoff arm 4 to rotate, and the rotation of the cutoff arm 4 drives the movable blade 5 to get close to the fixed blade 3; and finally the movable blade 5 cooperates with the fixed blade 3 to cut off the truss footing 100.

[0036] After the truss footing 100 is cut off, the truss 10 continues to be transported backward to a truss shearing device, and an upper chord rib and a lower chord rib of the truss 10 are cut off by the truss shearing device, thereby completing the cutoff of the whole truss 10.

Embodiment two

[0037] This embodiment provides a truss footing cutoff device. The difference between this embodiment and embodiment one is that in this embodiment, the cutoff arm is not rotatably arranged on the rack, but is slidably arranged on the rack; the driving member is configured to drive the cutoff arm to slide; and the transmission component is not provided.

[0038] Optionally, a slide rail may be provided on the rack, and correspondingly, a slide block is provided on the cutoff arm. The driving member drives the cutoff arm to slide in a vertical direction, and the slide block and the slide rail can play roles of guiding and stably supporting.

[0039] At the same time, the driving member of this embodiment may be an air cylinder or an oil cylinder, and an output end of the air cylinder or the oil cylinder is connected to the cutoff arm. Two driving members may be

provided. Each driving member is drivingly connected to one cutoff arm, and optionally, the two driving members synchronously operate so as to achieve the synchronous sliding of the cutoff arms. One driving member may also be provided, and in this case, a connection member needs to be provided. Two cutoff arms are fixedly connected through the connection member, an output end of the driving member is fixedly connected to the connection member, the connection member is driven by the driving member to move, and then the connection member can drive the two cutoff arms to slide at the same time.

[0040] The remaining structure of this embodiment is the same as the structure of the embodiment one, and will not be repeated here.

[0041] When the truss footing cutoff device in this embodiment works, first, the truss is placed on the supporting part of the fixed blade holder, and the truss footing is located on the fixed blade 3; then, the cutoff arm is driven by the driving member to slide downwards, and the movable blade on the cutoff arm is driven to get close to the fixed blade, and finally cooperates with the fixed blade to cut off the truss footing.

[0042] When the truss footing is cut off, the truss continues to be transported backward to a truss shearing device, and an upper chord rib and a lower chord rib of the truss are cut off on the truss shearing device, thereby completing the cutoff of the whole truss.

[0043] In the present application, the movable blade 5 is driven by the cutoff arm to get close to the fixed blade 3, and then the movable blade 5 cooperates with the fixed blade 3 to cut off the truss footing 100. Thus, the automatic cutoff of the truss footing 100 of the truss 10 is achieved without the manual cutoff, having a higher automation degree, improving the production efficiency, and reducing the labor intensity of the operator and the potential safety hazard.

Claims

1. A truss footing cutoff device, comprising:

a rack (1);
a fixed blade holder (2) fixed on the rack (1), wherein two fixed blades (3) are symmetrically arranged on the fixed blade holder (2), the fixed blade holder (2) is configured to support a truss (10), and each of the two fixed blades (3) is configured to support a truss footing (100) of the truss (10);
two cutoff arms (4) symmetrically mounted on the rack (1), wherein each of the two cutoff arms (4) is provided with a movable blade (5); and
a driving member (6) mounted on the rack (1) and configured to drive the two cutoff arms (4) to move, so that the each of the two cutoff arms (4) drives the movable blade (5) to get close to a respective one of the two fixed blades (3), and the movable blade (5) cooperates with the respective one of the two fixed blades (3) to cut off the truss footing (100).

2. The truss footing cutoff device of claim 1, wherein the two cutoff arms (4) are rotatably mounted on the rack (1), the driving member (6) is capable of driving the two cutoff arms (4) to rotate, and the movable blade (5) is mounted at one end of the each of the two cutoff arms (4) and is capable of being driven by the each of the two cutoff arms (4) to rotate.

3. The truss footing cutoff device of claim 2, further comprising: a transmission assembly (7), wherein the transmission assembly (7) comprises a crankshaft (71) rotatably mounted on the rack (1) and two connecting arms (72) mounted on the crankshaft (71) and capable of only rotating relative to the crankshaft (71), each of the two connecting arms (72) is rotatably connected to a respective one of the two cutoff arms (4), the driving member (6) is drivingly connected to the crankshaft (71) and is capable of driving the crankshaft (71) to rotate, and the crankshaft (71) is capable of driving the two connecting arms (72) to stretch out and draw back synchronously when the crankshaft (71) rotates.

4. The truss footing cutoff device of claim 3, wherein the crankshaft (71) comprises a first connecting part (711) and a second connecting part (712), a central axis of the first connecting part (711) and a central axis of the second connecting part (712) are symmetrically arranged with respect to a centerline of the crankshaft (71), one of the two connecting arms (72) is rotatably connected to the first connecting part (711) and the other one of the two connecting arms (72) is rotatably connected to the second connecting part (712).

5. The truss footing cutoff device of claim 3 or 4, wherein the transmission assembly (7) further comprises a connecting rod (73), one end of the connecting rod (73) is rotatably connected to the each of the two connecting arms (72), and the other end of the connecting rod (73) is rotatably connected to the respective one of the two cutoff arms (4).

6. The truss footing cutoff device of claim 2 or 5, wherein two driving members (6) are provided, and each of the two driving members (6) is drivingly connected to a respective one of the two cutoff arms (4).

7. The truss footing cutoff device of claim 6, wherein the two driving members (6) synchronously operate so as to drive the two cutoff arms (4) to synchronously rotate.

8. The truss footing cutoff device of claim 1, wherein

the two cutoff arms (4) are slidably mounted on the rack (1), the driving member (6) is capable of driving the two cutoff arms (4) to slide, and the movable blade (5) is mounted at one end of the each of the two cutoff arms (4) and is capable of being driven by the each of the two cutoff arms (4) to move towards the fixed blade (3).

9. The truss footing cutoff device of claim 8, wherein the driving member (6) is an air cylinder or an oil cylinder, and an output end of the air cylinder or the oil cylinder is connected to the two cutoff arms (4).

10. The truss footing cutoff device of claim 1, wherein the fixed blade holder (2) comprises a supporting part (21) and two mounting parts (22) located at two sides of the supporting part (21), the supporting part (21) is configured to support the truss (10), and the two fixed blades (3) are fixedly mounted on the two mounting parts (22) respectively.

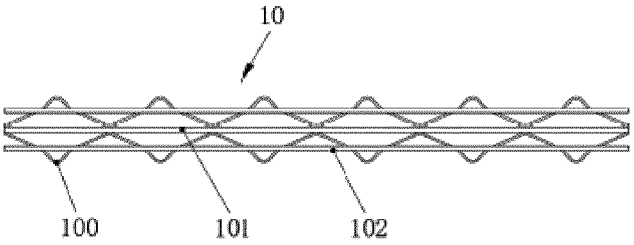

FIG. 1

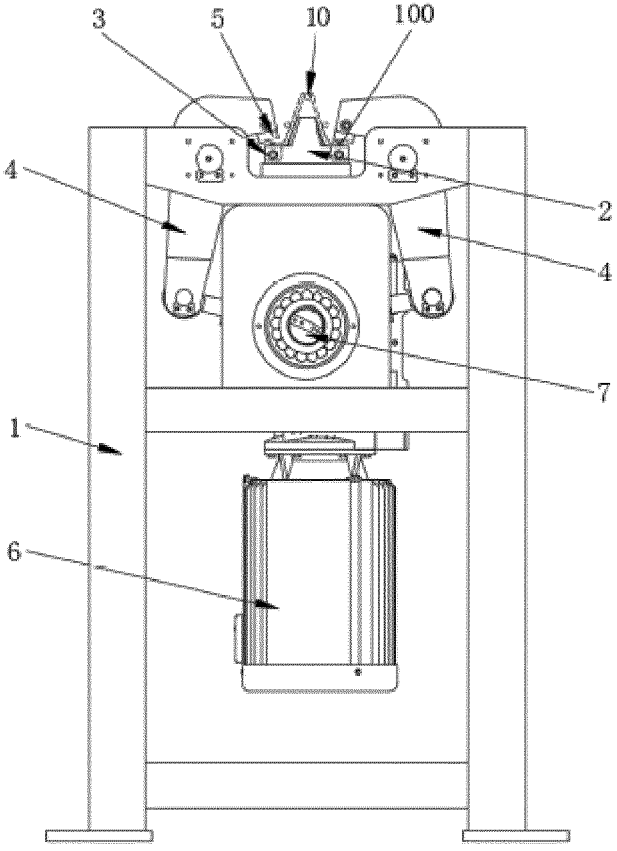

FIG. 2

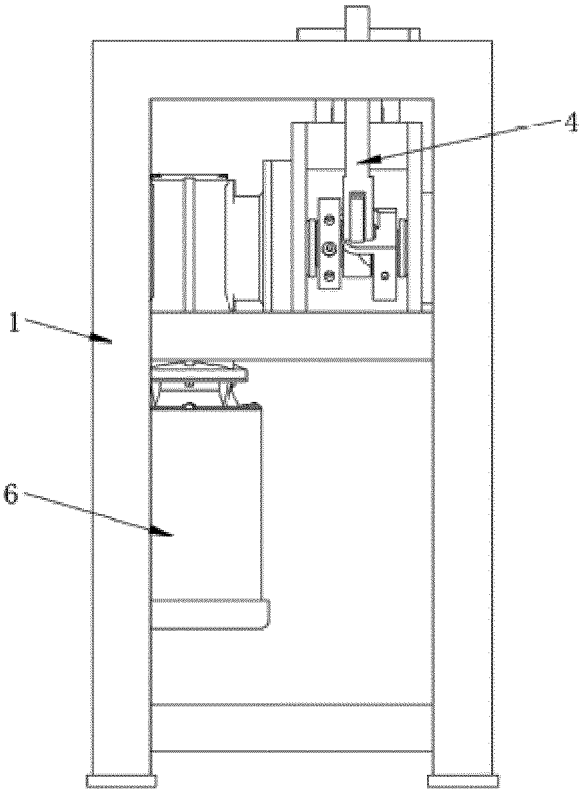

FIG. 3

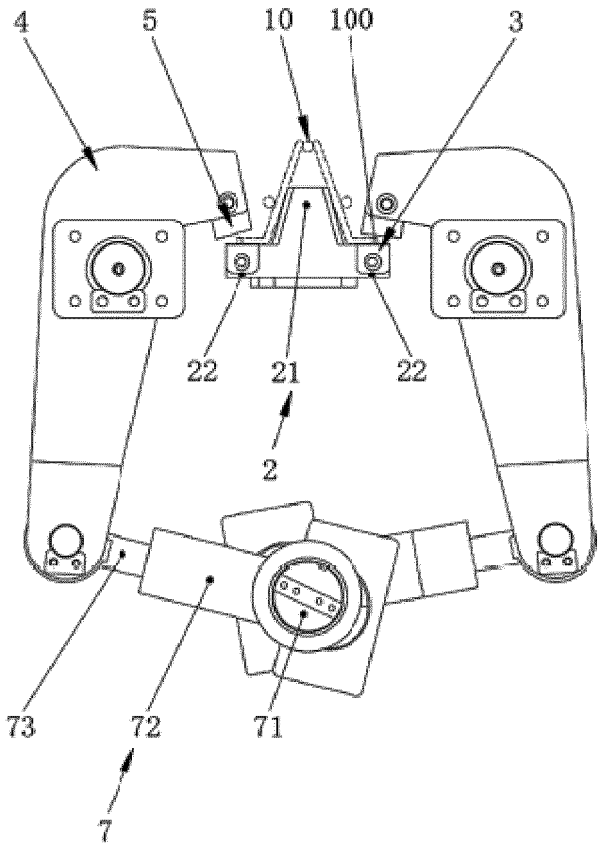

FIG. 4

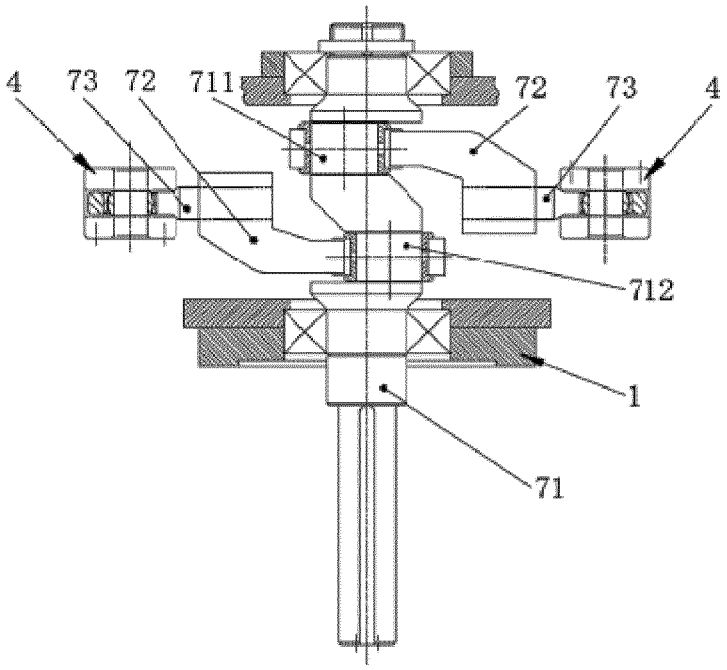

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/100386

A. CLASSIFICATION OF SUBJECT MATTER

B21F 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B21F 11/00; B23D 31/00; B23D 33/00; E04B 1/24; E04C 3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

VEN; CNABS; CNTXT; CNKI: 桁架, 底脚, 刀, 剪切, 切断, 剪断, 裁切, 支撑, 支承, 刀座, 底座, 建科机械, 陈振东, truss, girder, foot, feet, cut+, support+, hold+, bracket, TJK, CHEN ZHENDONG

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 112620539 A (TJK MACHINERY (TIANJIN) CO., LTD.) 09 April 2021 (2021-04-09) claims 1-10, description paragraphs 3-48 and figures 1-5	1-10
A	CN 105014149 A (TJK MACHINERY (TIANJIN) CO., LTD.) 04 November 2015 (2015-11-04) description, paragraphs 21-34, and figures 1-4	1-10
A	CN 103406475 A (WUXI WEIHUA ELECTRIC WELDER MANUFACTURE CO., LTD.) 27 November 2013 (2013-11-27) entire document	1-10
A	CN 103801637 A (TJK MACHINERY (TIANJIN) CO., LTD.) 21 May 2014 (2014-05-21) entire document	1-10
A	EP 1982779 A1 (PROMOSTAR S. R. L.) 22 October 2008 (2008-10-22) entire document	1-10
A	CN 204262252 U (ZHEJIANG WILLING TECHNOLOGY CO., LTD.) 15 April 2015 (2015-04-15) entire document	1-10
A	CN 204276753 U (TJK MACHINERY (TIANJIN) CO., LTD.) 22 April 2015 (2015-04-22) entire document	8-9

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 September 2021	**26 September 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2021/100386

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 112620539 A	09 April 2021	None	
CN 105014149 A	04 November 2015	None	
CN 103406475 A	27 November 2013	None	
CN 103801637 A	21 May 2014	None	
EP 1982779 A1	22 October 2008	IT PN20070023 A1	19 October 2008
CN 204262252 U	15 April 2015	None	
CN 204276753 U	22 April 2015	None	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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