(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 212 262 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.07.2023 Bulletin 2023/29

(21) Application number: **22151747.7**

(22) Date of filing: **17.01.2022**

(51) International Patent Classification (IPC):
B21D 53/52 *(2006.01)* ***B21F 45/18*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B21D 53/52; B21F 45/18

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Dongguan Lexiang Hardware & Zipper Products Co., Ltd**
Humen Town
Dongguan
Guangdong (CN)

(72) Inventor: **Luo, Futian**
Dongguan (CN)

(74) Representative: **Cleanthous, Marinos**
IOANNIDES CLEANTHOUS AND CO LLC
4 Prometheus Street, 3 Floor
1065 Nicosia (CY)

Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) MACHINING EQUIPMENT FOR DOUBLE-POINT ZIPPER TEETH

(57) The present disclosure discloses machining equipment for double-point zipper teeth includes a main driving mechanism, a cutter, a punch pin which is in transmission connection with the main driving mechanism and is capable of moving in an up-down direction, a main sliding seat which is in transmission connection with the main driving mechanism and is capable of moving in a front-back direction, and a machining module fixed at a front end of the main sliding seat; the machining module includes a profile die and a machining die which are disposed in sequence forwards; a via hole is formed in the profile die; a zipper profile moves one zipper tooth site in the via hole at each time under the driving of the main driving mechanism; the cutter and the punch pin are both arranged above the machining module; an upper surface of the machining die is provided with a machining die site correspondingly cooperating with the punch pin; the machining equipment for the double-point zipper teeth further includes a material clamping mechanism which is in transmission connection with the main driving mechanism; the material clamping mechanism includes two clamping blocks which are disposed oppositely and are capable of moving in a left-right direction; and the two clamping blocks are respectively located on two sides of the machining module. The present disclosure has a simple and reasonable structure and high machining efficiency, and saves materials and production time.

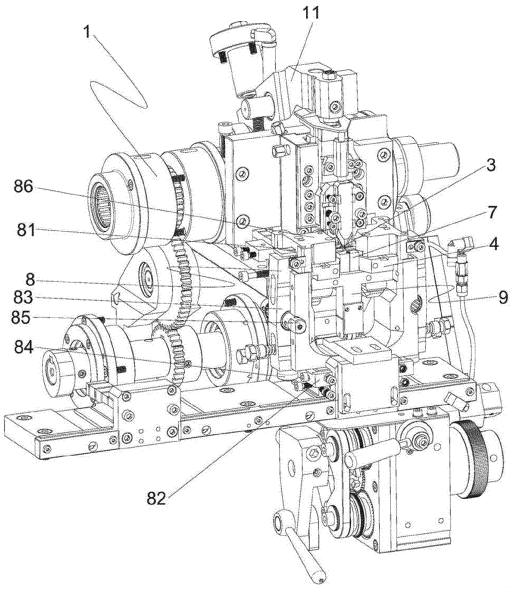

FIG. 1

EP 4 212 262 A1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of double-point zipper teeth, specifically to machining equipment for double-point zipper teeth.

BACKGROUND

[0002] A zipper is a connecting member that relies on continuously arranged zipper teeth to combine or separate objects. It is now widely used in clothing, bags, tents, etc. Zipper teeth include single-point zipper teeth and double-point zipper teeth. Traditional machining equipment for the double-point zipper teeth processing equipment generally has a complex structure, low production efficiency, waste of time and labor, has high material loss (40%), low stability, poor surface treatment, and a non-smooth surface section that needs to be ground for long time, resulting in secondary waste; and more than 50% of raw materials are polluted and damaged. For this reason, machining equipment for double-point zipper teeth is proposed.

SUMMARY

[0003] The present disclosure aims to provide machining equipment for double-point zipper teeth to solve the problems mentioned in the background art.

[0004] In order to achieve the above purpose, the present disclosure provides the following technical solution: machining equipment for double-point zipper teeth, including a main driving mechanism, a cutter, a punch pin which is in transmission connection with the main driving mechanism and is capable of moving in an up-down direction, a main sliding seat which is in transmission connection with the main driving mechanism and is capable of moving in a front-back direction, and a machining module fixed at a front end of the main sliding seat; the machining module includes a profile die and a machining die which are disposed in sequence forwards; a via hole is formed in the profile die; a zipper profile moves one zipper tooth site in the via hole at each time under the driving of the main driving mechanism; the cutter and the punch pin are both arranged above the machining module;

[0005] an upper surface of the machining die is provided with a machining die site correspondingly cooperating with the punch pin;

[0006] the machining equipment for the double-point zipper teeth further includes a material clamping mechanism which is in transmission connection with the main driving mechanism; the material clamping mechanism includes two clamping blocks which are disposed oppositely and are capable of moving in a left-right direction; the two clamping blocks are respectively located on two sides of the machining module; a V-shaped forming line (obtained by secondary machining of raw materials) can punch a double-point tooth finished product and punch granular single-point and double-point teeth (confirm whether the single-point teeth are successful);

[0007] the main driving mechanism drives the material clamping mechanism to clamp a cut zipper tooth; the main driving mechanism then drives the zipper profile to move to synchronously drive the main sliding seat to backwards move; the cutter cuts one zipper tooth from the zipper profile; the zipper tooth on the material clamping mechanism then falls into the machining die site; and finally, the punch pin moves downwards to cooperate with the machining die site, thus completing the machining of the double-point zipper teeth. During punching of the zipper teeth, when there is a pressure for pulling and supporting, a middle hole site becomes smaller; and when there is no pressure for pulling and supporting, the middle hole site becomes larger.

[0008] As one specific embodiment, a bottom of the machining die site is connected with a through hole; the machining equipment for the double-point zipper teeth further includes an ejection mechanism located at the bottom of the machining die and connected with the main sliding seat; the ejection mechanism includes an ejection seat, an ejection rod, a pulley base, a pulley, and a sliding plate; the ejection seat is arranged at the bottom of the machining die and is fixedly connected with the main sliding seat; the ejection rod is arranged in the ejection seat in a penetrating manner in an up-down movable manner, and an upper end of the ejection rod is arranged in the machining die site in a penetrating manner, so as to jack up the zipper tooth; the pulley base is located below the ejection seat and is fixedly connected with a lower end of the ejection rod; the pulley is arranged on the pulley base; and the sliding plate is fixed below the pulley and is provided with a first arc-shaped sliding surface correspondingly cooperating with the pulley.

[0009] As one specific embodiment, the main driving mechanism is further connected with a ratchet feed mechanism which is used for driving the zipper profile to move one zipper tooth site at each time.

[0010] As one specific embodiment, the main driving mechanism includes a motor, a main transmission shaft connected with the motor, and a first cam arranged on the main transmission shaft; the main sliding seat is provided with a first rotating wheel cooperating with the first cam; and the main sliding seat is further connected with a first reset spring used for resetting the main sliding seat.

[0011] Further, the main driving mechanism further includes a second cam arranged on the main transmission shaft; a main punch arm is connected between the second cam and the punch pin; the middle part of the main punch arm is connected with a first rotating shaft; and the main punch arm is further connected with a second reset spring used for resetting the main punch arm.

[0012] As one specific embodiment, the material clamping mechanism further includes a clamping block sliding seat, two movable bodies, two movable wheels,

two second rotating shafts, and two third reset springs used for resetting the two clamping blocks; the clamping block sliding seat is in transmission connection with the main driving mechanism in a front-back movable manner; the two movable bodies are arranged on two sides of the clamping block sliding seat through the two second rotating shafts in a manner of being flipped up and down; upper ends of the two movable bodies are correspondingly connected with ends of the two clamping blocks away from the machining module; the two movable wheels are correspondingly arranged at lower ends of the two movable bodies; and two sides of the clamping block sliding seat are each provided with one second arc-shaped sliding surface correspondingly cooperating with each movable wheel.

[0013] Further, the material clamping mechanism further includes two positioning guide blocks fixedly disposed; the two clamping blocks are correspondingly arranged in the two positioning guide blocks in a penetrating manner; spring mounting slots are arranged in the positioning guide blocks; and the third reset springs are mounted in the spring mounting slots.

[0014] Further, the clamping block sliding seat is in transmission connection with the main driving mechanism through a cam subassembly; the cam subassembly includes a second rotating wheel fixed at a rear end of the clamping block sliding seat and a third cam which is fixed behind the clamping block sliding seat and cooperates with the second rotating wheel; the third cam is in transmission connection with the main driving mechanism through a gear subassembly; and the clamping block sliding seat is connected with a fourth reset spring used for resetting the clamping block sliding seat.

[0015] As one specific embodiment, the machining module further includes a sliding block connected between the profile die and the machining die; a top surface of the sliding block is flush with a top surface of the machining die; an end of the sliding block close to the profile die is provided with a protrusion; a top surface of the protrusion is not higher than that of the profile die; the protrusion is provided with an embedding slot which is aligned with the via hole and the machining die site and is used for allowing one end of the zipper tooth to be embedded; and the two clamping blocks are arranged in front of the protrusion.

[0016] Further, ends of the two clamping blocks close to each other are each provided with a recess; the two recesses are respectively located on sides of the two clamping blocks close to the protrusion; and an accommodating space corresponding to the zipper tooth is formed between the embedding slots and the two recesses.

[0017] Compared with the prior art, the present disclosure has the following beneficial effects.

[0018] The present disclosure has a simple and reasonable structure, high machining efficiency, great shortening of the production time, a smooth surface, a utilization rate of 99.99%, high efficiency, zero pollution, and smooth wires; raw materials can be saved to an extremely large extent when machined by the equipment; at the same time, the service life of the die is long; since the material clamping mechanisms are arranged on two sides of the machining module, and the machining die is provided with the machining die site correspondingly cooperating with the punch pin, the cut zipper tooth can be fixed through the material clamping mechanisms and conveyed onto the machining die site; finally, a double-point zipper tooth is machined by cooperation between the punch pin and the machining die site. The process is simple and convenient; the machining efficiency is high; and the production time is saved. After the zipper tooth has been machined, the ejection mechanism jacks up the zipper tooth, and the zipper tooth is unloaded finally.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a schematic diagram I of an entire structure of the present disclosure;
FIG. 2 is a schematic diagram II of an entire structure of the present disclosure;
FIG. 3 is a schematic diagram I of a partial structure of the present disclosure;
FIG. 4 is a schematic diagram II of a partial structure of the present disclosure;
FIG. 5 is a schematic diagram III of a partial structure of the present disclosure; and
FIG. 6 is a schematic diagram IV of a partial structure of the present disclosure.

[0020] In the drawings: 1: main driving mechanism; 101: main transmission shaft; 102: first cam; 103: second cam; 2: cutter; 3: punch pin; 4: main sliding seat; 41: first rotating wheel; 42: opening; 5: profile die; 51: via hole; 6: sliding block; 61: protrusion; 611: embedding slot; 7: machining die; 71: machining die site; 8: material clamping seat; 81: clamping block; 811: recess; 82: clamping block sliding seat; 821: second arc-shaped sliding surface; 822: second rotating wheel; 83: movable body; 84: movable wheel; 85: second rotating shaft; 86: positioning guide block; 9: ejection mechanism; 91: ejection seat; 92: pulley base; 93: pulley; 94: sliding plate; 941: first arc-shaped sliding surface; 10: ratchet feed mechanism; 11: main punch arm; 12: first rotating shaft; 13: third cam; 14: mounting plate.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] The following clearly and completely describes the technical solution in the embodiments of the present disclosure in combination with the accompanying drawings of the embodiments of the present disclosure. Apparently, the described embodiments are only part of the embodiments of the present disclosure, not all embodi-

ments. Based on the embodiments in the present disclosure, all other embodiments obtained by those of ordinary skill in the art without creative work shall fall within the protection scope of the present disclosure.

[0022] As shown in FIG. 1 to FIG. 6, machining equipment for double-point zipper teeth includes a main driving mechanism 1, a cutter 2, a punch pin 3 which is in transmission connection with the main driving mechanism 1 and is capable of moving in an up-down direction, a main sliding seat 4 which is in transmission connection with the main driving mechanism 1 and is capable of moving in a front-back direction, and a machining module fixed at a front end of the main sliding seat 4; the machining module includes a profile die 5 and a machining die 7 which are disposed in sequence forwards; a via hole 51 is formed in the profile die 5; a zipper profile moves one zipper tooth site in the via hole 51 at each time under the driving of the main driving mechanism 1; the cutter 2 and the punch pin 3 are both arranged above the machining module; an upper surface of the machining die 7 is provided with a machining die site 71 correspondingly cooperating with the punch pin 3, that is, the punch pin 3 and the machining die site 71 are respectively an upper die and a lower die. The machining equipment for the double-point zipper teeth further includes a material clamping mechanism 8 which is in transmission connection with the main driving mechanism 1; the material clamping mechanism 8 includes two clamping blocks 81which are disposed oppositely and are capable of moving in a left-right direction; the two clamping blocks 81 are respectively located on two sides of the machining module; a V-shaped forming line (obtained by secondary machining of raw materials) can punch a double-point tooth finished product and punch granular single-point and double-point teeth (confirm whether the single-point teeth are successful). The main driving mechanism 1 drives the material clamping mechanism 8 to clamp a cut zipper tooth; the main driving mechanism 1 then drives the zipper profile to move to synchronously drive the main sliding seat 4 to backwards move; the cutter 2 cuts one zipper tooth from the zipper profile; the zipper tooth on the material clamping mechanism 8 then falls into the machining die site 71; and finally, the punch pin 3 moves downwards to cooperate with the machining die site 71, thus completing the machining of the double-point zipper teeth. During punching of the zipper teeth, when there is a pressure for pulling and supporting, a middle hole site becomes smaller; and when there is no pressure for pulling and supporting, the middle hole site becomes larger.

[0023] Specifically, an opening 42 is formed in a front end of the main sliding seat 4. The machining module is arranged in the opening 42.

[0024] As shown in FIG. 3, a bottom of the machining die site 71 is connected with a through hole (not shown). The machining equipment for the double-point zipper teeth further includes an ejection mechanism 9 located at the bottom of the machining die 7 and connected with the main sliding seat 4; the ejection mechanism 9 includes an ejection seat 91, an ejection rod (not shown), a pulley base 92, a pulley 93, and a sliding plate 94; the ejection seat 91 is arranged at the bottom of the machining die 7 and is fixedly connected with the main sliding seat 4; the ejection rod is arranged in the ejection seat in a penetrating manner in an up-down movable manner, and an upper end of the ejection rod is arranged in the machining die site 71 in a penetrating manner, so as to jack up the zipper tooth; the pulley base 92 is located below the ejection seat 91 and is fixedly connected with a lower end of the ejection rod; the pulley 93 is arranged on the pulley base 92; and the sliding plate 94 is fixed below the pulley 93 and is provided with a first arc-shaped sliding surface 941 correspondingly cooperating with the pulley 93.

[0025] Specifically, the first arc-shaped sliding surface 941 upwards extends from back to front. By the arrangement of the ejection mechanism 9, the machined double-point zipper tooth can be jacked up. A specific working method is as follows: when the main sliding seat 4 moves, the pulley 93 is synchronously driven to move on the first arc-shaped sliding surface 941, so that the ejection rod connected with the pulley base 9 moves up and down, and the upper end of the ejection rod can jack up the zipper tooth in the machining die site 71 through the through hole.

[0026] The main driving mechanism 1 is further connected with a ratchet feed mechanism 10. The ratchet feed mechanism 10 is used for driving a zipper to move one zipper tooth site at each time. The ratchet feed mechanism 10 is the existing art, so no repeated descriptions will be made here.

[0027] As shown in FIG. 5, the main driving mechanism 1 includes a motor (not shown), a main transmission shaft 101 connected with the motor, and a first cam 102 arranged on the main transmission shaft 101; the main sliding seat 4 is provided with a first rotating wheel 41 cooperating with the first cam 102; and the main sliding seat 4 is further connected with a first reset spring (not shown) used for resetting the main sliding seat 4. The motor drives the main transmission shaft 101 to rotate to synchronously drive the first cam 102 to rotate, thus pushing the first rotating wheel 41 and causing the main sliding seat 4 to do reciprocating motion in the front-back direction.

[0028] As shown in FIG. 5, preferably, the main driving mechanism 1 further includes a second cam 103 arranged on the main transmission shaft 102; a main punch arm 11 is connected between the second cam 103 and the punch pin 3; the middle part of the main punch arm 11 is connected with a first rotating shaft 12; and the main punch arm 11 is further connected with a second reset spring used for resetting the main punch arm 11. Specifically, the main punch arm 11 is provided with a rotating wheel correspondingly cooperating with the second cam 103. Specifically, the punch pin 3 is arranged on the main punch arm 11 The second cam 103 drives the main punch arm 11 to flip, thus driving the punch pin 3 to move. The

above components are the existing art, so no repeated descriptions will be made here.

[0029] As shown in FIG. 4, the material clamping mechanism 8 includes a clamping block sliding seat 82, two movable bodies 83, two movable wheels 84, two second rotating shafts 85, and two third reset springs (not shown) used for resetting the two clamping blocks 81; the clamping block sliding seat 82 is in transmission connection with the main driving mechanism 1 in a front-back movable manner; the two movable bodies 83 are arranged on two sides of the clamping block sliding seat 82 through the two second rotating shafts 95 in a manner of being flipped up and down; upper ends of the two movable bodies 83 are correspondingly connected with ends of the two clamping blocks 81 away from the machining module; the two movable wheels 84 are correspondingly arranged at lower ends of the two movable bodies 83; and two sides of the clamping block sliding seat 82 are each provided with one second arc-shaped sliding surface 821 correspondingly cooperating with each movable wheel 84. Specifically, the second arc-shaped sliding surfaces 821 outwards extend from front to back. Due to the movement of the clamping block sliding seat 82, the movable wheels 84 slide on the second arc-shaped sliding surfaces 821, and the movable bodies 83 rotate under the lever principle, so as to push the clamping blocks 81 to move.

[0030] As shown in FIG. 1, the material clamping mechanism 8 further includes two positioning guide blocks 86 fixedly disposed; the two clamping blocks 81 are correspondingly arranged in the two positioning guide blocks 86 in a penetrating manner; spring mounting slots are arranged in the positioning guide blocks 86; and the third reset springs are mounted in the spring mounting slots. By the arrangement of the positioning guide blocks 86, the clamping blocks 81 move better.

[0031] As shown in FIG. 2, the clamping block sliding seat 82 is in transmission connection with the main driving mechanism 1 through a cam subassembly; the cam subassembly includes a second rotating wheel 822 fixed at a rear end of the clamping block sliding seat 82 and a third cam 13 which is fixed behind the clamping block sliding seat 82 and cooperates with the second rotating wheel 822; the third cam 13 is in transmission connection with the main driving mechanism 1 through a gear subassembly;. Specifically, the third cam 13 is in transmission connection with the main transmission shaft 101 through the gear assembly. The clamping block sliding seat 82 is connected with a fourth reset spring used for resetting the clamping block sliding seat 82. When the main transmission shaft 101 rotates, the gear subassembly causes the third cam 13 to rotate, and finally, the clamping block sliding seat 82 moves through the cooperation between the third cam 103 and the second rotating wheel 822 and the fourth reset spring.

[0032] As shown in FIG. 6, the machining module further includes a sliding block 6 connected between the profile die 5 and the machining die 7; a top surface of the sliding block 6 is flush with a top surface of the machining die 7; an end of the sliding block 6 close to the profile die 5 is provided with a protrusion 61; and a top surface of the protrusion 61 is not higher than that of the profile die 5. In this embodiment, the top surface of the protrusion 61 is flush with the top surface of the profile die 5. The protrusion 61 is provided with an embedding slot 611 which is aligned with the via hole 51 and the machining die site 71 and is used for allowing a first end of the zipper tooth to be embedded; and the two clamping blocks 81 are arranged in front of the protrusion 61. By the above arrangement, as the main sliding seat 4 moves, the cut zipper tooth falls from the top of the via hole 51 into the embedding slot 611 for positioning; the two clamping blocks 81 then clamp the zipper tooth; in the moving process of the main sliding seat 4, the zipper tooth falls into the machining die site 71; and due to the embedding slot 611, the zipper tooth can be conveniently positioned and is prevented from deviating from a preset path.

[0033] As shown in FIG. 6, preferably, ends of the two clamping blocks 81 close to each other are each provided with a recess 811; the two recesses 811 are respectively located on sides of the two clamping blocks 81 close to the protrusion 61; and an accommodating space corresponding to the zipper tooth is formed between the embedding slots 611 and the two recesses 811. Specifically, the sharp end of the zipper tooth is embedded into the embedding slots 611, and the two recesses 611 are used for clamping the other end of the zipper tooth. By the above arrangement, the two clamping blocks 81 can clamp the zipper tooth more stably.

[0034] A bottom of the main sliding seat 4 is fixed with a mounting plate 14; the mounting plate 14 is provided with a mounting slot; and the main sliding seat 4 is arranged in the mounting slot. By the above arrangement, the main sliding seat 4 can move more stably.

[0035] The working principle of the present disclosure is described below, so as to understand the present disclosure:

Firstly, the zipper profile moves one zipper tooth site in the via hole 51; at this time, one cut zipper tooth has been already mounted in the embedding slots 611; the material clamping mechanism 8 acts; the two clamping blocks 81 clamp the zipper tooth in the embedding slots 611; the main sliding seat 4 backwards moves, so that the cutter 2 cut one new zipper tooth from the zipper profile; in the backwards moving process of the main sliding seat 4, the new zipper tooth falls into the embedding slot 611; at the same time, the machining die site 71 also moves below the zipper tooth clamped by the clamping blocks 81 due to the movement of the main sliding seat 4; the zipper tooth then falls into the machining die site 71; and next, the punch pin 3 moves to punch the zipper tooth and cooperates with the machining die site 71 to machine double-point zipper teeth. After the machining is completed, the machine is reset to cause the main sliding seat 4 to forwards move, so that the pulley 93 slides on the first arc-shaped sliding surface 941; in the forwards

moving process of the pulley 93, the ejection rod synchronously upwards moves, so that the zipper tooth in the machining die site 71 can be jacked up; finally, the zipper tooth is blown away by an air blowing device. In this way, unloading is completed. After the unloading is completed, the material clamping mechanism 8 clamps a zipper tooth located in the embedding slots 611 again for machining of a new zipper tooth. The above process is continuously repeated to complete the machining of the double-point zipper teeth.

[0036] Later, the two clamping blocks 81 clamp the zipper tooth. As the main sliding seat 4 continues to move, the machining die site 71 moves below the zipper tooth, and the zipper tooth falls into the machining die site 71; next, the punch pin 3 moves to punch the zipper tooth and cooperates with the machining die site 71 to machine double-point zipper teeth. After the machining is completed, the machine is reset to cause the main sliding seat 4 to forwards move, so that the pulley 93 slides on the first arc-shaped sliding surface 941; in the forwards moving process of the pulley 93, the ejection rod synchronously upwards moves, so that the zipper tooth in the machining die site 71 can be jacked up; finally, the zipper tooth is blown away by the air blowing device. In this way, unloading is completed.

[0037] Although the embodiments of the present disclosure have been shown and described, it will be understood by those of ordinary skill in the art that various changes, modifications, substitutions, and variations can be made to these embodiments without departing from the principle and spirit of the present disclosure. The scope of the present disclosure is defined by the attached claims and their equivalents.

Claims

1. Machining equipment for double-point zipper teeth, comprising a main driving mechanism, a cutter, a punch pin which is in transmission connection with the main driving mechanism and is capable of moving in an up-down direction, a main sliding seat which is in transmission connection with the main driving mechanism and is capable of moving in a front-back direction, and a machining module fixed at a front end of the main sliding seat, wherein the machining module comprises a profile die and a machining die which are disposed in sequence forwards; a via hole is formed in the profile die; a zipper profile moves one zipper tooth site in the via hole at each time under the driving of the main driving mechanism; the cutter and the punch pin are both arranged above the machining module;

   an upper surface of the machining die is provided with a machining die site correspondingly cooperating with the punch pin;
   the machining equipment for the double-point zipper teeth further comprises a material clamping mechanism which is in transmission connection with the main driving mechanism; the material clamping mechanism comprises two clamping blocks which are disposed oppositely and are capable of moving in a left-right direction; the two clamping blocks are respectively located on two sides of the machining module;
   the main driving mechanism drives the material clamping mechanism to clamp a cut zipper tooth; the main driving mechanism then drives the zipper profile to move to synchronously drive the main sliding seat to backwards move; the cutter cuts one zipper tooth from the zipper profile; the zipper tooth on the material clamping mechanism then falls into the machining die site; and finally, the punch pin moves downwards to cooperate with the machining die site, thus completing the machining of the double-point zipper teeth.

2. The machining equipment for the double-point zipper teeth according to claim 1, wherein
   a bottom of the machining die site is connected with a through hole; the machining equipment for the double-point zipper teeth further comprises an ejection mechanism located at the bottom of the machining die and connected with the main sliding seat; the ejection mechanism comprises an ejection seat, an ejection rod, a pulley base, a pulley, and a sliding plate; the ejection seat is arranged at the bottom of the machining die and is fixedly connected with the main sliding seat; the ejection rod is arranged in the ejection seat in a penetrating manner in an up-down movable manner, and an upper end of the ejection rod is arranged in the machining die site in a penetrating manner, so as to jack up the zipper tooth; the pulley base is located below the ejection seat and is fixedly connected with a lower end of the ejection rod; the pulley is arranged on the pulley base; and the sliding plate is fixed below the pulley and is provided with a first arc-shaped sliding surface correspondingly cooperating with the pulley.

3. The machining equipment for the double-point zipper teeth according to claim 1, wherein
   the main driving mechanism is further connected with a ratchet feed mechanism which is used for driving the zipper profile to move one zipper tooth site at each time.

4. The machining equipment for the double-point zipper teeth according to claim 1, wherein
   the main driving mechanism comprises a motor, a main transmission shaft connected with the motor, and a first cam arranged on the main transmission shaft; the main sliding seat is provided with a first rotating wheel cooperating with the first cam; and

the main sliding seat is further connected with a first reset spring used for resetting the main sliding seat.

5. The machining equipment for the double-point zipper teeth according to claim 4, wherein
the main power mechanism further comprises a second cam arranged on the main transmission shaft; a main punch arm is connected between the second cam and the punch pin; the middle part of the main punch arm is connected with a first rotating shaft; and the main punch arm is further connected with a second reset spring used for resetting the main punch arm.

6. The machining equipment for the double-point zipper teeth according to claim 1, wherein
the material clamping mechanism further comprises a clamping block sliding seat, two movable bodies, two movable wheels, two second rotating shafts, and two third reset springs used for resetting the two clamping blocks; the clamping block sliding seat is in transmission connection with the main driving mechanism in a front-back movable manner; the two movable bodies are arranged on two sides of the clamping block sliding seat through the two second rotating shafts in a manner of being flipped up and down; upper ends of the two movable bodies are correspondingly connected with ends of the two clamping blocks away from the machining module; the two movable wheels are correspondingly arranged at lower ends of the two movable bodies; and two sides of the clamping block sliding seat are each provided with one second arc-shaped sliding surface correspondingly cooperating with each movable wheel.

7. The machining equipment for the double-point zipper teeth according to claim 6, wherein
the material clamping mechanism further comprises two positioning guide blocks fixedly disposed; the two clamping blocks are correspondingly arranged in the two positioning guide blocks in a penetrating manner; spring mounting slots are arranged in the positioning guide blocks; and the third reset springs are mounted in the spring mounting slots.

8. The machining equipment for the double-point zipper teeth according to claim 6, wherein
the clamping block sliding seat is in transmission connection with the main driving mechanism through a cam subassembly; the cam subassembly comprises a second rotating wheel fixed at a rear end of the clamping block sliding seat and a third cam which is fixed behind the clamping block sliding seat and cooperates with the second rotating wheel; the third cam is in transmission connection with the driving mechanism through a gear subassembly; and the clamping block sliding seat is connected with a fourth reset spring used for resetting the clamping block sliding seat.

9. The machining equipment for the double-point zipper teeth according to claim 1, wherein
the machining module further comprises a sliding block connected between the profile die and the machining die; a top surface of the sliding block is flush with a top surface of the machining die; an end of the sliding block close to the profile die is provided with a protrusion; a top surface of the protrusion is not higher than that of the profile die; the protrusion is provided with an embedding slot which is aligned with the via hole and the machining die site and is used for allowing one end of the zipper tooth to be embedded; and the two clamping blocks are arranged in front of the protrusion.

10. The machining equipment for the double-point zipper teeth according to claim 9, wherein
ends of the two clamping blocks close to each other are each provided with a recess; the two recesses are respectively located on sides of the two clamping blocks close to the protrusion; and an accommodating space corresponding to the zipper tooth is formed between the embedding slots and the two recesses.

Amended claims in accordance with Rule 137(2) EPC.

1. Machining equipment for double-point zipper teeth, comprising a main driving mechanism, a cutter, a punch pin which is in transmission connection with the main driving mechanism and is capable of moving in an up-down direction, a main sliding seat which is in transmission connection with the main driving mechanism and is capable of moving in a front-back direction, and a machining module fixed at a front end of the main sliding seat, wherein the machining module comprises a profile die and a machining die which are disposed in sequence forwards; a via hole is formed in the profile die; a zipper profile moves one zipper tooth site in the via hole at each time under the driving of the main driving mechanism; the cutter and the punch pin are both arranged above the machining module;

an upper surface of the machining die is provided with a machining die site correspondingly cooperating with the punch pin;
the machining equipment for the double-point zipper teeth further comprises a material clamping mechanism which is in transmission connection with the main driving mechanism; the material clamping mechanism comprises two clamping blocks which are disposed oppositely and are capable of moving in a left-right direc-

tion; the two clamping blocks are respectively located on two sides of the machining module; the main driving mechanism drives the material clamping mechanism to clamp a cut zipper tooth; the main driving mechanism then drives the zipper profile to move to synchronously drive the main sliding seat to backwards move; the cutter cuts one zipper tooth from the zipper profile; the zipper tooth on the material clamping mechanism then falls into the machining die site; and finally, the punch pin moves downwards to cooperate with the machining die site, thus completing the machining of the double-point zipper teeth;

wherein a bottom of the machining die site is connected with a through hole; the machining equipment for the double-point zipper teeth further comprises an ejection mechanism located at the bottom of the machining die and connected with the main sliding seat; the ejection mechanism comprises an ejection seat, an ejection rod, a pulley base, a pulley, and a sliding plate; the ejection seat is arranged at the bottom of the machining die and is fixedly connected with the main sliding seat; the ejection rod is arranged in the ejection seat in a penetrating manner in an up-down movable manner, and an upper end of the ejection rod is arranged in the machining die site in a penetrating manner, so as to jack up the zipper tooth; the pulley base is located below the ejection seat and is fixedly connected with a lower end of the ejection rod; the pulley is arranged on the pulley base; and the sliding plate is fixed below the pulley and is provided with a first arc-shaped sliding surface correspondingly cooperating with the pulley;

the main driving mechanism is further connected with a ratchet feed mechanism which is used for driving the zipper profile to move one zipper tooth site at each time.

2. The machining equipment for the double-point zipper teeth according to claim 1, wherein
the main driving mechanism comprises a motor, a main transmission shaft connected with the motor, and a first cam arranged on the main transmission shaft; the main sliding seat is provided with a first rotating wheel cooperating with the first cam; and the main sliding seat is further connected with a first reset spring used for resetting the main sliding seat.

3. The machining equipment for the double-point zipper teeth according to claim 2, wherein
the main power mechanism further comprises a second cam arranged on the main transmission shaft; a main punch arm is connected between the second cam and the punch pin; the middle part of the main punch arm is connected with a first rotating shaft; and the main punch arm is further connected with a second reset spring used for resetting the main punch arm.

4. The machining equipment for the double-point zipper teeth according to claim 1, wherein
the material clamping mechanism further comprises a clamping block sliding seat, two movable bodies, two movable wheels, two second rotating shafts, and two third reset springs used for resetting the two clamping blocks; the clamping block sliding seat is in transmission connection with the main driving mechanism in a front-back movable manner; the two movable bodies are arranged on two sides of the clamping block sliding seat through the two second rotating shafts in a manner of being flipped up and down; upper ends of the two movable bodies are correspondingly connected with ends of the two clamping blocks away from the machining module; the two movable wheels are correspondingly arranged at lower ends of the two movable bodies; and two sides of the clamping block sliding seat are each provided with one second arc-shaped sliding surface correspondingly cooperating with each movable wheel.

5. The machining equipment for the double-point zipper teeth according to claim 4, wherein
the material clamping mechanism further comprises two positioning guide blocks fixedly disposed; the two clamping blocks are correspondingly arranged in the two positioning guide blocks in a penetrating manner; spring mounting slots are arranged in the positioning guide blocks; and the third reset springs are mounted in the spring mounting slots.

6. The machining equipment for the double-point zipper teeth according to claim 4, wherein
he clamping block sliding seat is in transmission connection with the main driving mechanism through a cam subassembly; the cam subassembly comprises a second rotating wheel fixed at a rear end of the clamping block sliding seat and a third cam which is fixed behind the clamping block sliding seat and cooperates with the second rotating wheel; the third cam is in transmission connection with the driving mechanism through a gear subassembly; and the clamping block sliding seat is connected with a fourth reset spring used for resetting the clamping block sliding seat.

7. The machining equipment for the double-point zipper teeth according to claim 1, wherein
the machining module further comprises a sliding block connected between the profile die and the machining die; a top surface of the sliding block is flush with a top surface of the machining die; an end of the sliding block close to the profile die is provided

with a protrusion; a top surface of the protrusion is not higher than that of the profile die; the protrusion is provided with an embedding slot which is aligned with the via hole and the machining die site and is used for allowing one end of the zipper tooth to be embedded; and the two clamping blocks are arranged in front of the protrusion.

8. The machining equipment for the double-point zipper teeth according to claim 7, wherein
ends of the two clamping blocks close to each other are each provided with a recess; the two recesses are respectively located on sides of the two clamping blocks close to the protrusion; and an accommodating space corresponding to the zipper tooth is formed between the embedding slots and the two recesses.

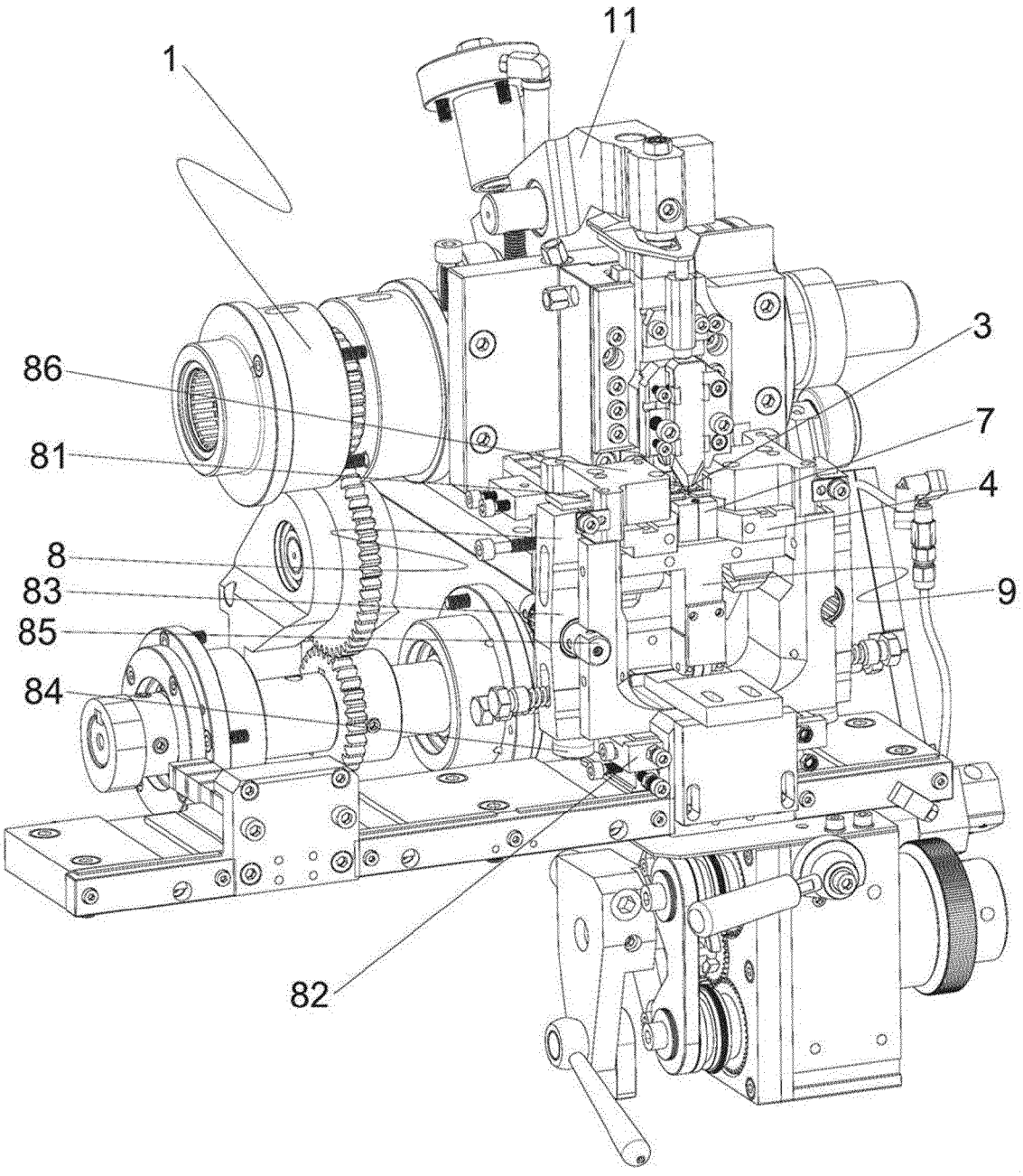

FIG. 1

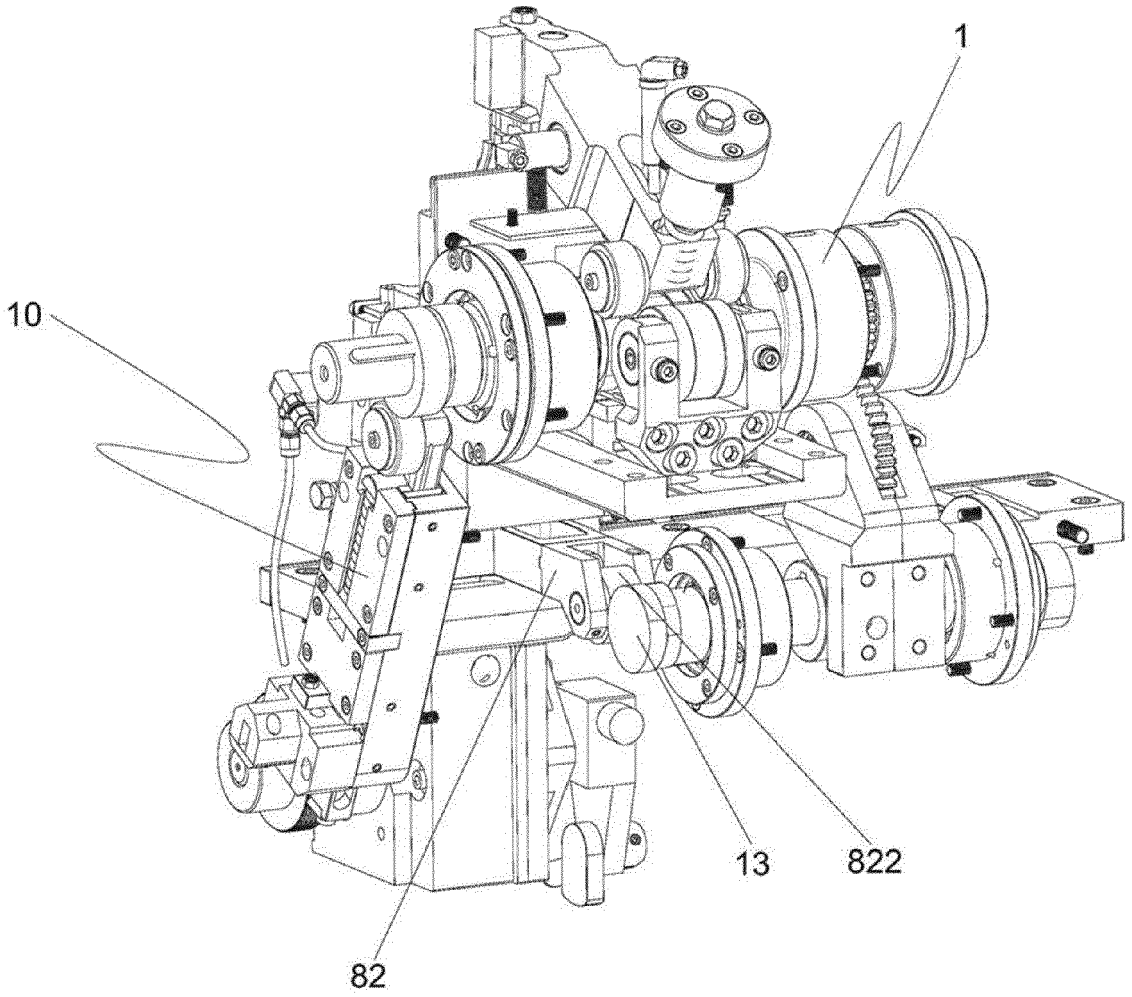

FIG. 2

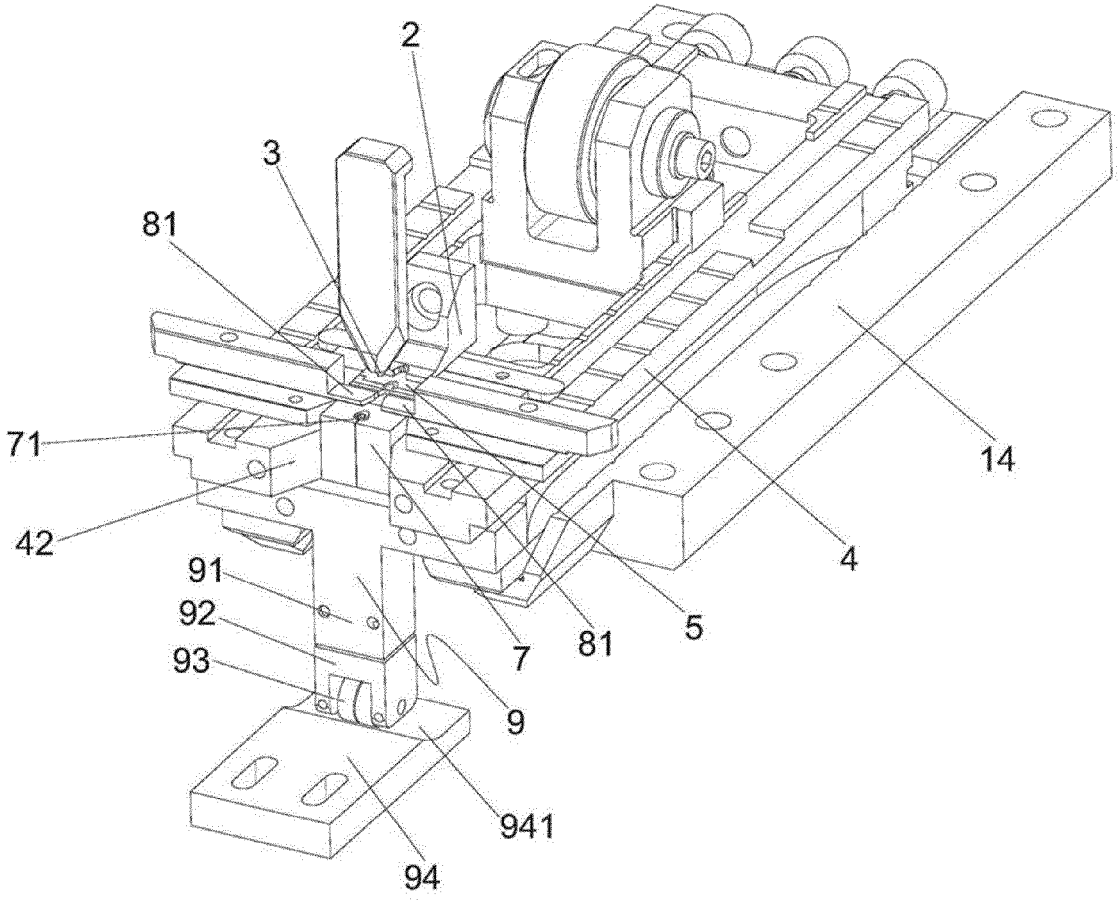

FIG. 3

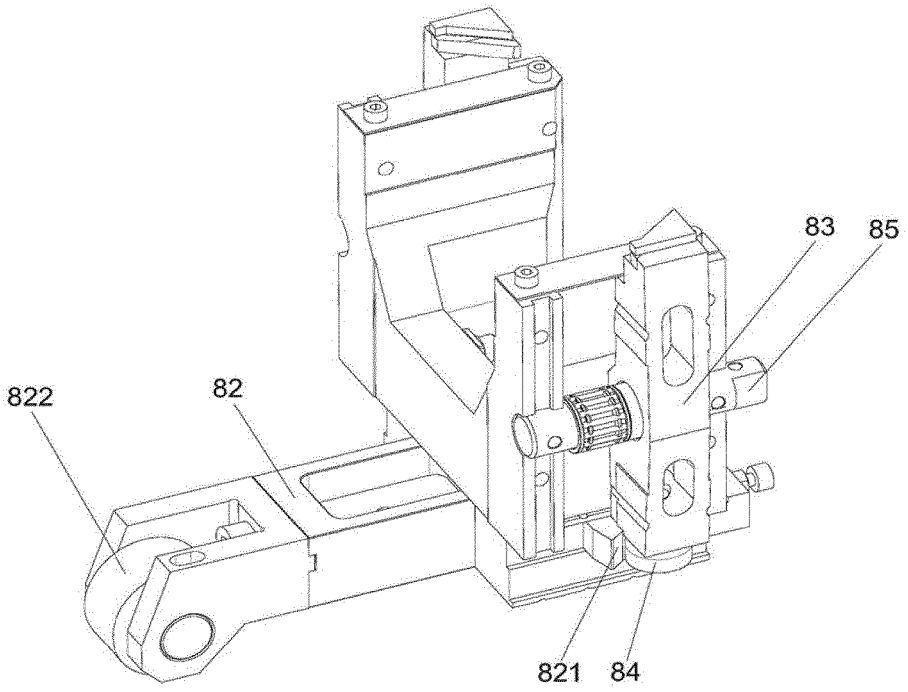

FIG. 4

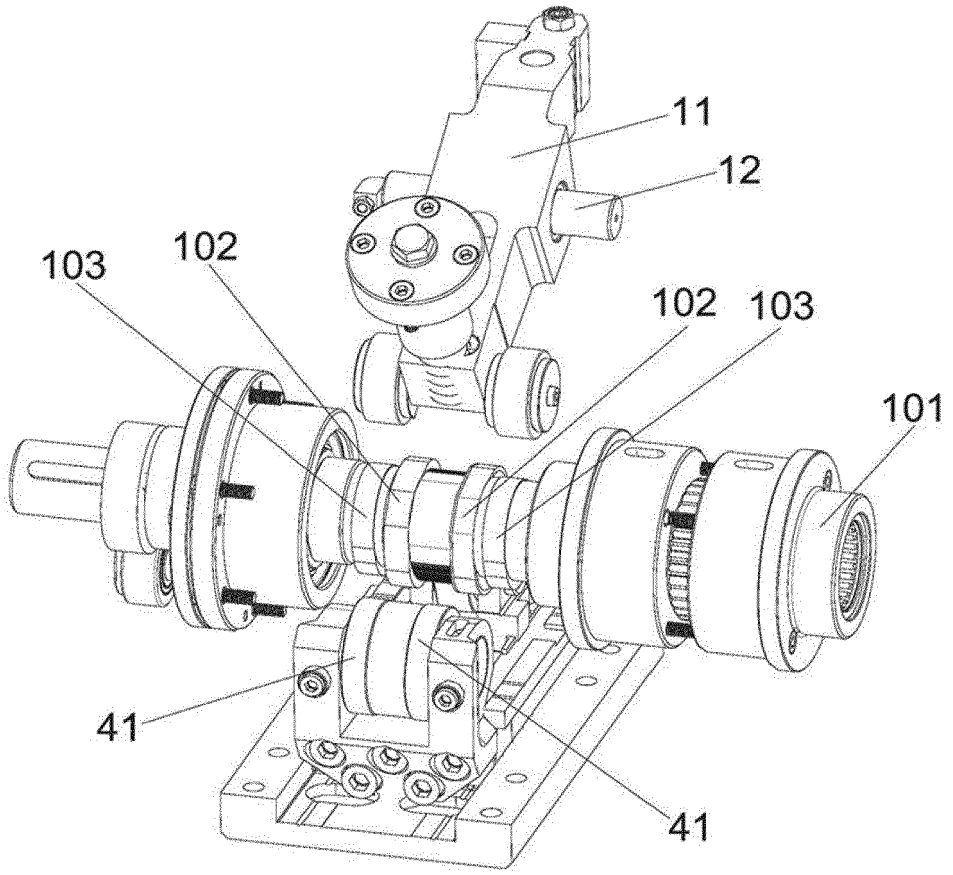

FIG. 5

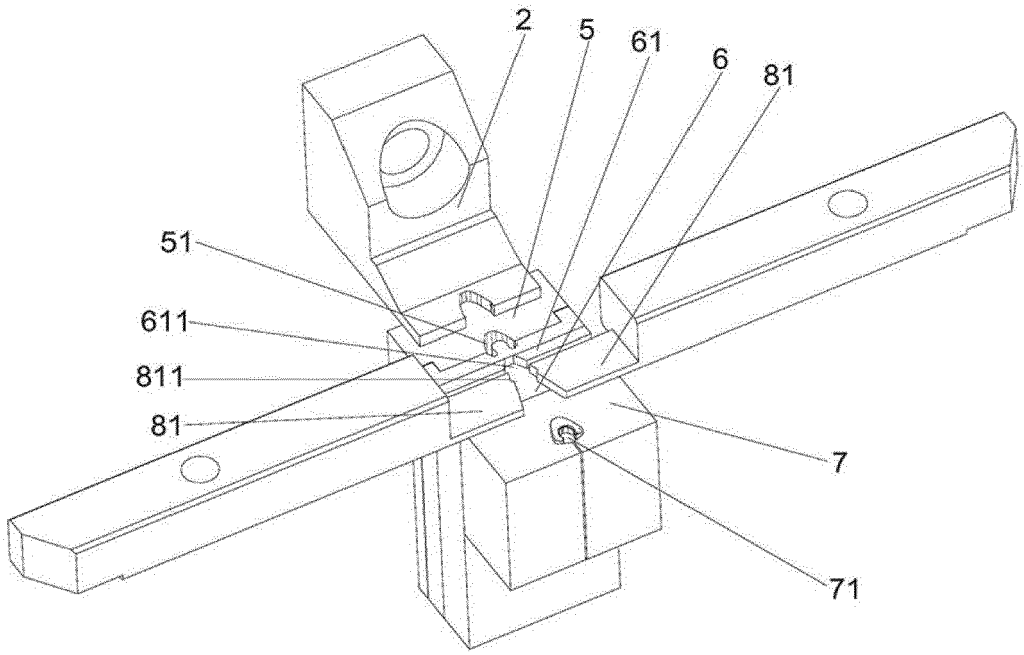

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 15 1747

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 111 674 018 A (DONGGUAN RORO ZIPPER AND HARDWARE CO LTD) 18 September 2020 (2020-09-18) * the whole document *	1-10	INV. B21D53/52 B21F45/18
A	EP 0 578 171 A2 (YOSHIDA KOGYO KK [JP]) 12 January 1994 (1994-01-12) * claims; figures *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

B21D
B21F
B21L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 June 2022	Knecht, Frank

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 15 1747

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-06-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 111674018 A	18-09-2020	NONE	
EP 0578171 A2	12-01-1994	BR 9302336 A	25-01-1994
		CA 2099177 A1	07-01-1994
		CN 1082953 A	02-03-1994
		DE 69322321 T2	29-04-1999
		EP 0578171 A2	12-01-1994
		JP 2690429 B2	10-12-1997
		JP H0623455 A	01-02-1994
		KR 940005378 A	21-03-1994
		MY 131450 A	30-08-2007
		US 5357663 A	25-10-1994

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82