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(54) MOULD-LOADING APPARATUS FOR NUMERICALLY CONTROLLED PUNCH

(57) A punch assembly of CNC punch press machine is disclosed. A press type of lock system is provided between the guide sleeve and the lock ring of the punch assembly of CNC punch press machine. When it needs to adjust the length of the plunger chip, the lock ring and the guide sleeve are locked by the locking mechanism, bringing the entire mechanism into a state of adjustment, and pinching the upper lock ring by hand is not necessary. When the adjustment of the length of the plunger chip is achieved, press the hook pin to unlock the locking mechanism, and lock ring will be reset. Thus, the operation of adjustment is easy and convenient.

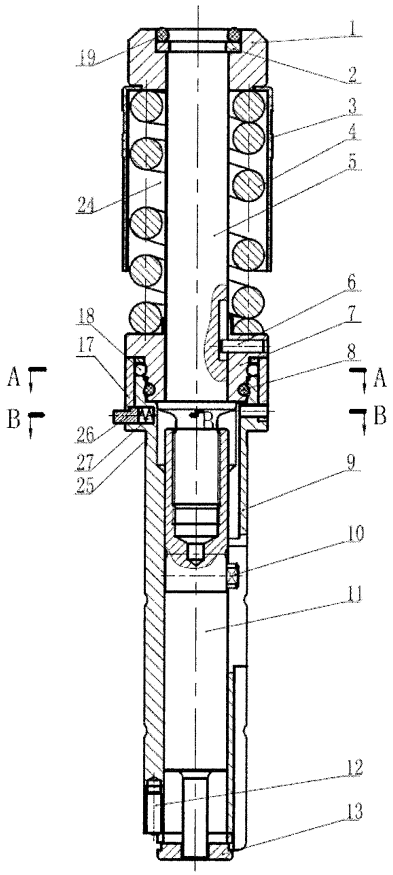

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a punch assembly, and more specifically to a punch assembly of CNC punch press machine.

BACKGROUND OF THE INVENTION

[0002] The punch assembly of CNC punch press machine of the Chinese Patent No. ZL200520065714.7 has advantages, such as reliable connection between the guide assembly and the punch head assembly, fine-adjustment of the length of the plunger, and long operating life of the mechanism. However, it needs to pinch the locking ring by hand during adjustment to bring the guide sleeve and the locking ring into adjustment state, and the operator has to operate with the other hand. Thus, it is inconvenient, and the popularization of this type of product is affected in a certain extent.

SUMMARY OF THE INVENTION

[0003] The object of the present invention is to provide a punch assembly of CNC punch press machine, with which a mechanism for maintaining adjustment state is provided while all kinds of adjustment functions of the Chinese patent No. ZL200520065714.7 are maintained, and the adjustment is made easier.

[0004] To achieve the above object, a punch assembly of CNC punch press machine includes:

a guide assembly, includes:

a guide sleeve;

a locking ring, movably sleeved outside an upper part of the guide sleeve, wherein two symmetric circular grooves are provided on the locking ring;

two shotpins, one end of which is fixed to the guide sleeve, and the other end of which is placed into the circular grooves;

pressure springs, respectively mounted in two symmetric circular grooves on outer cylinder of the upper part of the guide sleeve; and

two poke pins, one end of which is fixed to the locking ring, and the other end of which is inserted into one end of the springs of the circular grooves of the guide sleeve;

wherein a press type of lock system is provided between the guide sleeve and the locking ring, the press type of lock system comprises a hook pin and a spring, the hook pin is provided with a latch hook, the guide sleeve is provided with a cylinder hole, the cylinder hole is configured to cooperate with the hook pin in a manner of sliding fit, and the spring is set in the cylinder hole; a flat groove is provided on a lower end surface of the locking ring, which allow the hook pin slide rather than rotate, and a groove is provided on an inner end face of the flat groove matching the latch hook of the hook pin.

[0005] The forepart of the hook pin may be flat circular, the lower part of the hook is provided with a serrated latch hook, and the tail part of the hook is cylinder shaped.

[0006] The working principle of the present invention is: when the protruding length of the plunger chip need to be adjusted, the locking ring is turned clockwise, and the flat groove of the locking ring slides along the hook pin with a flat circular shaped head. When the groove on the end surface of the flat groove of the locking ring contacts the serrated latch hook of the lower part of the hook pin, the serrated latch hook falls into the groove under the push force from the tail spring, which makes the locking ring unable to rotate, and the entire mechanism is in a state of adjustment. After the adjustment, when press the hook pin, the serrated latch hook is released from the groove and slides into the hole of the guide sleeve, and the locking ring is rotated counterclockwise under the push force from the two restoring springs until being stopped at working position by the shotpin, and the mechanism is in the working state.

[0007] With the present invention, a mechanism for maintaining adjustment state is provided, whereby the adjustment operation is easier while all kinds of adjustment functions disclosed in the Chinese patent No. ZL200520065714.7 are maintained.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a construction schematic diagram of one embodiment of the present invention.

Fig. 2 is a sectional diagram along A-A line of Fig. 1 in working state.

Fig. 3 is a sectional diagram along A-A line of Fig. 1 in working state.

Fig. 4 is a sectional diagram along B-B line of Fig. 1 in working state.

Fig. 5 is a sectional diagram along B-B line of Fig. 1 in adjustment state.

Fig. 6 is a stereogram of the hook pin according to one embodiment of the present invention.

Fig. 7 is a stereogram of the locking ring (bottom up) according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0009] As shown in Figs. 1 to 7, the punch assembly of CNC punch press machine of the present invention includes a punch head assembly 24, a guide assembly 25, a punch 11 and a stripper plate 13. The punch head assembly 24 includes a punch head 1, two half pieces of clip ring 2, a stripping spring 4, a punch driver 5, a dowel pin 6, a container ring 7 with twelve seal grooves 23 uniformly distributed circumferencial direction, an O-shaped seal ring 19 mounted on the top surface of the two half pieces of clip ring 2 in the interior groove of the punching head 1, and an spring cover 3. The stripping spring4 is installed at the punch driver 5 between the inner cone of the lower part of the container ring 7 and two half pieces of clip ring 2. The punch driver 5 is connected to the container ring 7 by the dowel pin 6, thus the punch driver 5 can be driven to move up and down. The guide assembly 25 is composed of a guide sleeve 9, a poke pin 14, a shotpin 15, a pressure spring 16, a locking ring 17, and a small steel ball 18. The locking ring 17 is movably sleeved on the upper part of the guide sleeve 9, and two circular grooves 20 are provided on the locking ring. One ends of the two shotpins 15 are fixed at the guide sleeve 9, while the other ends are placed into the circular groove 20 of the locking ring 17, to support the locking ring 17, prevent it from axial movement with the guide sleeve 9, and only allow it to rotate with a small angle along the two circular grooves 20. An O-shaped seal ring 8 is set between the bottom of the container ring 7 and the interior groove of the upper part of the guide sleeve 9.Two symmetric circular grooves 21 are provided on the guide sleeve 9 corresponding to the locking ring 17, and pressure springs 16 is set inside of the circular grooves 21. The locking ring 17 is mounted with two poke pins 14, one end of which is fixed on the locking ring 17, and the other end of which is inserted into one end of the pressure spring 16 in the circular groove 21 on the guide sleeve 9. When turn the locking ring 17 clockwise, the locking ring 17 turns a degree relative to the guide sleeve 9 within the range limited both by the locking ring 17 and the circular groove 21. When the power is released, two pressure springs 16 push two poke sheaths 14 of the locking ring 17, and then drive the locking ring 17 rotate to return to its original position. The guide sleeve 9 is provided with four holes with cone holes inside, which are set with four small steel balls 18 respectively. The small steel ball 18 falls into the seal groove 23 of the outside surface of the container ring 7 in the punch head assembly 24, and the outside surface of the container ring 7 is locked by the locking ring 17, thus the punch head assembly 24 can be locked. There are four circular recesses 22 processed on the inner cylinder surface of the locking ring 17, which apart from the four small steel balls 18 for a certain angle. When turn the locking ring 17 clockwise, the locking ring 17 is stopped by the shotpin 15, the four circular recesses 22 align to the four small steel balls 18, and the mechanism is unlocked. The punch head assembly 24 can rotate, and can be pulled out from the guide assembly 25. The punch 11 is provided with a dowel pin 10. Internal thread on upper part of the punch 11 is connected with external thread on lower part of the mould guide rod 5. The inside groove of the stripper plate 13 is embedded on the protrusion of the lower part of the guide sleeve 9, and the opening portion of the guide sleeve 9 is provided with a positioning steel ball 12. A press type of lock system is set between the guide sleeve 9 and the locking ring 17, and the mechanism is provided with a hook pin 26 and a restoring spring 27. The front portion of the hook pin 6 is in flat circular shape, a serrated latch hook is provided in the lower part of the hook pin, and the tail part of the hook pin 26 is cylinder shaped. A cylinder hole is provided on the guide sleeve 9, the hole is configured to cooperate with the tail part of the hook pin in a manner of slide fit, and the returning spring 27 is set in the cylinder hole. A flat groove is provided on the lower end surface of the locking ring 17, which can accommodate the circular shape part of the hook pin 26 to slide but not rotate. A groove 28 matching the latch hook of the hook pin 26 is set in the interior surface of the flat groove. When the locking ring 17 and the guide sleeve 9 are at the adjusting position, both of them can be fastened, and the locking ring 17 and the guide sleeve 9 can not be rotated with respect to each other, so as to make the mechanism maintain at the state of adjustment.

Claims

1. A punch assembly of CNC punch press machine, comprising:

    a guide assembly, comprising:

    a guide sleeve;
    a lock ring, movably sleeved outside an upper part of the guide sleeve, wherein two symmetric circular grooves are provided on the lock ring;
    two shotpins, one end of which is fixed to the guide sleeve, and the other end of which is placed into the circular grooves;
    pressure springs, respectively mounted in two symmetric circular grooves on outer cylinder of the upper part of the guide sleeve; and
    two poke pins, one end of which is fixed to the lock ring, and the other end of which is inserted into one end of the springs of the circular grooves of the guide sleeve;

wherein a press type of lock system is provided between the guide sleeve and the lock ring, the press type of lock system comprises a hook pin and a spring, the hook pin is provided with a latch hook, the guide sleeve is provided with a cylinder hole, the cylinder hole is configured to cooperate with the hook pin in a manner of sliding fit, and the spring is set in the cylinder hole; a flat groove is provided on a lower end surface of the lock ring, which allow the hook pin slide rather than rotate, and a groove is provided on an inner end face of the flat groove matching the latch hook of the hook pin.

2. The punch assembly of CNC punch press machine according to claim 1, wherein a forepart of the hook pin is flat circular, the lower part of the hook pin is provided with a serrated latch hook, and a tail part of the hook pin is cylinder-shaped.

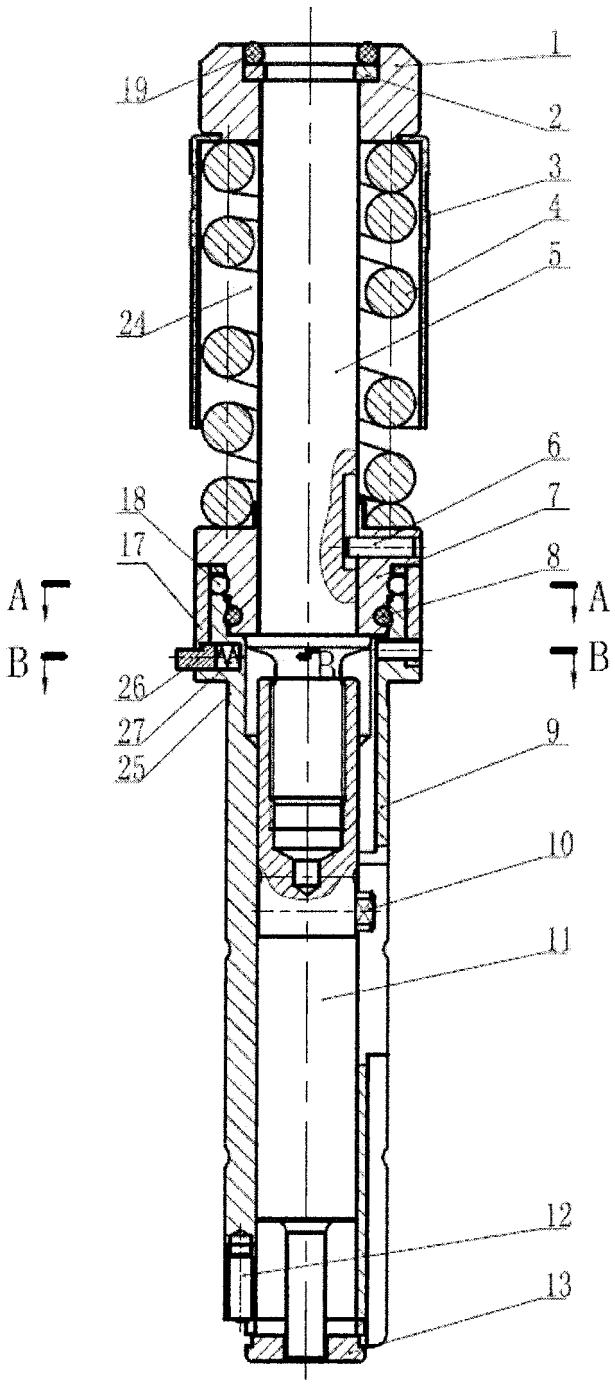

Fig. 1

A—A

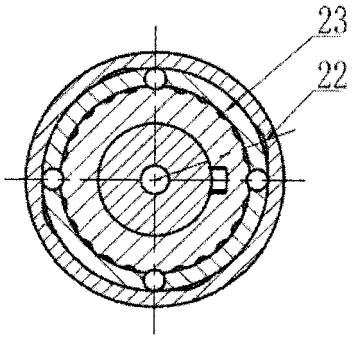

Fig. 2

A—A

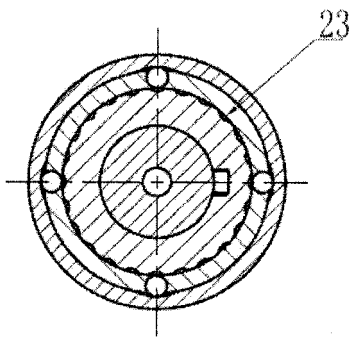

Fig. 3

B—B

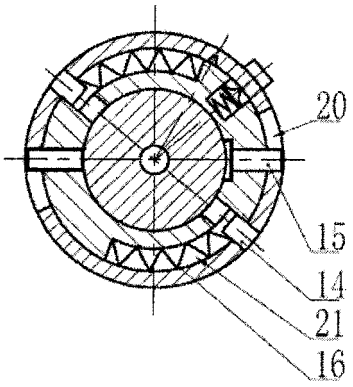

Fig. 4

B—B

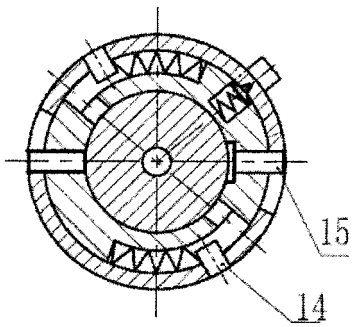

Fig. 5

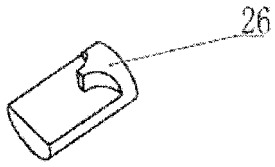

Fig.6

Fig.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/070265

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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)

IPC: B21D 37, B21D 28

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)

WPI; EPODOC; CNPAT; CNKI: numerical control, NC, numerical, control, turret, punch, die, upper, spring, pin, lock, unlock, hole, groove

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 2834728 Y (KETEC PRECISION TOOLING CO., LTD.), 08 November 2006 (08.11.2006), see description, page 2, line 22 to page 4, line 7, and figures 1-3	1-2
A	CN 201437140 U (RATE PRECISION TOOLING CO., LTD.), 14 April 2010 (14.04.2010), see the whole document	1-2
A	CN 101524733 A (HONG FU JIN PRECISION INDUSTRY (SHENZHEN) CO., LTD. et al.), 09 September 2009 (09.09.2009), see the whole document	1-2
A	CN 201098715 Y (JINAN ZHUDUANSUO JIEMAI MACHINERY CO., LTD.), 13 August 2008 (13.08.2008), see the whole document	1-2

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

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 May 2012 (28.05.2012)	**28 June 2012 (28.06.2012)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **XU, Han** Telephone No.: (86-10) **62085424**

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/070265

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 2827580 Y (KETEC PRECISION TOOLING CO., LTD.), 18 October 2006 (18.10.2006), see the whole document	1-2
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/070265

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 2834728 Y	08.11.2006	None	
CN 201437140 U	14.04.2010	None	
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/070265

CONTINUATION OF SECOND SHEET: A. CLASSIFICATION OF SUBJECT MATTER

B21D 37/12 (2006.01) i

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN ZL200520065714 **[0002] [0003] [0007]**