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(54) NEEDLE SELECTION APPARATUS AND METHOD FOR LATCH NEEDLE WARP KNITTING MACHINE

(57) A device and a method for needle selection of a latch needle warp knitting machine are provided. The device includes a needle bed, wherein the needle bed includes several grooves arranged in rows according to gauge type of the knitting machine, latch needles capable of moving up and down being mounted in the needle grooves, and being provided with needle butts; and a cover plate is mounted on the needle bed, insertion grooves corresponding to the grooves being provided in the cover plate, insertion-support members capable of moving forward and backward being mounted in the insertion grooves, and the insertion-support member including an upper insertion-support member and a lower insertion-support member, wherein the needle butt is clamped between the upper insertion-support member and the lower insertion-support member, and a support member is arranged below the latch needle. By using the above device, the latch needle warp knitting machine may adjust, during knitting, a height of each knitting needle according to technology requirements, thereby enriching a pattern type of latch needle warp knitted fabrics, and in addition, the device is wide in adjustment range, and therefore is high in selectivity.(Fig.1)

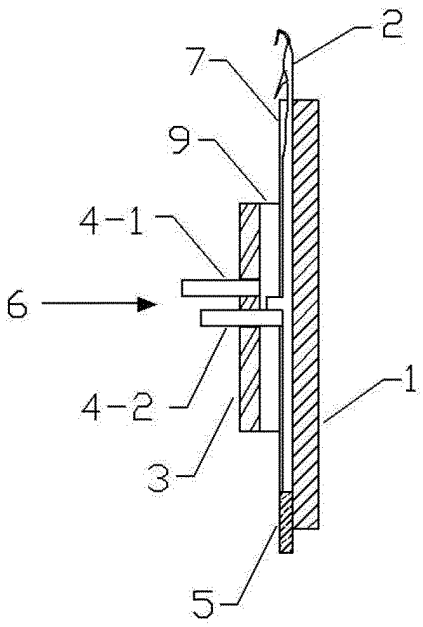

Fig.4

EP 3 819 414 A1

Description

FIELD OF TECHNOLOGY

[0001] The present disclosure relates to the technical field of warp knitting machines, in particular to a device and a method for needle selection of a latch needle warp knitting machine.

BACKGROUND

[0002] Warp knitted fabrics are fabrics formed through simultaneous loop-forming and mutual looping of one or several groups of warps, parallelly arranged, lapped against a row of knitting needles in a longitudinal direction on a warp knitting machine. Loop-forming elements of the warp knitting machine mainly include a knitting needle, a guide needle, a sinker, etc. At present, all the knitting needles on the warp knitting machine are mounted on a needle bed, and reciprocate up and down along with the needle bed. The existing warp knitting machines have not been provided with a device which is used for needle selection on a single knitting needle and controlling the knitting needle to move up and down independently, and therefore cannot control single or multiple knitting needles to move optionally.

[0003] As a result, a knitting needle selection device which may achieve individual needle selection and automatic needle selection becomes a hot spot and a difficulty of research contents at present.

[0004] At present, a utility model with number CN202688628 U disclosed a knitting warp knitting machine capable of performing automatic needle selection. The utility model is provided with a knitting mechanism and an automatic needle selection device, among which the automatic needle selection device further includes a transmission mechanism and automatic needle selection mechanisms. The automatic needle selection mechanisms are controlled by the transmission mechanism to operate on a linear guide rail to sequentially move to needle pushing members corresponding to bearded needles which do not need work for needle section. After needle selection is completed, a needle pushing plate drives, through the needle pushing member, unselected bearded needles to perform knitting work. When it is necessary to perform needle reselection, only a needle pushing baffle plate is needed to be pushed, so as to reset a selected bearded needle, that is make the selected bearded needle re-enter a working position. The automatic knitting warp knitting machine may achieve automatic needle selection and needle arrangement, shorten preparation time for production, improve working efficiency of workers, and improve production capacity of enterprises.

[0005] Disclosed by the present inventors, the device in the above utility model is applicable to a bearded needle warp knitting machine, which is relatively complex. The knitting needle only has a working state and a non-working state, and in a knitting process, a working knitting needle cannot be further selected, such that a fabric type and a pattern type of knitting are limited. Meanwhile, although the purpose of automatic needle selection is achieved by the above automatic needle selection mechanism, it only achieves needle arrangement before starting to knit rather than controlling the knitting needle to move up and down.

[0006] The present disclosure aims at solving the problems of automatic needle selection and control over up-down moving of a specific knitting needle in the knitting process.

SUMMARY

[0007] As for the problems described above, the present disclosure transforms a traditional latch needle warp knitting machine, and provides a device and method for needle selection of a latch needle warp knitting machine, which capable of selectively adjusting a height of a working position of each knitting needle, accordingly solving the problem of limited types of an existing warp knitted fabric, facilitating development and trial production of a novel warp knitted fabric, therefore expanding a pattern design range, and widenning application fields of the warp knitted fabric.

[0008] A technical solution used by the present disclosure for solving the above technical problem is as below: a device for the needle selection of the latch needle warp knitting machine, including a needle bed, wherein the needle bed includes several needle grooves arranged in rows according to the gauge type of the latch needle warp knitting machine, latch needles capable of moving up and down being mounted in the grooves and being provided with needle butts; and a cover plate mounted on the needle bed, insertion grooves corresponding to the needle grooves being provided in the cover plate, insertion-support members capable of moving forward and backward and comprising an upper insertion-support member and a lower insertion-support member are mounted in the insertion grooves; the needle butts are clamped between the upper insertion-support member and the lower insertion-support member; and support members arranged below the latch needles.

[0009] In further embodiments of the above technical solution, channel grooves corresponding to the needle grooves are provided on the cover plate; the insertion grooves are provided in the channel grooves according to a knitting technology requirement, and arranged in one row, at least two rows, in a horizontal direction.

[0010] In further embodiments of the above technical solution, the insertion-support members are connected to control mechanisms, and controlled by the control mechanisms to be inserted, in a working state, into the insertion grooves so as to perform needle selection, needle raising or needle pressing operation, and exit, in a non-working state, from the insertion grooves.

[0011] In further embodiments of the above technical solution, the control mechanism is a hand-actuated, elec-

trically-controlled, hydraulic or pneumatic mechanism, and is used for controlling the insertion-support member to move.

[0012] In further embodiments of the above technical solution, the control mechanisms are arranged to one set to simultaneously control the upper insertion-support member and the lower insertion-support member to move.

[0013] In further embodiments of the above technical solution, the control mechanisms are arranged to two set, one of which controls the upper insertion-support member to move, and the other of which controls the lower insertion-support member to move.

[0014] In further embodiments of the above technical solution, the support member is a leaf spring or a square column.

[0015] In further embodiments of the above technical solution, a surface, in contact with the needle butt, of the insertion-support member is a plane. And the other surfaces are not limited to planes, and can be cuboids, triangular prisms or half-cylinders, for example.

[0016] A method for the needle selection of the latch needle warp knitting machine is applied to the device for the needle selection of the latch needle warp knitting machine of any technical solution described above, in an ascending or descending process of the cover plate, stopping, by adjusting an inserting position of an upper insertion-support member and an inserting position of a lower insertion-support member, synchronous movement of a latch needle and the cover plate and making the latch needle stay at a corresponding position particularly include:

when the cover plate ascends, inserting, the lower insertion-support member to a position below a needle butt, and making the latch needle synchronously ascend with the cover plate; when the lower insertion-support member is not inserted to a position below the needle butt, making the latch needle stop synchronously ascending with the cover plate and stay at the corresponding position;

when the cover plate descends, inserting the upper insertion-support member to a position above a needle butt, and making the latch needle synchronously descend with the cover plate; when the upper insertion-support member is not inserted to a position above the needle butt, making the latch needle stop synchronously descending with the cover plate and stay at the corresponding position; and

when the cover plate ascends to a middle position, adjusting the inserting position of the lower insertion-support member to change the height of the latch needle.

[0017] The present disclosure brings about the beneficial effects:

after the above present disclosure is used, the latch needle warp knitting machine may adjust, during knitting, a height of a working position of each knitting needle according to technological requirements, may achieve selective knitting into loops, tucking, floating or knitting by partial knitting needles, thereby enriching a pattern type of latch needle warp knitted fabrics.

[0018] In addition, the device is simple in structure, convenient to operate, wide in adjustment range and high in selectivity, and facilitates the development and trial production of the novel warp knitted fabric.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] With reference to accompanying drawings, contents disclosed by the present disclosure will become easier to understand. It is easy for those skilled in the art to understand that these accompanying drawings are only used for exemplarily illustrating the technical solution of the present disclosure and are not intended to limit the scope of protection of the present disclosure. In the figures:

Fig. 1 is a front view of a device of the present disclosure (with only a part shown);

Fig. 2 is a top view of the device of the present disclosure (with only a part shown);

Fig. 3 is a partial enlarged drawing of a back (the surface adjacent to a needle bed) of a cover plate of the device of the present disclosure;

Fig. 4 is a section view of the present disclosure in a state of the insertion-support member entering needle selection and needle raising states;

Fig. 5 is a section view of the present disclosure in a state of the insertion-support member entering a needle pressing state; and

Fig. 6 is a section view of the present disclosure in a state of the insertion-support member re-entering needle selection and needle raising states.

DESCRIPTION OF THE EMBODIMENTS

[0020] Hereinafter, the present disclosure will be further explained with reference to accompanying drawings. Particular embodiments of the present disclosure described in the accompanying drawings are merely used for explaining the present disclosure, but are not strictly drawn per actual sizes and ratios. Therefore, the accompanying drawings of the present disclosure shall not be interpreted as any limit to the present disclosure. The scope of protection of the present disclosure is defined by the claims.

[0021] For the sake of simplifying and highlighting the present disclosure, only details particularly related to the prevent disclosure are illustrated in some accompanying drawings. It should be understood that such a graphic representation manner does not exclude existence of other details related to the present disclosure. Therefore, the accompanying drawings of the present disclosure are not intended to limit the scope of the present disclosure.

Embodiment 1

[0022] A device for needle selection of a latch needle warp knitting machine

With reference to Figs. 1 to 6, the device includes a needle bed 1, latch needles 2, a cover plate 3, insertion-support members 4, support members 5 and control mechanisms 6. The needle bed 1 is provided with a row of needle grooves 7 according to the type of the latch needle warp knitting machine, the latch needles 2 capable of moving up and down being mounted in the needle grooves 7, and the latch needles 2 being provided with needle butts. The cover plate 3 is mounted on the needle bed 1, and is provided with insertion grooves 8, the insertion-support members 4 are mounted in the insertion grooves 8 and are capable of moving forward and backward, wherein an upper insertion-support member 4-1 and a lower insertion-support member 4-2 may clamp the needle butt, the support member 5 is arranged below the latch needle 2, and the control mechanism 6 may control the insertion-support members 4 to move.

[0023] In this embodiment, the cover plate 3 is mounted on the needle bed 1, the cover plate 3 is provided with a row of channel grooves 9 corresponding to the grooves 7, the insertion grooves 8 are provided in each grooves 9 according to a knitting technology requirement, the insertion grooves 8 are arranged in one row in a horizontal direction, and at least two rows of insertion grooves are arranged.

[0024] The insertion-support members 4 are controlled by the control mechanism 6 to enter, in a working state, the insertion grooves 8 so as to perform needle selection, needle raising or needle pressing, and exit, in a non-working state, from the insertion grooves 8.

[0025] The support members 5 may be a leaf spring or a square column, and play a role in maintaining a height of the latch needles 2. A surface, in contact with the needle butt, of the insertion-support member shall be a plane to facilitate clamping, and the other surfaces thereof are not limited to planes, and can be cuboids, triangular prisms or half-cylinders, for example.

[0026] The control mechanism 6 may be hand-actuated, electrically-controlled, hydraulic or pneumatic and capable of driving the insertion-support members 4 to move, such as a driving air cylinder. One control mechanism 6 may be arranged, and simultaneously controls the upper insertion-support member 4-1 and the lower insertion-support member 4-2, or two control mechanisms may be arranged, one of which controls the upper insertion-support member 4-1, and the other of which controls the lower insertion-support member 4-2.

Embodiment 2

[0027] A method for needle selection of a latch needle warp knitting machine

The method is applied to the device for the needle selection of the latch needle warp knitting machine in embodiment 1, and particularly includes :

in an ascending or descending process of a cover plate 3, making, by adjusting an inserting position of an upper insertion-support member 4-1 and an inserting position of a lower insertion-support member 4-2, the latch needle 2 stop synchronously moving with the cover plate 3 and stay at a corresponding position, which particularly includes:

when the cover plate 3 ascends, inserting the lower insertion-support member 4-2 to a position below a needle butt, and making the latch needle 2 synchronously ascend with the cover plate 3; making, when the lower insertion-support member 4-2 is not inserted to a position below the needle butt, the latch needle 2 stop synchronously ascending with the cover plate 3 and stay at the corresponding position;

when the cover plate 3 descends, inserting the upper insertion-support member 4-1 to a position above a needle butt, and making the latch needle 2 synchronously descend with the cover plate 3; making, when the upper insertion-support member 4-1 is not inserted to a position above the needle butt, the latch needle 2 stop synchronously descending with the cover plate 3 and stay at the corresponding position; and

when the cover plate 3 ascends to a middle position, adjusting the inserting position of the lower insertion-support member 4-2, resulting in a change of a height of the latch needle 2 accordingly.

[0028] By the method described above, the latch needle warp knitting machine may adjust, during knitting, a height of a working position of each knitting needle according to technological requirements, may perform loops-forming, tucking, floating or knitting by partial knitting needles selectively and individually, thereby enriching a pattern type of latch needle warp knitted fabrics.

[0029] Different embodiments of the present disclosure are described as above, it is obvious to those skilled in the art that the present disclosure is not limited to details of the above exemplary embodiments, and the contents described above are merely preferred embodiments of the present disclosure and cannot be regarded as limits to the scope of implementation of the present disclosure. Any equivalent change, improvement, etc. made within the scope of application of the present disclosure shall fall within the scope covered by the patent of the present disclosure.

Claims

1. A device for needle selection of a latch needle warp knitting machine, comprising a needle bed, **characterized in that**, the needle bed comprises several needle grooves arranged in rows according to the type of the latch needle warp knitting machine, latch needles capable of moving up and down being

mounted in the grooves and being provided with needle butts; and a cover plate mounted on the needle bed, insertion grooves corresponding to the needle grooves being provided in the cover plate, insertion-support members capable of moving forward and backward and each comprising an upper insertion-support member and a lower insertion-support member are mounted in the insertion grooves; the needle butts are clamped between the upper insertion-support member and the lower insertion-support member; and support members arranged below the latch needles.

2. The device for the needle selection of the latch needle warp knitting machine according to claim 1, **characterized in that**, a row of channel grooves corresponding to the needle grooves are provided on the cover plate; the insertion grooves are provided in the channel grooves according to a knitting technology requirement, and arranged in one row, at least two rows, in a horizontal direction.

3. The device for the needle selection of the latch needle warp knitting machine according to claim 1, **characterized in that**, the insertion-support members are connected to control mechanisms, and controlled by the control mechanisms to be inserted, in a working state, into the insertion grooves so as to perform needle selection, needle raising or needle pressing operation, and exit, in a non-working state, from the insertion grooves.

4. The device for the needle selection of the latch needle warp knitting machine according to claim 3, **characterized in that**, the control mechanisms is a hand-actuated, electrically-controlled, hydraulic or pneumatic mechanism, and is used for controlling the insertion-support member to move.

5. The device for the needle selection of the latch needle warp knitting machine according to claim 4, **characterized in that**, the control mechanisms are arranged to one set to simultaneously control the upper insertion-support member and the lower insertion-support member to move.

6. The device for the needle selection of the latch needle warp knitting machine according to claim 4, **characterized in that**, the control mechanisms are arranged to two sets, and one of which controls the upper insertion-support member to move, and the other of which controls the lower insertion-support member to move.

7. The device for the needle selection of the latch needle warp knitting machine according to claim 1, **characterized in that**, the support member is a leaf spring or a square column.

8. The device for the needle selection of the latch needle warp knitting machine according to claim 1, **characterized in that**, a surface, in contact with the needle butt, of the insertion-support member is a plane.

9. A method for needle selection of a latch needle warp knitting machine, applied to the device for the needle selection of the latch needle warp knitting machine according to any one of claims 1-8, in an ascending or descending process of the cover plate, making, by adjusting an inserting position of an upper insertion-support member and an inserting position of a lower insertion-support member, one latch needle or latch needles stop synchronously moving with the cover plate and stay at a corresponding position, comprising:

when the cover plate ascends, inserting the lower insertion-support member to a position below a needle butt, and making the latch needle synchronously ascend with the cover plate; when the lower insertion-support member is not inserted to a position below the needle butt, making the latch needle stop synchronously ascending with the cover plate and stay at the corresponding position;
when the cover plate descends, inserting the upper insertion-support member to a position above a needle butt, and making the latch needle synchronously descend with the cover plate;
when the upper insertion-support member is not inserted to a position above the needle butt, making the latch needle stop synchronously descending with the cover plate and stay at the corresponding position; and
when the cover plate ascends to a middle position, adjusting the inserting position of the lower insertion-support member to change the height of the latch needle.

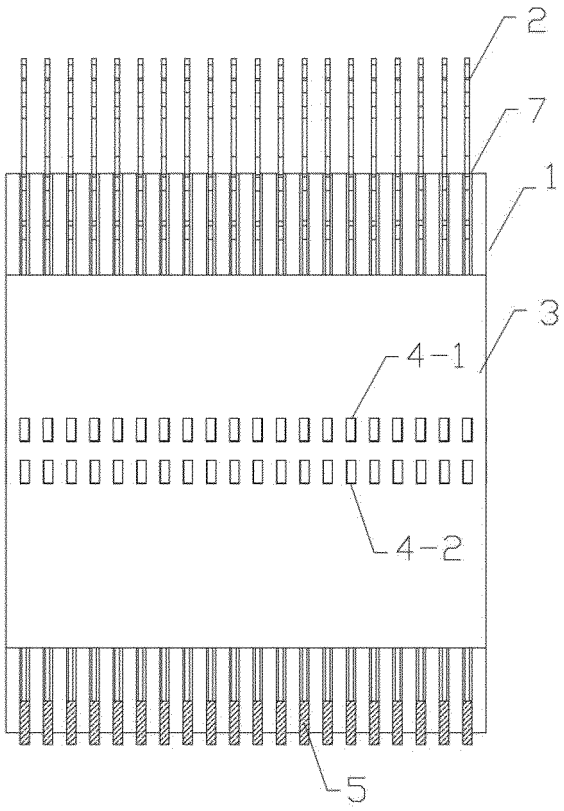

Fig. 1

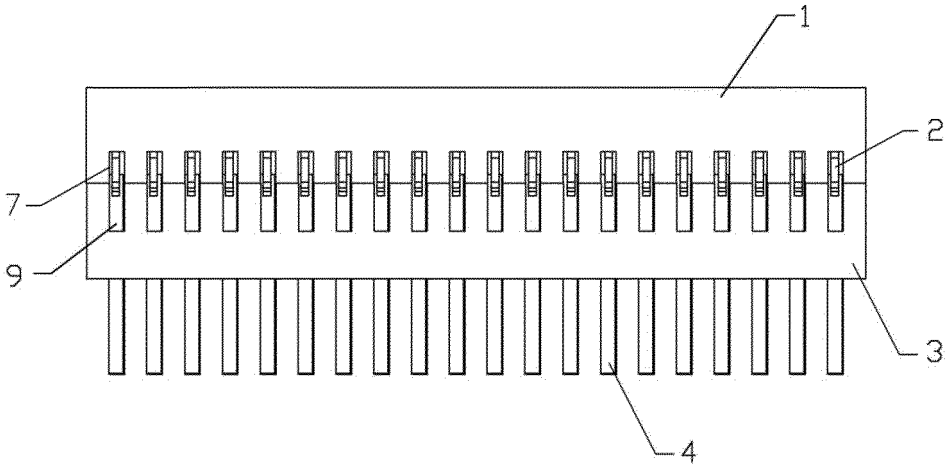

Fig. 2

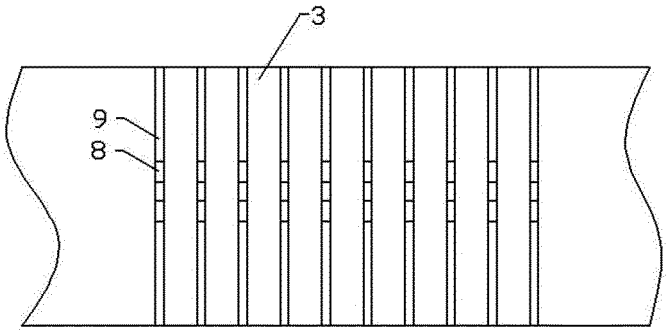

Fig. 3

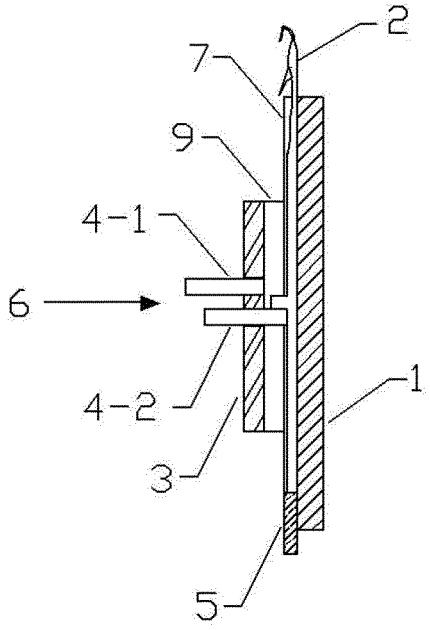

Fig.4

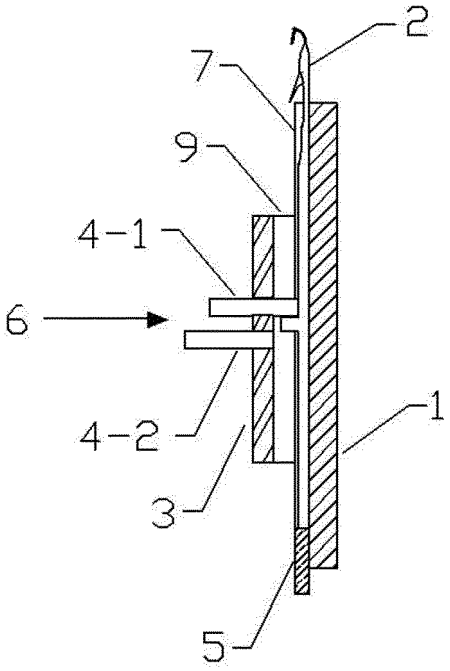

Fig. 5

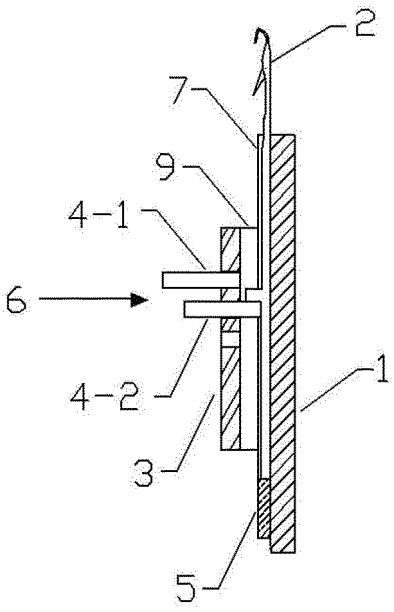

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/080811

A. CLASSIFICATION OF SUBJECT MATTER

D04B 27/00(2006.01)i; D04B 27/06(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)

D04B

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)

CNABS; CNTXT; CNKI; DWPI: 经编, 编织, 舌针, 织针, 针槽, 浮线, 集圈, 盖板, 压针板, 针脚, 针踵, 插, 选针, 支撑, 支承, warp, needle, groove, slot, tuck, float, butt, foot, select, insert

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 108842287 A (TIANJIN POLYTECHNIC UNIVERSITY) 20 November 2018 (2018-11-20) claims 1-9	1-9
X	CN 2417186 Y (SANQIANG (GROUP) CO., LTD., SHANGHAI) 31 January 2001 (2001-01-31) description, pp. 1 and 2, and figures 1-4	1-9
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A	DE 2107024 A1 (VU PLETARSKY) 26 August 1971 (1971-08-26) entire document	1-9

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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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
29 May 2019	**13 June 2019**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/080811

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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CN	108842287	A	20 November 2018	None			
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CN	205171094	U	20 April 2016	None			

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REFERENCES CITED IN THE DESCRIPTION

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