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

(11) EP 2 767 626 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.08.2014 Bulletin 2014/34

(51) Int Cl.:
D04B 35/06 *(2006.01)*

(21) Application number: **14151077.6**

(22) Date of filing: **14.01.2014**

(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

(30) Priority: **04.07.2013 CN 201310278223**

(71) Applicant: **Ningbo Cixing Co., Ltd.**
Cixi Zhejiang (CN)

(72) Inventors:
- **Sun, Pingfan**
  Cixi Zhejiang (CN)
- **Jeanbourquin, Frank**
  Cixi Zhejiang (CN)
- **Gao, Yunpeng**
  Cixi Zhejiang (CN)

(74) Representative: **Sun, Yiming**
HUASUN Patent- und Rechtsanwälte
Friedrichstraße 33
80801 München (DE)

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

(54) Knitting needle for flat knitting machine

(57) The present invention discloses a knitting needle for a flat knitting machine. The knitting needle consists of two identical needle jacks, i.e. left needle jack and right needle jack; the needle jacks are flaky, a plurality of gauges are arranged between the two needle jacks, and the two needle jacks are integrally fixed by a plurality of connecting pins; the needle jack comprises a head and a main body, and the gauges and the connecting pins are located on the main body; the head of the needle jack is provided with a pointed front end, the part behind the front end is recessed downwards to form a first groove, the first groove is extended backwards and protruded upwards to form a needle ear in the shape of an acute angle, and the needle ear is extended backwards and recessed downwards to form a second groove; the second groove is smaller than the first groove; and the thickness of the needle ear is smaller than those of the other parts of the needle jack. The knitting needle of the utility model is simply structured, totally consists of fixed components, and can be obtained by the steps of manufacturing the needle jacks, the gauges and the connecting pins by means of wire cutting, stamping or other methods while machining and then assembling these components, thus the machining process is simple and convenient and low in error possibility.

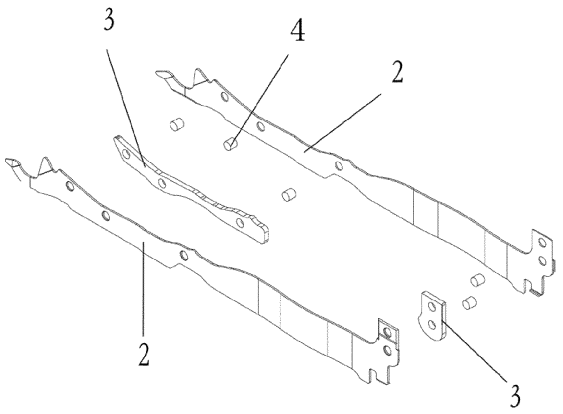

Fig. 2

EP 2 767 626 A1

Description

FIELD OF THE INVENTION

[0001] The present invention belongs to the technical field of knitting machinery, in particular to a knitting needle for a flat knitting machine.

BACKGROUND OF THE INVENTION

[0002] Flat knitting machine is a machine that achieves looped weaving by the combination of yarns and knitting needles in such a manner that the head of the flat knitting machine drives yarns to perform a back-and-forth translation motion on a knitting needle-filled needle bed. Multiple types of knitting needles are required to achieve weaving, and among these knitting needles, the most common ones are major needle and latch needle.

[0003] The latch needle in the prior art is provided with a rotatable needle latch on the needle rod, and such actions as turning and clearing are accomplished by the combination of yarns and knitting needles through opening and closing of the needle latch. The latch needle is small in size and high in precision requirement and also needs to be equipped with a rotating component, which obviously results in quite high requirement on processing precision, as a result, the cost of the latch needle is high, and the defective and failure rates are also high.

SUMMARY OF THE INVENTION

[0004] To solve the above problems, an object of the present invention is to provide a knitting needle that can take the place of the latch needle.

[0005] Accordingly, adopted in the present invention is the technical scheme below: a knitting needle for a flat knitting machine is characterized in that: the knitting needle consists of two identical needle jacks, i.e. left needle jack and right needle jack; the needle jacks are flaky, a plurality of gauges are arranged between the two needle jacks, and the two needle jacks are integrally fixed by a plurality of connecting pins; the needle jack comprises a head and a main body, and the gauges and the connecting pins are located on the main body; the head of the needle jack is provided with a pointed front end, the part behind the front end is recessed downwards to form a first groove, the first groove is extended backwards and protruded upwards to form a needle ear in the shape of an acute angle, and the needle ear is extended backwards and recessed downwards to form a second groove; the second groove is smaller than the first groove; and the thickness of the needle ear is smaller than those of the other parts of the needle jack.

[0006] The working process of the knitting needle of the present invention is as follows: when clearing is needed, a loop is already formed on a major needle, the major needle is pushed by a cam to move upwards to hook a new yarn in order to prepare for another looping, meanwhile, the knitting needle of the present invention is moved downwards and reset in a major needle clamping groove before the formed loop; at this moment, the formed loop is moved downwards in relation to the major needle to enter a first groove of the knitting needle of the present invention, and the knitting needle of the present invention receives the formed loop; the major needle that hooks the new yarn is moved downwards, and the knitting needle of the present invention drives the formed loop to move upwards; the major needle is continuously moved downwards and the knitting needle of the present invention is continuously moved upwards to form a new loop, and simultaneously, the old loop slips off the front end of the knitting needle of the present invention.

[0007] When turning between the knitting needles is needed, the major needle that requires turning is moved upwards, and the knitting needle of the present invention is moved downwards to acquire a loop that requires turning; the major needle is moved downwards, the knitting needle of the present invention is moved upwards to drive the turning-requiring loop to reach the turning position, meanwhile, another knitting needle for needle connection is moved upwards to pass through the turning-requiring loop and enter a needle ear part of the needle jack of the opposite needle bed to wait for needle connection; the knitting needle for needle connection hooks the turning-requiring loop by a second groove thereof and keeps stationary, and the knitting needle for turning is moved downwards to leave away from the loop; and the knitting needle for needle connection hooks the turning-requiring loop and is reset near the major needle to complete turning between the front and rear needle beds.

[0008] When turning between the knitting needle and the major needle is needed, the needle for turning acquires a turning-requiring loop and is moved upwards to reach the turning position; the major needle for needle connection is correspondingly moved upwards to pass through the turning-requiring loop and enter the needle ear part of the needle jack of the opposite needle bed to wait for needle connection; the major needle for needle connection hooks the turning-requiring loop and keeps stationary, and the knitting needle 1 for turning is moved downwards to leave away from the loop; and the major needle for needle connection hooks the yarn and is then reset to finish the turning process.

[0009] It is thus clear that, clearing and turning actions can be accomplished by such designs as the first groove, the second groove and the needle ear of the present invention, thus the knitting needle of the present invention can take the place of the latch needle. The knitting needle of the present invention is actually hollow and is free from obstruction of the connecting pin and other components at the head thereof, so the major needle is capable of entering the space between the two needle jacks smoothly to further accomplish actions; in addition, the knitting needle of the present invention is simply structured, totally consists of fixed components, and can be obtained by the steps of manufacturing the needle jacks, the gaug-

es and the connecting pins by means of wire cutting, stamping or other methods while machining and then assembling these components, thus the machining process is simple and convenient and low in error possibility.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Detailed description is further made below with reference to the accompanying drawings and the embodiments of the present invention.

FIG.1 is an overall view of the present invention.
FIG.2 is a structure view of the present invention.
FIG.3 is a structure view of the needle jack of the present invention.
FIG.4, FIG.5, FIG.6 and FIG.7 are flowcharts illustrating looping and clearing of the present invention.
FIG.8, FIG.9, FIG.10 and FIG.11 are flowcharts illustrating turning between the needle bushes of the present invention.
FIG.12, FIG.13 and FIG.14 are flowcharts illustrating turning between the needle bush and the major needle of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0011] Reference is made to the drawings. A knitting needle 1 in this embodiment consists of two identical needle jacks 2, i.e. left needle jack and right needle jack; the needle jacks 2 are flaky, a plurality of gauges 3 are arranged between the two needle jacks, and the two needle jacks are integrally fixed by a plurality of connecting pins 4; the needle jack 2 comprises a head 21 and a main body 22, and the gauges 3 and the connecting pins 4 are located on the main body 22; the head 21 of the needle jack 2 is provided with a pointed front end 211, the part behind the front end 211 is recessed downwards to form a first groove 212, the first groove 212 is extended backwards and protruded upwards to form a needle ear 213 in the shape of an acute angle, and the needle ear 213 is extended backwards and recessed downwards to form a second groove 214; the second groove 214 is smaller than the first groove 212; and the thickness of the needle ear 213 is smaller than those of the other parts of the needle jack 2.

[0012] The working process of this embodiment is as follows: when clearing is needed, as shown in FIG.4, FIG. 5, FIG.6 and FIG.7, a loop 51 is already formed on a major needle 6, the major needle 6 is pushed by a cam to move upwards to hook a new yarn 52 in order to prepare for another looping, meanwhile, the knitting needle 1 in this embodiment is moved downwards and reset in a major needle clamping groove 61 before the formed loop 51; at this moment, the formed loop 51 is moved downwards in relation to the major needle 6 to enter a first groove 212 of the knitting needle 1 in this embodiment, and the knitting needle 1 in this embodiment receives the formed loop 51; the major needle 6 that hooks the new yarn 21 is moved downwards, and the knitting needle 1 in this embodiment drives the formed loop 51 to move upwards; the major needle 6 is continuously moved downwards and the knitting needle 1 in this embodiment is continuously moved upwards to form the new loop 52, and simultaneously, the old loop 51 slips off the front end 211 of the knitting needle 1 in this embodiment.

[0013] When turning between the knitting needles is needed, as shown in FIG.8, FIG.9, FIG.10 and FIG.11, the major needle 6 that requires turning is moved upwards, and the knitting needle 1 in this embodiment is moved downwards to acquire a loop 53 that requires turning; the major needle 6 is moved downwards, the knitting needle 1 in this embodiment is moved upwards to drive the turning-requiring loop 53 to reach the turning position, meanwhile, another knitting needle 1' for needle connection is moved upwards to pass through the turning-requiring loop 53 and enter a needle ear 213 part of the needle jack of the opposite needle bed to wait for needle connection; the knitting needle 1' for needle connection hooks the turning-requiring loop 53 by a second groove 213 thereof and keeps stationary, and the knitting needle 1 for turning is moved downwards to leave away from the loop 53; and the knitting needle 1' for needle connection hooks the turning-requiring loop 53 and is reset near the major needle 6 to complete turning between the front and rear needle beds.

[0014] When turning between the knitting needle and the major needle is needed, as shown in FIG.12, FIG.13 and FIG.14, the needle 1 for turning acquires a turning-requiring loop 54 and is moved upwards to reach the turning position; the major needle 6' for needle connection is correspondingly moved upwards to pass through the turning-requiring loop 54 and enter the needle ear 213 part of the needle jack of the opposite needle bed to wait for needle connection; the major needle 6' for needle connection hooks the turning-requiring loop 54 and keeps stationary, and the knitting needle 1 for turning is moved downwards to leave away from the loop 54; and the major needle 6' for needle connection hooks the yarn and is then reset to finish the turning process.

Claims

1. A knitting needle for a flat knitting machine, **characterized in that**: the knitting needle consists of two identical needle jacks, i.e. left needle jack and right needle jack; the needle jacks are flaky, a plurality of gauges are arranged between the two needle jacks, and the two needle jacks are integrally fixed by a plurality of connecting pins; the needle jack comprises a head and a main body, and the gauges and the connecting pins are located on the main body; the head of the needle jack is provided with a pointed front end, the part behind the front end is recessed downwards to form a first groove, the first groove is extended backwards and protruded upwards to form

a needle ear in the shape of an acute angle, and the needle ear is extended backwards and recessed downwards to form a second groove; the second groove is smaller than the first groove; and the thickness of the needle ear is smaller than those of the other parts of the needle jack.

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

1. A knitting needle (1) for a flat knitting machine, comprising two identical needle jacks (2), i.e. left needle jack and right needle jack; the needle jacks are flaky; the needle jack comprises a head (21) and a main body (22); the head of the needle jack is provided with a pointed front end (211), the part behind the front end is recessed downwards to form a first groove (212), the first groove is extended backwards and protruded upwards to form a needle ear (213) in the shape of an acute angle, and the needle ear is extended backwards and recessed downwards to form a second groove (214); the second groove is smaller than the first groove;
characterized in that,
a plurality of gauges (3) are arranged between the two needle jacks, and the two needle jacks are integrally fixed by a plurality of connecting pins (4).

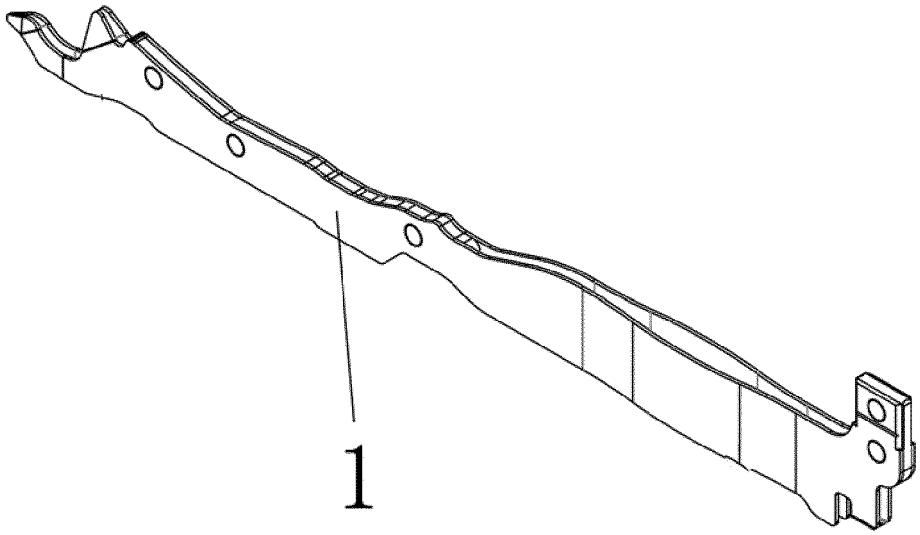

Fig. 1

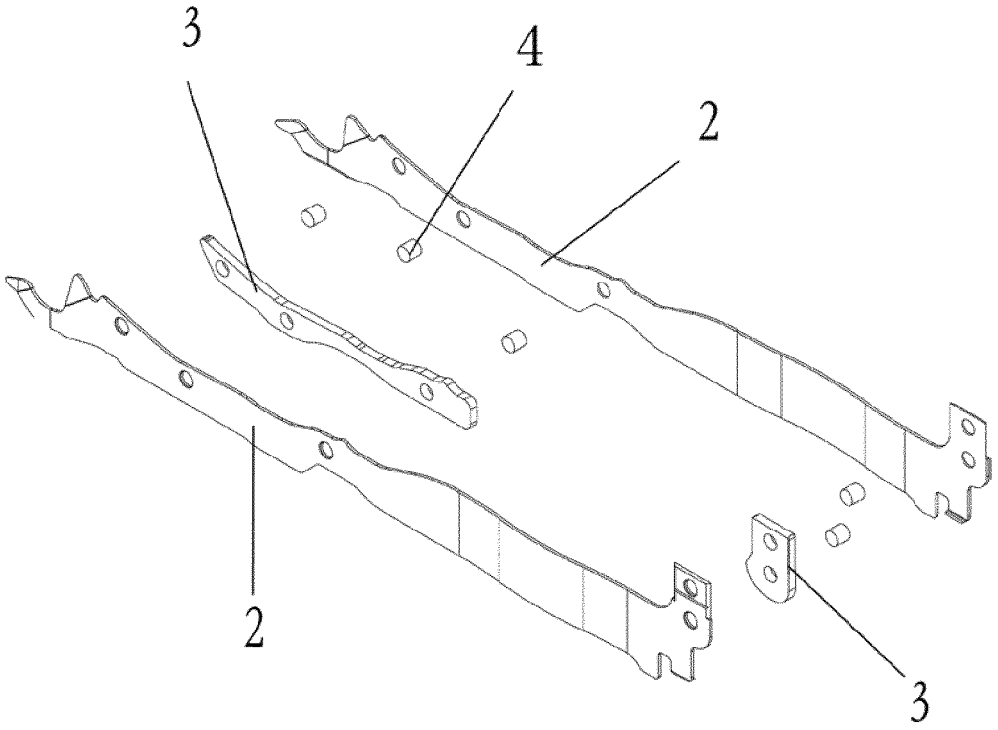

Fig. 2

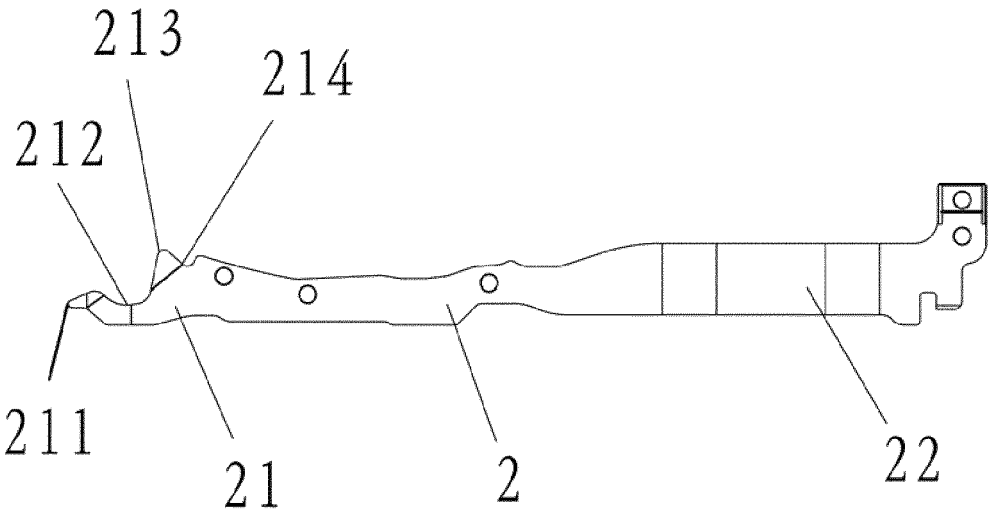

Fig. 3

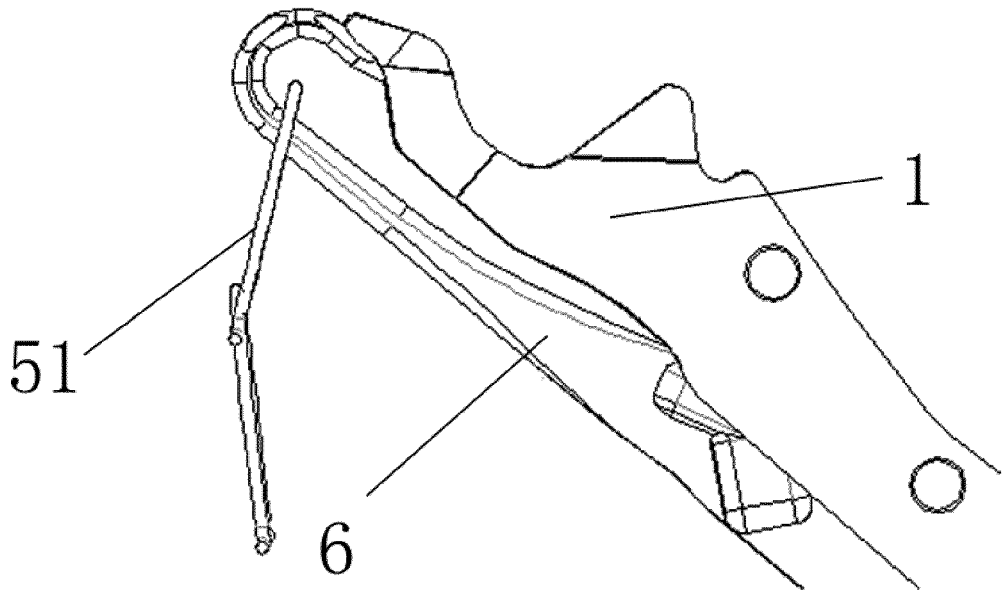

Fig. 4

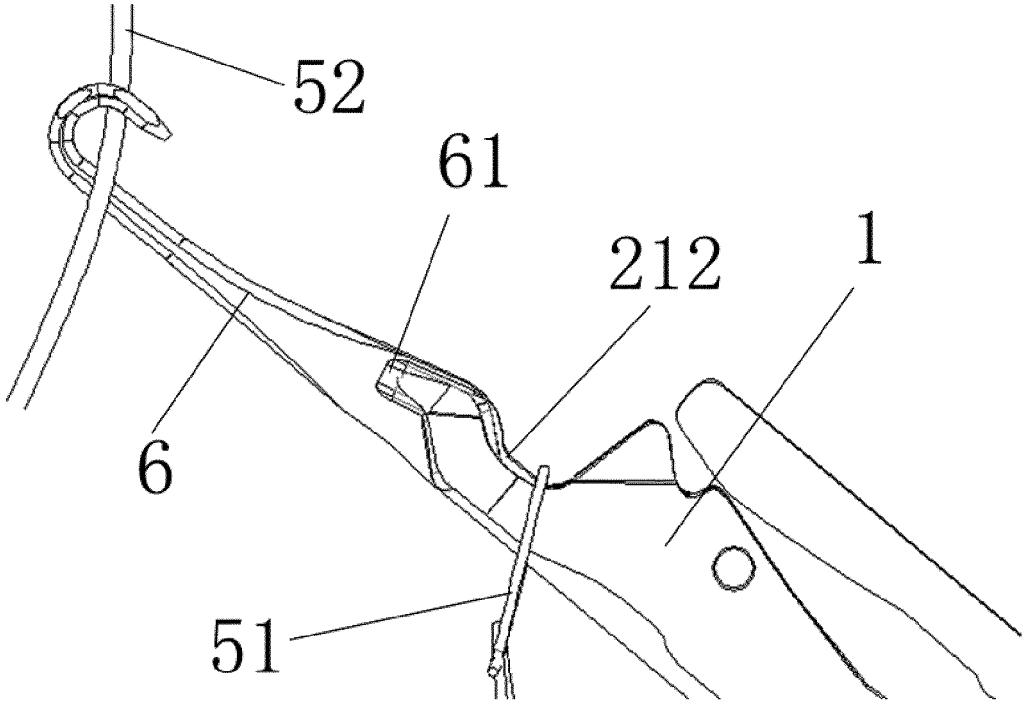

Fig. 5

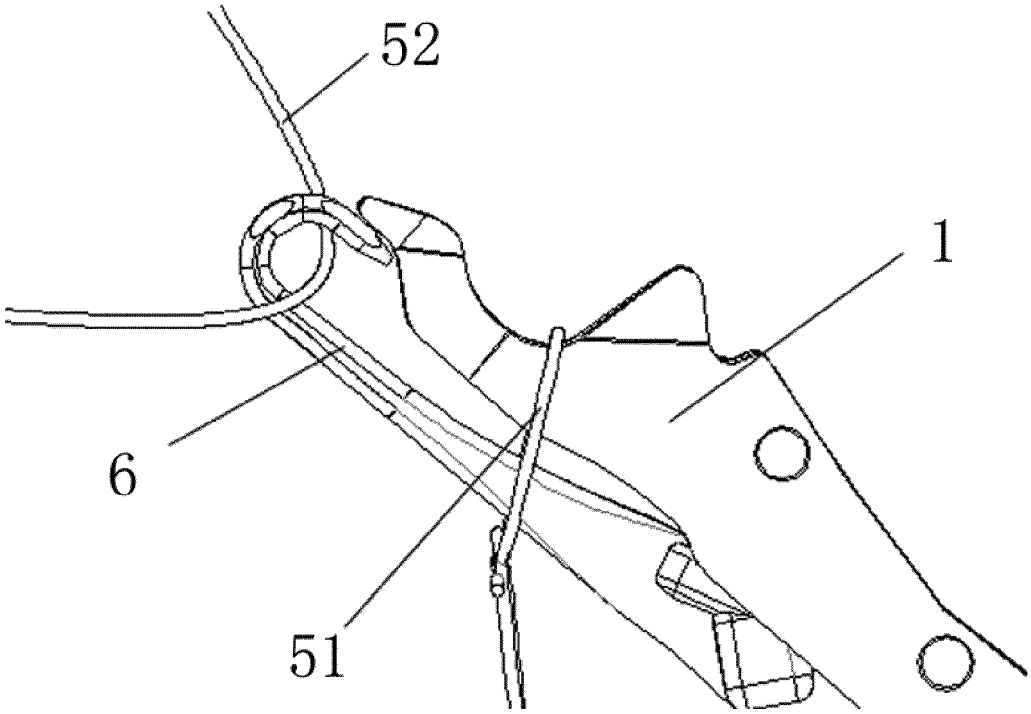

Fig. 6

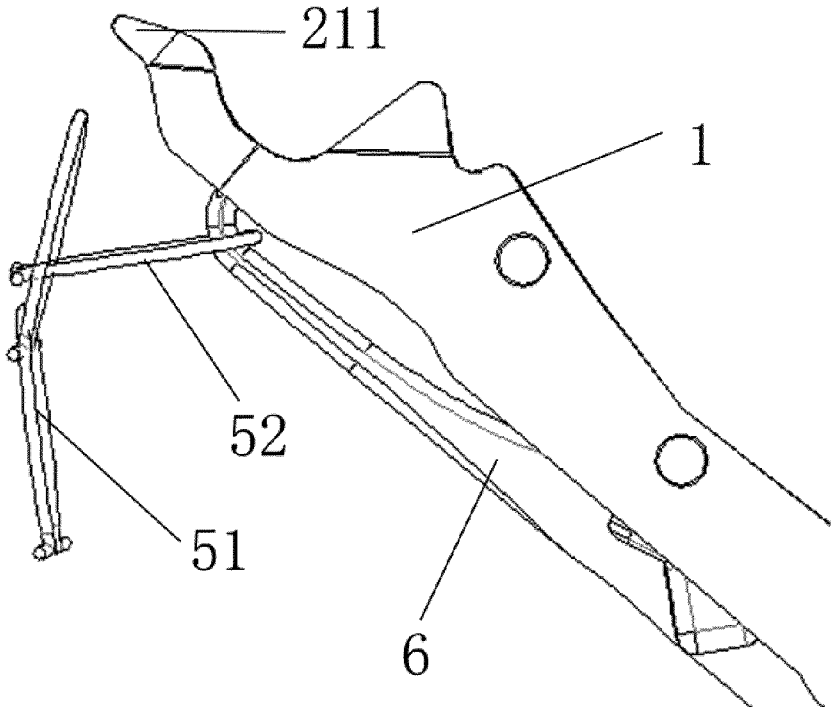

Fig. 7

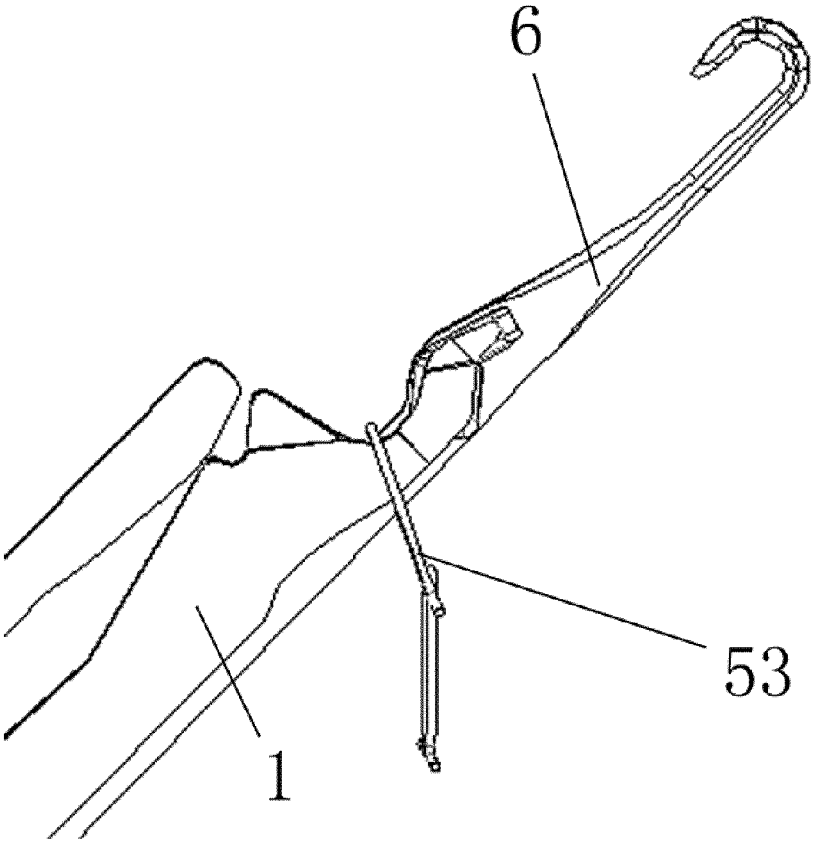

Fig. 8

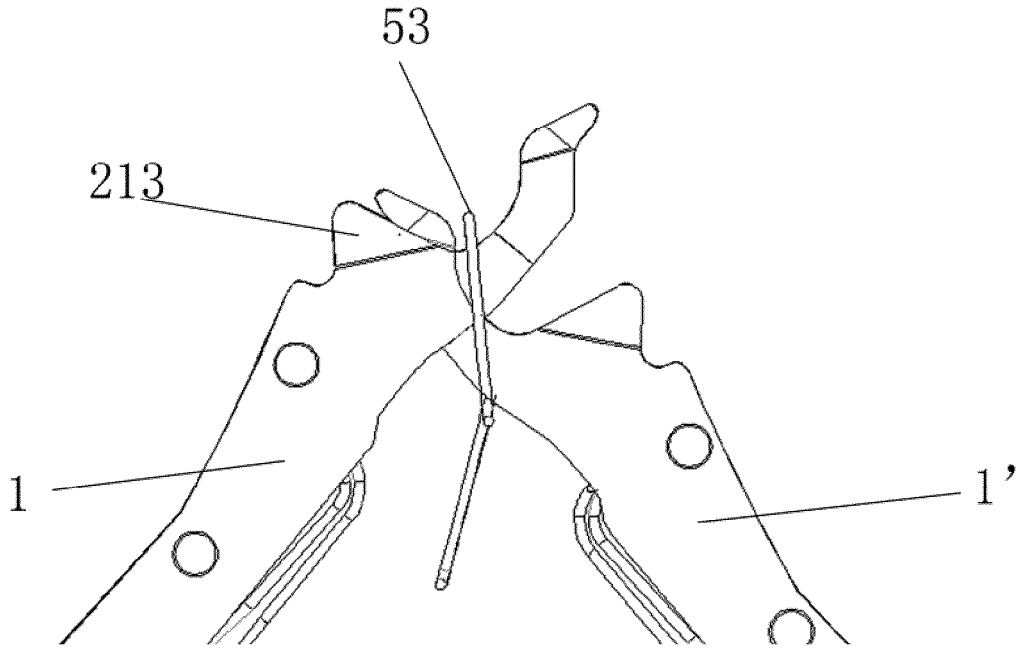

Fig. 9

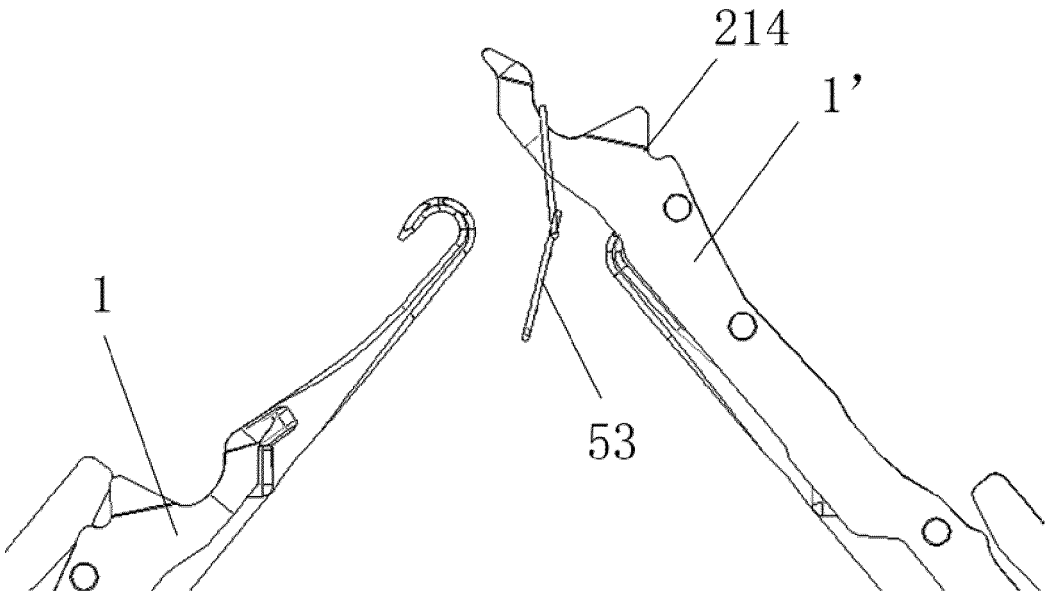

Fig. 10

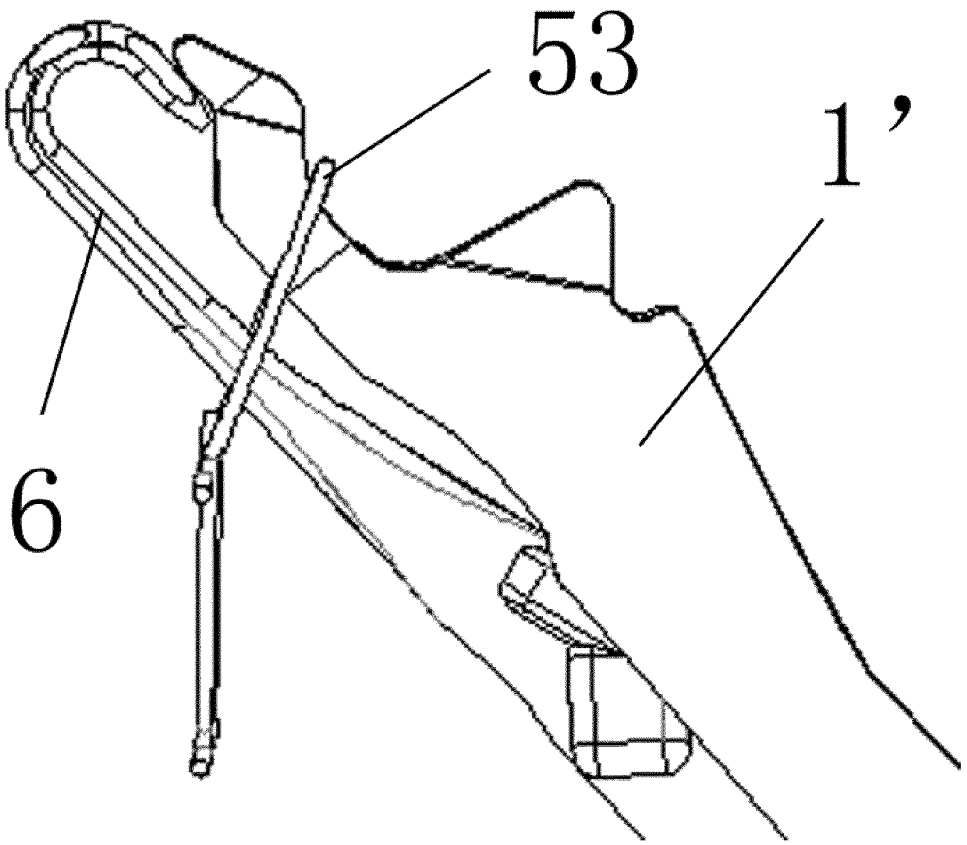

Fig. 11

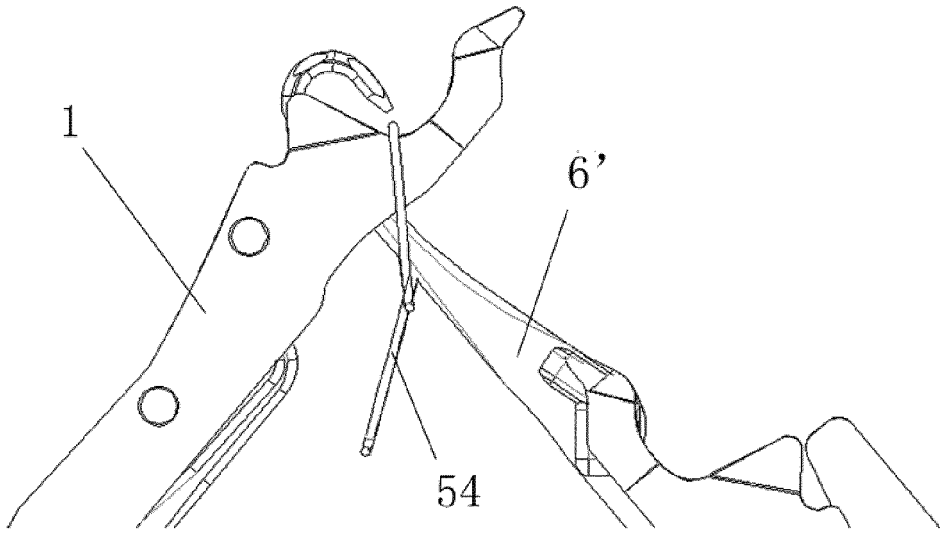

Fig. 12

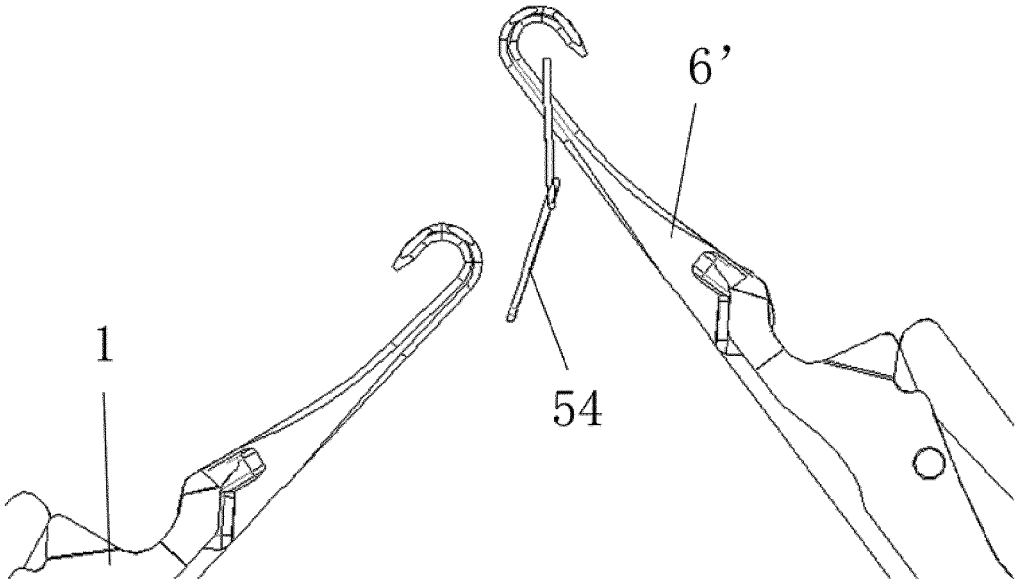

Fig. 13

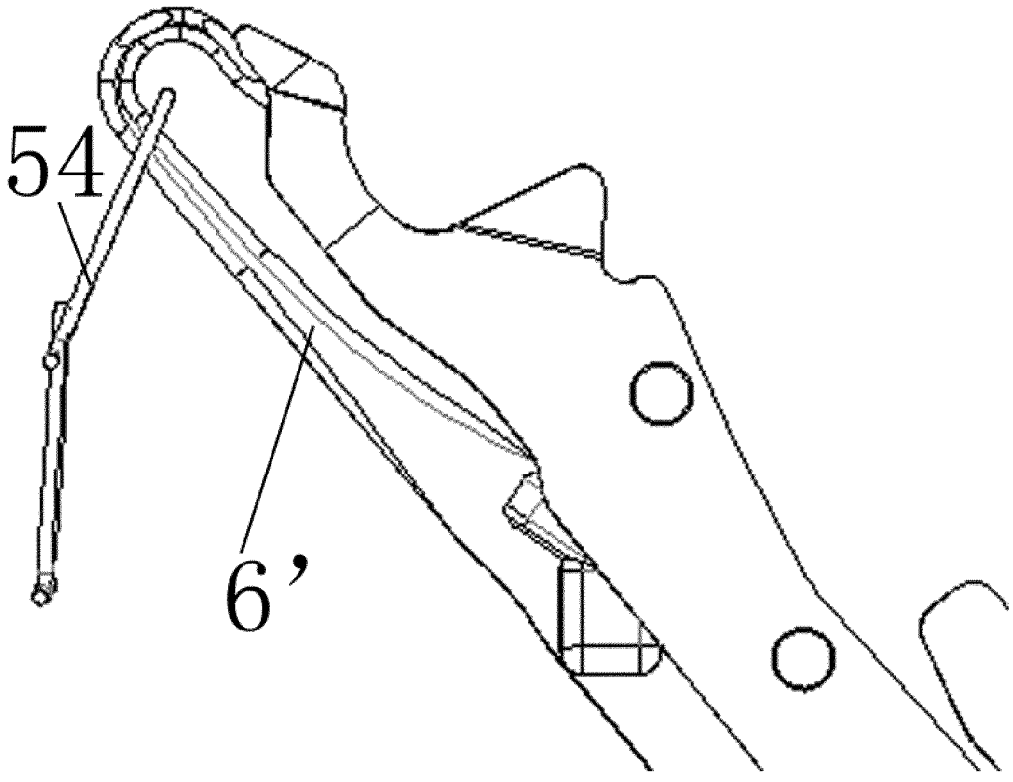

Fig. 14

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 15 1077

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2002/112509 A1 (BASEGGIO MARCELLO [CH] ET AL) 22 August 2002 (2002-08-22) * paragraph [0018] - paragraph [0023]; figures 1-11 *	1	INV. D04B35/06
A	GB 2 112 819 A (SCHIEBER UNIVERSAL MASCHF) 27 July 1983 (1983-07-27) * page 1, line 80 - line 89; claims 5,6 *	1	
A	US 5 987 932 A (BASEGGIO MARCELLO [CH] ET AL) 23 November 1999 (1999-11-23) * column 3, lines 6-23; figures 3,4 *	1	
A	EP 1 203 838 A1 (SHIMA SEIKI MFG [JP]) 8 May 2002 (2002-05-08) * paragraphs [0014], [0015]; figure 1 *	1	
			TECHNICAL FIELDS SEARCHED (IPC) D04B B21G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 April 2014	Kirner, Katharina

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 14 15 1077

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.

01-04-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002112509 A1	22-08-2002	AT 310844 T	15-12-2005
		BR 0200461 A	29-10-2002
		CN 1372028 A	02-10-2002
		DE 60207454 D1	29-12-2005
		DE 60207454 T2	20-07-2006
		EP 1233093 A1	21-08-2002
		ES 2252417 T3	16-05-2006
		FR 2821093 A1	23-08-2002
		HK 1049030 A1	04-05-2007
		JP 4121286 B2	23-07-2008
		JP 2002294541 A	09-10-2002
		KR 20020068278 A	27-08-2002
		TW 553231 U	11-09-2003
		US 2002112509 A1	22-08-2002
GB 2112819 A	27-07-1983	DE 3151150 A1	14-07-1983
		ES 277173 U	01-01-1986
		FR 2518593 A1	24-06-1983
		GB 2112819 A	27-07-1983
		IT 1153875 B	21-01-1987
		JP S6028946 B2	08-07-1985
		JP S58109663 A	30-06-1983
		SU 1217263 A3	07-03-1986
		US 4448045 A	15-05-1984
US 5987932 A	23-11-1999	NONE	
EP 1203838 A1	08-05-2002	CN 1351684 A	29-05-2002
		DE 60018760 D1	21-04-2005
		DE 60018760 T2	08-09-2005
		EP 1203838 A1	08-05-2002
		JP 3538730 B2	14-06-2004
		JP 2000328409 A	28-11-2000
		US 6389848 B1	21-05-2002
		WO 0071796 A1	30-11-2000

EPO FORM P0459

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