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

(11) EP 3 719 190 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.10.2020 Bulletin 2020/41

(51) Int Cl.:
D04B 9/12 *(2006.01)* ***D04B 35/04*** *(2006.01)*

(21) Application number: **19167540.4**

(22) Date of filing: **05.04.2019**

(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: **Pai Lung Machinery Mill Co., Ltd.**
New Taipei City (TW)

(72) Inventor: **YU, Jen-Wei**
New Taipei City (TW)

(74) Representative: **2K Patentanwälte Blasberg Kewitz & Reichel Partnerschaft mbB**
Schumannstrasse 27
60325 Frankfurt am Main (DE)

(54) CIRCULAR KNITTING MACHINE KNITTING STRUCTURE FOR KNITTING A DOUBLE-SIDED CLOTH OF CUT-PILE FABRIC

(57) A circular knitting machine knitting structure for knitting a double-sided cloth (60) of cut-pile fabric is provided, disposed at a gap (11) of a circular knitting machine (100) and including a first knitting group (20) provided with a plurality of knitting latch needles (21), and a second knitting group (30) including a plurality of intarsia sinkers (31, 32), two intarsia hooks (34, 35) disposed between any two intarsia sinkers (31, 32), and a shearing latch needle (36) disposed between the two intarsia bearded needles (34, 35). The shearing bearded needle (36) includes a first yarn hooking section (362) facing the gap (11) and comprises a second needle latch (361), a yarn cutting section extending from the first yarn hooking section (362) to form a cutter, and a first control section (366) extending from the yarn cutting section to form at least one first butt (365). Through the foregoing knitting structure, the double-sided cloth (60) with the cut-pile fabric on one side is knitted by the circular knitting machine (100).

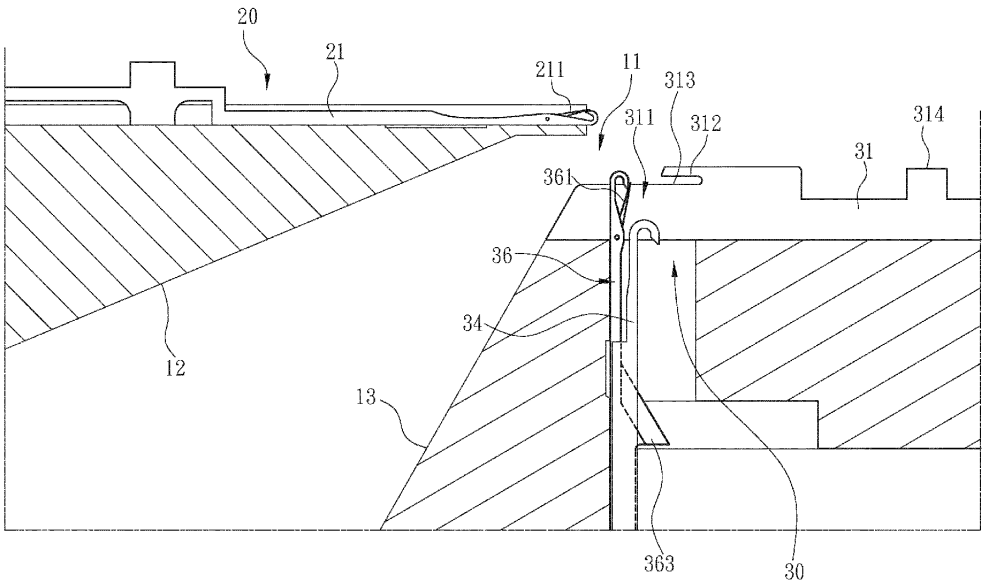

Fig. 3

EP 3 719 190 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a circular knitting machine knitting structure, and in particular, to a circular knitting machine knitting structure for knitting a double-sided cloth comprising a cut-pile fabric is on one side.

BACKGROUND OF THE INVENTION

[0002] Currently, patents related to a circular knitting machine with knitting cloth comprising a cut-pile fabric are disclosed in US Patent No. 4,592,212, US Patent No. 4,409,800, US Patent No. 9,890,486 and GB Patent No. 988,865, however, the knitted cloth from the foregoing patents are single side only, so if the manufacturer wants to increase the richness, heat preservation property or textural diversity of the cloth, it needs to bond another single-sided cloth to meet demands.

SUMMARY OF THE INVENTION

[0003] The main objective of the present invention is to solve the problem that a double-sided cloth having a cut-pile fabric cannot be knitted at one time and needs extra processing.

[0004] The secondary objective of the present invention is to make the double-sided cloth having the cut-pile fabric bond without glue, so as to avoid the harm of glue residues to human health.

[0005] In order to achieve the foregoing objectives, the present invention provides a circular knitting machine knitting structure for knitting a double-sided cloth comprising a cut-pile fabric. The knitting structure is disposed corresponding to a gap of a circular knitting machine, and includes a first knitting group and a second knitting group. The first knitting group includes a plurality of knitting bearded needles disposed in a spacing manner. Each of the plurality of knitting bearded needles is provided with a first needle latch and comprises a first knitting stroke displacing towards the gap. The second knitting group includes a plurality of intarsia sinkers, two intarsia bearded needles disposed between any two intarsia sinkers adjacent to thereof, and a shearing bearded needle disposed between the two intarsia bearded needles. The shearing bearded needle includes a first yarn hooking section facing the gap and comprises a second needle latch, a yarn trimming section extending from the first yarn hooking section to form a trimmer, and a first control section extending from the yarn trimming section to form at least one first butt. The trimmer faces the gap. Each of the intarsia bearded needles comprises a yarn hooking stroke for pulling a yarn to displace towards one of the plurality of intarsia sinkers. Each of the plurality of intarsia sinkers comprises a yarn pushing stroke for allowing the yarn hung thereon to be fed into the shearing bearded needle. The shearing bearded needle has a second knitting stroke displacing towards the gap to pull the yarn via the first yarn hooking section, and a yarn trimming stroke displacing towards the gap to cut the yarn hooked by one of the intarsia bearded needles via the trimmer.

[0006] In one embodiment, each of the intarsia bearded needles comprises a second yarn hooking section facing the gap, a connecting section extending from the second yarn hooking section and a second control section extending from the connecting section to form at least one second butt. The second yarn hooking section and the first yarn hooking section are located on different extending lines.

[0007] In one embodiment, each of the plurality of intarsia sinkers comprises a yarn hanging part staggered with the yarn hooking stroke and a throat part connected to the yarn hanging part and guiding the yarn to be fed into the shearing bearded needle in the yarn pushing stroke.

[0008] In one embodiment, the yarn pushing stroke is parallel to the first knitting stroke.

[0009] Compared with the prior art, the foregoing embodiments of the present invention have the following characteristics. The circular knitting machine knitting structure of the present invention allows one side of the double-sided cloth knitted by the circular knitting machine to have the cut-pile fabric. Therefore, the present invention changes existing implementation solutions and omits extra bonding procedures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a structural schematic diagram of a circular knitting machine according to an embodiment of the present invention.

Fig. 2 is a partially structural schematic diagram of a circular knitting machine according to an embodiment of the present invention.

Fig. 3 is a partially structural sectional schematic diagram of a circular knitting machine according to an embodiment of the present invention.

Fig. 4 is a top view of a second knitting group arranged on a work drum according to an embodiment of the present invention.

Fig. 5 is a structural schematic diagram of a second knitting group according to an embodiment of the present invention.

Fig. 6 is an action diagram of knitting bearded needles and intarsia sinkers according to an embodiment of the present invention.

Fig. 7 is a schematic diagram of a yarn hooking stroke of an intarsia bearded needle according to an embodiment of the present invention.

Fig. 8 is a schematic diagram of a yarn pushing stroke of an intarsia sinker according to an embodiment of the present invention.

Fig. 9 is a schematic diagram of a yarn trimming

stroke of a shearing bearded needle according to an embodiment of the present invention.

Fig. 10 is a schematic diagram of interweaving of knitting bearded needles and a shearing bearded needle according to an embodiment of the present invention.

Fig. 11 is a structural schematic diagram of double-sided cloth according to an embodiment of the present invention.

Fig. 12 is a schematic diagram of a knitting order of the double-sided cloth according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] In order to specifically distinguish each component, components of same names are distinguished by first, second and the like in the present invention, but these are not intended to limit the order. The detailed description and technical content of the present invention are described below with reference to the accompanying drawings.

[0012] Referring to Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, the present invention provides a circular knitting machine knitting structure for knitting a double-sided cloth comprising a cut-pile fabric. The circular knitting machine knitting structure is disposed corresponding to a gap 11 of a circular knitting machine 100. The gap 11 is defined by a dial 12 and a work drum 13 of the circular knitting machine 100, and the gap 11 is a place where a fabric is knitted and formed by the circular knitting machine 100. The circular knitting machine knitting structure mainly includes a first knitting group 20 and a second knitting group 30. Further, the first knitting group 20 is able to be disposed on the dial 12 and includes a plurality of knitting bearded needles 21 disposed in a spacing manner with same forms. Each of the plurality of knitting bearded needles 21 is provided with a first needle latch 211. The plurality of knitting bearded needles 21 are respectively driven by a needle cam (not shown in the figures) to action independently. That is, each of the plurality of knitting bearded needles 21 comprises a first knitting stroke 40 displacing towards the gap 11, as shown in Fig. 6.

[0013] On the other aspect, referring to Fig. 4, the second knitting group 30 is able to be disposed on the work drum 13 and includes a plurality of intarsia sinkers 31 and 32 disposed in a spacing manner, two intarsia bearded needles 34 and 35 disposed between any two intarsia sinkers 31 and 32 adjacent to thereof, and a shearing bearded needle 36 disposed between the two intarsia bearded needles 34 and 35. Referring to Figs. 3 and 5, the shearing bearded needle 36 of the present invention includes a first yarn hooking section 362 facing the gap 11 and comprising a second needle latch 361, a yarn trimming section 364 extending from the first yarn hooking section 362 to form a trimmer 363, and a first control section 366 extending from the yarn trimming section 364 to form at least one first butt 365. Further, the trimmer 363 faces the gap 11. The trimmer 363 of the present invention and the second needle latch 361 are not closely disposed, but are disposed in a spacing manner, so that the shearing bearded needle 36 also comprises a knitting action in addition to a shearing function. The first butt 365 of the shearing bearded needle 36 is pushed by a control cam (not shown in the figures) to displace towards the gap 11. Further, the shearing bearded needle 36 comprises a second knitting stroke 41 (as shown in Fig. 7) displacing towards the gap 11 to pull a yarn via the first yarn hooking section 362, and a yarn trimming stroke 42 (as shown in Fig. 9) displacing towards the gap 11 to cut the yarn hooked by one of the intarsia bearded needles 34 (35) via the trimmer 363. Further, the shearing bearded needle 36 carries out the second knitting stroke 41 or the yarn trimming stroke 42 based on a displaced degree that pushed by the control cam.

[0014] Referring to Fig. 5, each of the intarsia bearded needles 34 (35) of the prevent invention comprises a second yarn hooking section 341 (351) facing the gap 11, a connecting section 342 (352) extending from the second yarn hooking section 341 (351) and a second control section 344 (354) extending from the connecting section 342 (352) to form at least one second butt 343 (353). In one embodiment, the second yarn hooking section 341 (351) of each of the intarsia bearded needles 34 (35) and the first yarn hooking section 362 are located on different extending lines. Referring to Fig. 7, the intarsia bearded needles 34 (35) of the present invention are pushed by the control cam to displace towards the gap 11. Further, each of the intarsia bearded needles 34 (35) comprises a yarn hooking stroke 43 for pulling the yarn to displace towards one of the intarsia sinkers 31 (32).

[0015] According to the above, the arrangement direction of each of the plurality of intarsia sinkers 31 (32) is staggered with the arrangement directions of the two intarsia bearded needles 34 and 35 as well as the shearing bearded needle 36, as shown in Fig. 3. Referring to Figs. 5 and 7, each of the plurality of intarsia sinkers 31 (32) comprises a yarn hanging part 311 (321) staggered with the yarn hooking stroke 43 and a throat part 312 (322) connected to the yarn hanging part 311 (321). Referring to Figs. 5, 7, and 8, each of the plurality of yarn hanging parts 311 (321) is able to be formed by a plane 313 (323) on each of the plurality of intarsia sinkers 31 (32). When each of the plurality of intarsia sinkers 31 (32) is not pushed by a sinker cam (not shown in the figure), each of the plurality of intarsia sinkers 31 (32) allows the yarn hooked by each of the intarsia bearded needles 34 (35) in the yarn hooking stroke 43 to be hung on each of the plurality of yarn hanging parts 311 (321). Further, each of the plurality of intarsia sinkers 31 (32) comprises a control butt 314 (324). Each control butt 314 (324) is pushed by the sinker cam, so as to allow each of the plurality of intarsia sinkers 31 (32) to comprise a yarn pushing stroke 44 for hanging the yarn thereon to be fed into the shearing bearded needle 36. Further, in the proc-

ess of the yarn pushing stroke 44, the throat part 312 (322) of each the plurality of intarsia sinkers 31 (32) pushes the yarn hung on one of the plurality of intarsia sinkers 31 (32) to displace towards the shearing bearded needle 36, so that the yarn pushed by the throat part 312 (322) of each of the plurality of intarsia sinkers 31 (32) is fed into the shearing bearded needle 36. In addition, the yarn pushing stroke 44 is parallel to the first knitting stroke 40.

[0016] According to the above, the circular knitting machine knitting structure of the present invention achieves the circular knitting machine 100 knitting a double-sided cloth 60 wherein comprise a cut-pile fabric is on one side. The double-sided cloth 60 is shown as Fig. 11, which comprises a first cloth layer 61, a second cloth layer 62, a middle layer 63 for connecting the first cloth layer 61 with the second cloth layer 62, and a pile layer 64 arranged on the second cloth layer 62. A knitting process is described below, and a knitting order is shown as Fig. 12. At the beginning of knitting, the plurality of knitting bearded needles 21 on the first knitting group 20 knit the first cloth layer 61, and patterns of the first cloth layer 61 is properly adjusted according to an implemented demand. Then, two different yarns 70 and 71 are respectively fed into one of the intarsia bearded needles 34 and the shearing bearded needle 36. One of the intarsia bearded needles 34 operates the yarn hooking stroke 43 to allow one of the yarns 71 fed into one of the intarsia bearded needles 34 to be hung on one of the intarsia sinkers 31. After that, one of the intarsia sinkers 31 operates the yarn pushing stroke 44 to allow one of the yarns 71 hung on one of the intarsia sinkers 31 to be fed into the shearing bearded needle 36. When one of the intarsia bearded needles 34 operates the yarn hooking stroke 43, the shearing bearded needle 36 is controlled to operate the second knitting stroke 41, wherein one of the yarns 70 is fed into the shearing bearded needle 36 by a yarn carrier (not shown in the figures), and the another one of yarns 71 is also fed into the shearing bearded needle 36 by the intarsia sinkers 31, so as to knit the second cloth layer 62. However, one of the yarns 71 hooked by one of the intarsia bearded needles 34 is knitted into a loop when fed into the shearing bearded needle 36. Then, the shearing bearded needle 36 is controlled to operate the yarn trimming stroke 42, that is, the displaced degree of the shearing bearded needle 36 equals the trimmer 363 being able to trim one of the yarns 71 hooked by one of the intarsia bearded needles 34, that is, the cut-pile fabric is formed by trimming loops which are formed by one of the yarns 71. The pile layer 64 is formed at the place where the cut-pile fabric is located. Finally, a yarn 72 is fed into the plurality of knitting bearded needles 21 and the shearing bearded needle 36, wherein the plurality of knitting bearded needles 21 and the shearing bearded needle 36 are allowed to interweave with the first cloth layer 61 and the second cloth layer in a half or full stitching manner, as shown in Fig. 10. After that, the yarn 72 forms the middle layer 63, and the double-sided cloth 60 of the present invention is completed. Therefore, the manufacturing cost and the manufacturing time of the double-sided cloth 60 may be reduced.

[0017] The foregoing needle cam, control cam and sinker cam of the present invention are conventional structures on the circular knitting machine 100. Those of ordinary skill in the art can learn about the uses of the cams according to their names, so no more details will be described herein.

Claims

1. A circular knitting machine knitting structure for knitting a double-sided cloth (60) comprising a cut-pile fabric, disposed corresponding to a gap (11) of a circular knitting machine (100), and comprising:

   a first knitting group (20), comprising a plurality of knitting bearded needles (21) disposed in a spacing manner, each of the plurality of knitting bearded needles (21) being provided with a first needle latch (211), and each of the plurality of knitting bearded needles (21) comprise a first knitting stroke (40) displacing towards the gap (11); and

   a second knitting group (30), comprising a plurality of intarsia sinkers (31, 32), two intarsia bearded needles (34, 35) disposed between any two intarsia sinkers (31, 32) adjacent to thereof, and a shearing bearded needle (36) disposed between the two intarsia bearded needles (34, 35), the shearing bearded needle (36) including a first yarn hooking section (362) facing the gap (11) and comprising a second needle latch (361), a yarn trimming section (364) extending from the first yarn hooking section (362) to form a trimmer (363), and a first control section (366) extending from the yarn trimming section (364) to form at least one first butt (365), wherein the trimmer (363) faces the gap (11), each of the intarsia bearded needles (34, 35) comprises a yarn hooking stroke (43) for pulling a yarn to displace towards one of the plurality of intarsia sinkers (31, 32); each of the plurality of intarsia sinkers (31, 32) comprises a yarn pushing stroke (44) for allowing the yarn hung thereon to be fed into the shearing bearded needle (36); and the shearing bearded needle (36) comprises a second knitting stroke (41) displacing towards the gap (11) to pull the yarn via the first yarn hooking section (362), and a yarn trimming stroke (42) displacing towards the gap (11) to cut the yarn hooked by one of the intarsia bearded needles (34, 35) via the trimmer (363).

2. The circular knitting machine knitting structure of claim 1, wherein each of the intarsia bearded nee-

dles (34, 35) comprises a second yarn hooking section (341, 351) facing the gap (11), a connecting section (342, 352) extending from the second yarn hooking section (341, 351) and a second control section (344, 354) extending from the connecting section (342, 352) to form at least one second butt (343, 353), and the second yarn hooking section (341, 351) of each of the intarsia bearded needles (34, 35) and the first yarn hooking section (362) are located on different extending lines.

3. The circular knitting machine knitting structure of claims 1 or 2, wherein each of the plurality of intarsia sinkers (31, 32) comprises a yarn hanging part (311, 321) staggered with the yarn hooking stroke (43) and a throat part (312, 322) connected to the yarn hanging part (311, 321) and guiding the yarn to be fed into the shearing bearded needle (36) in the yarn pushing stroke (44).

4. The circular knitting machine knitting structure of claim 3, wherein the yarn pushing stroke (44) is parallel to the first knitting stroke (40).

5. The circular knitting machine knitting structure of claim 1 or 2, wherein the yarn pushing stroke (44) is parallel to the first knitting stroke (40).

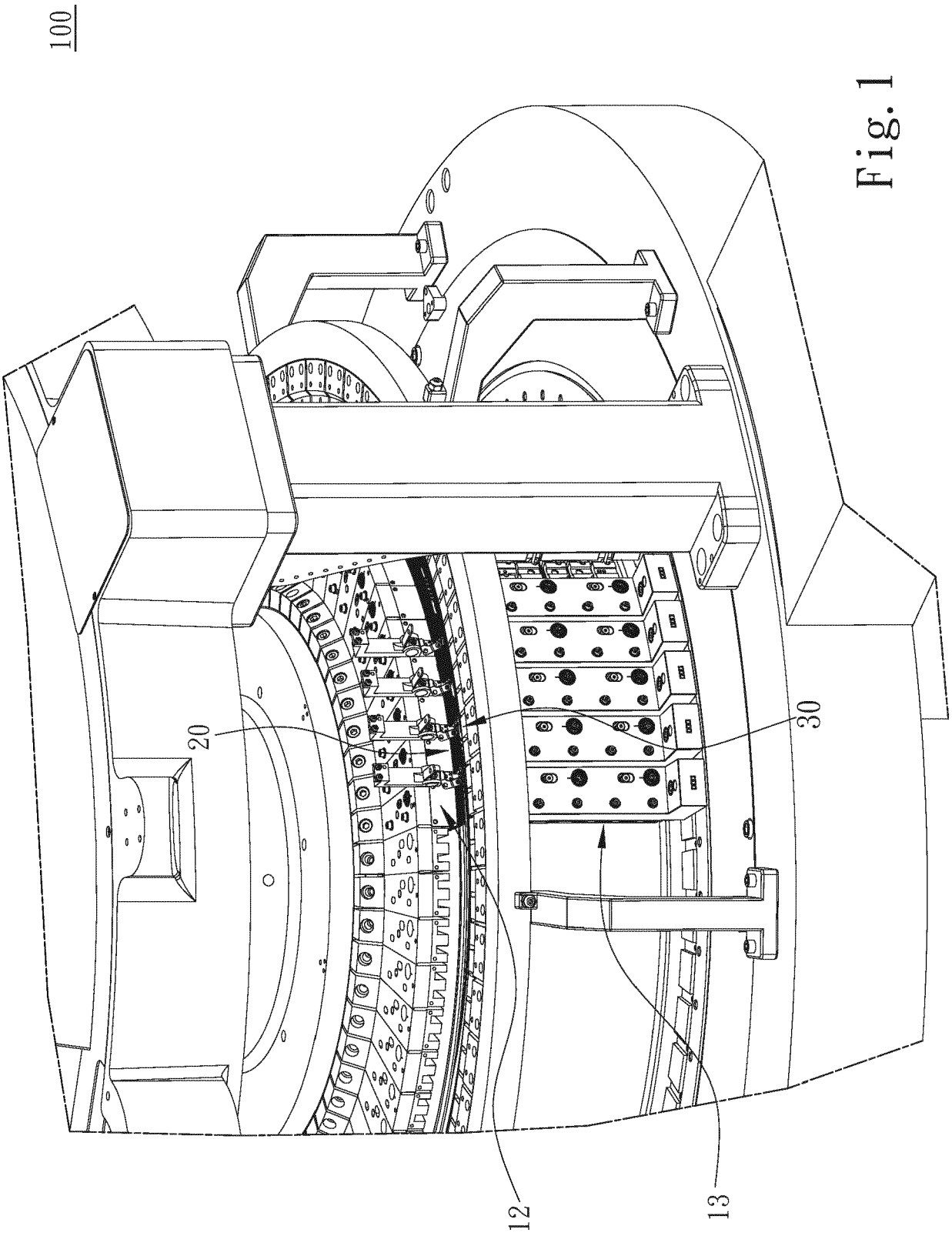

Fig. 1

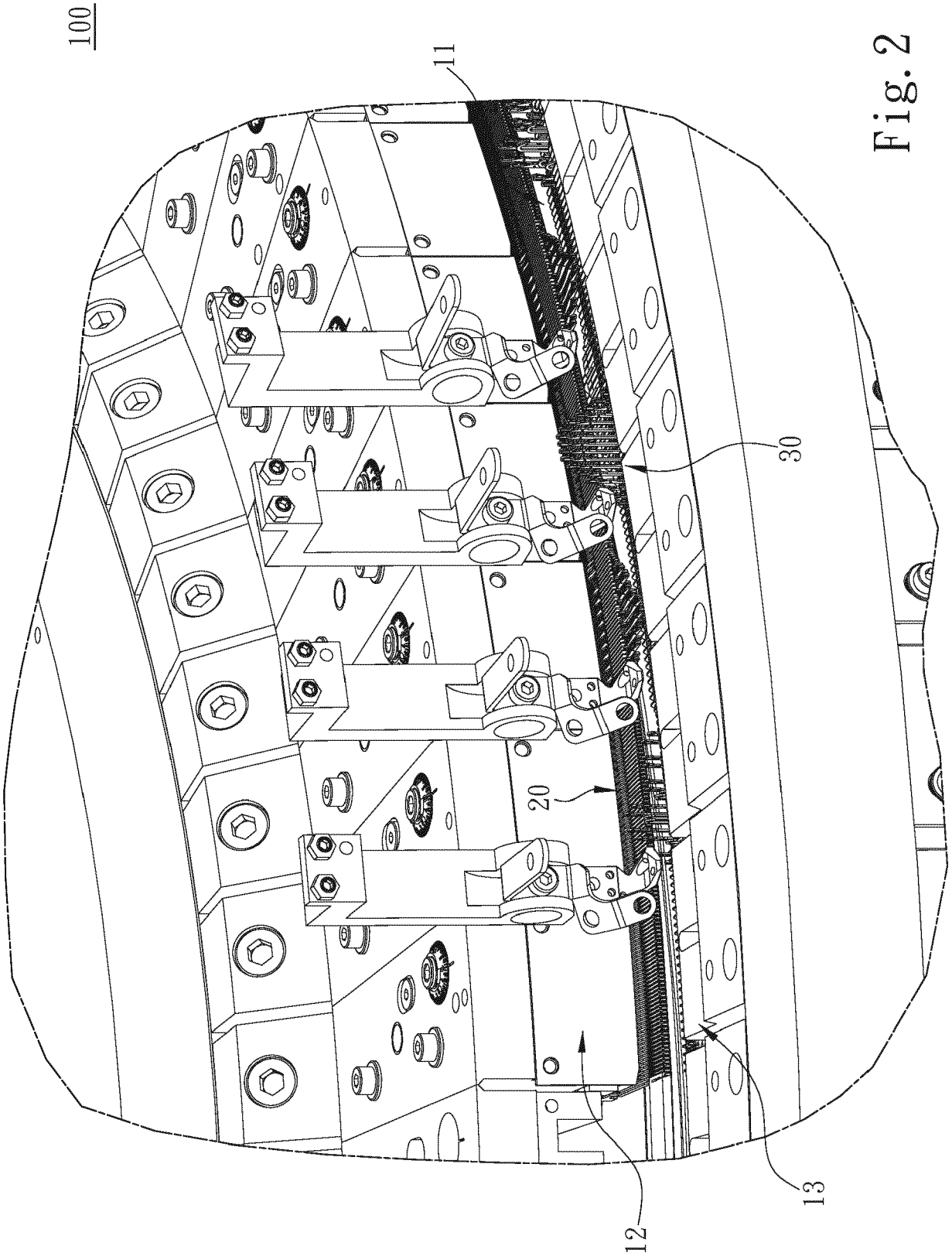

Fig. 2

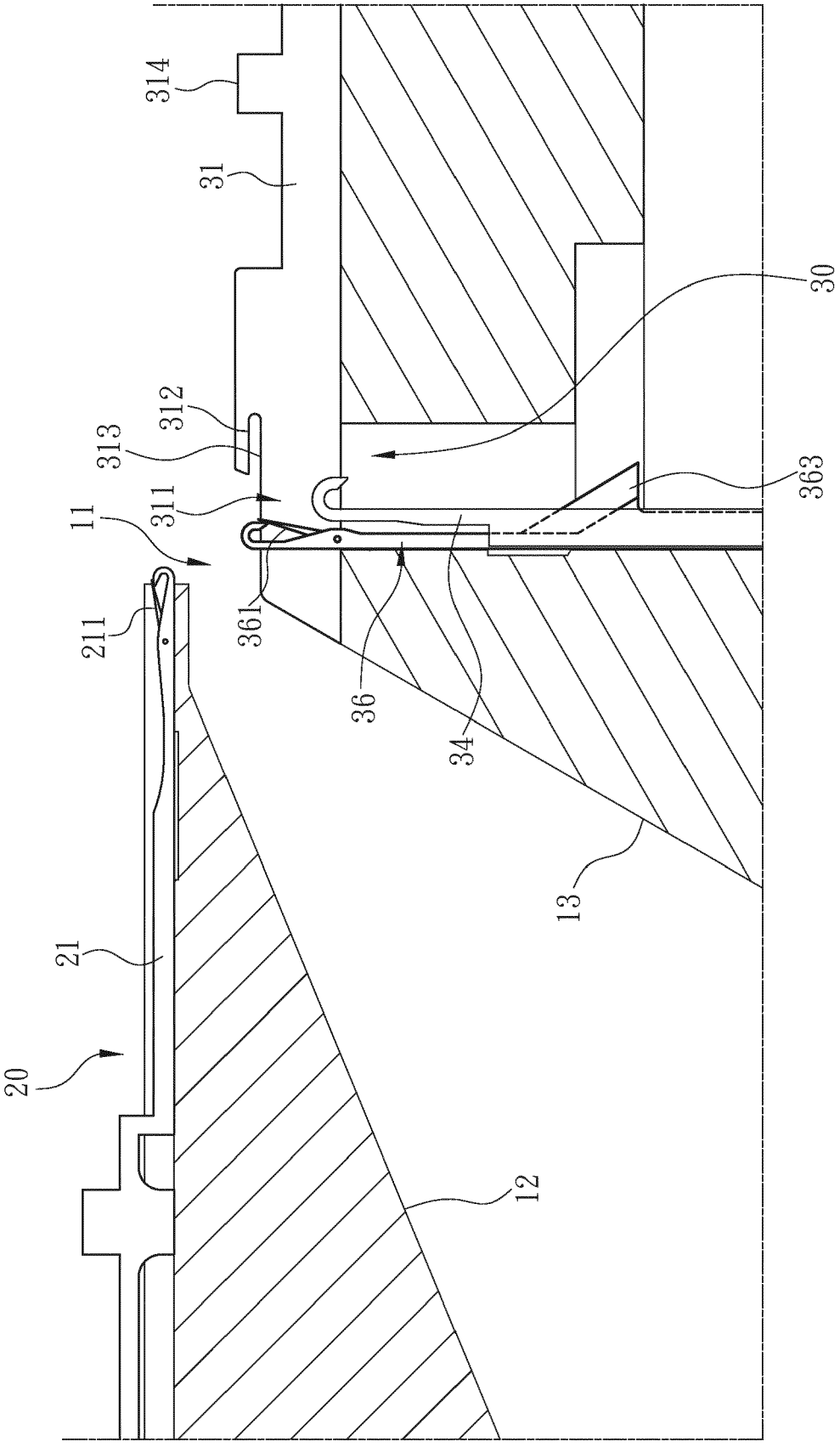

Fig. 3

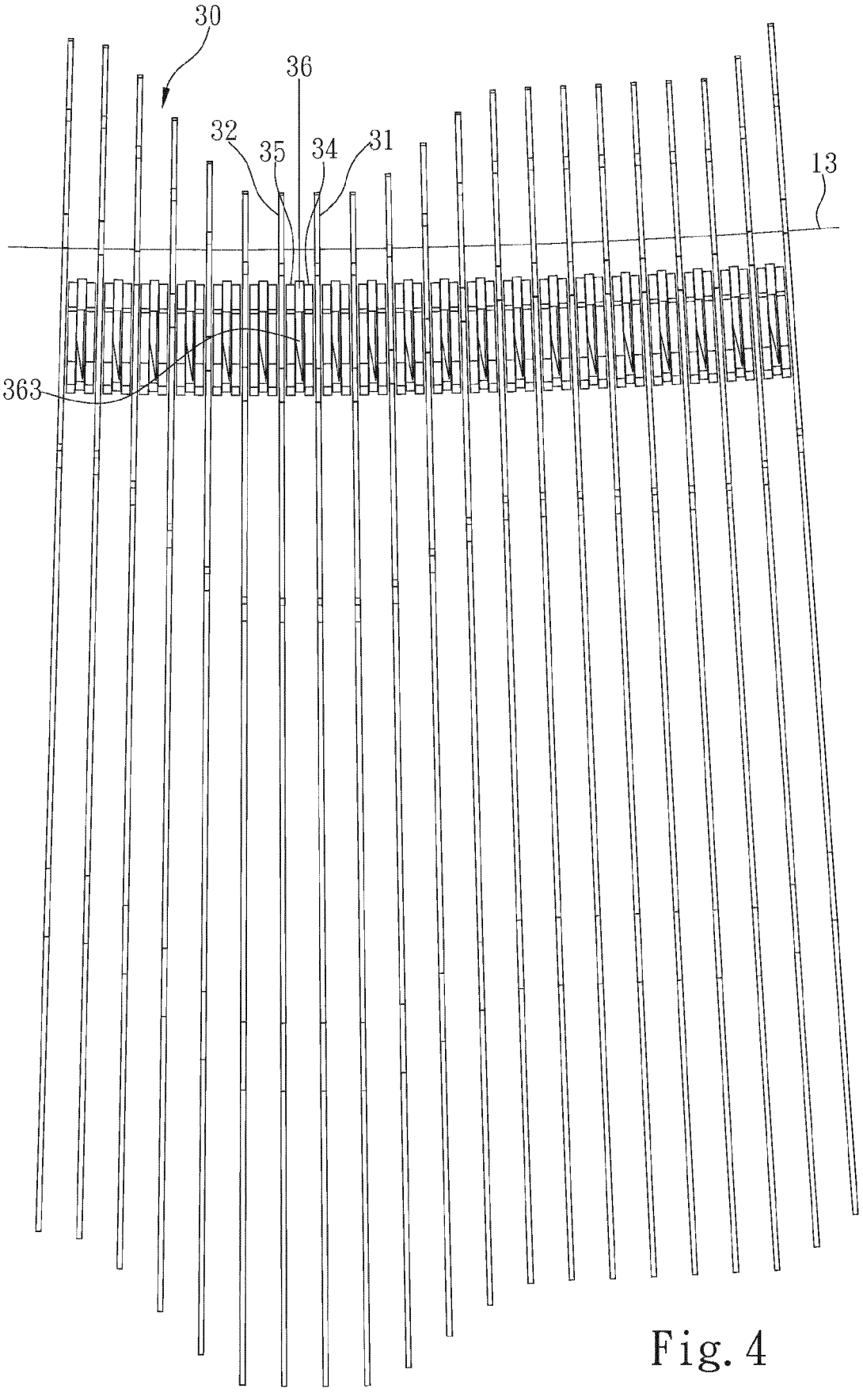

Fig. 4

Fig. 5

35
34
354
344
353
36
343
365
352
366
342
324
321
32
363
364
341
351
322
323
311
362
31
314
361
312
313

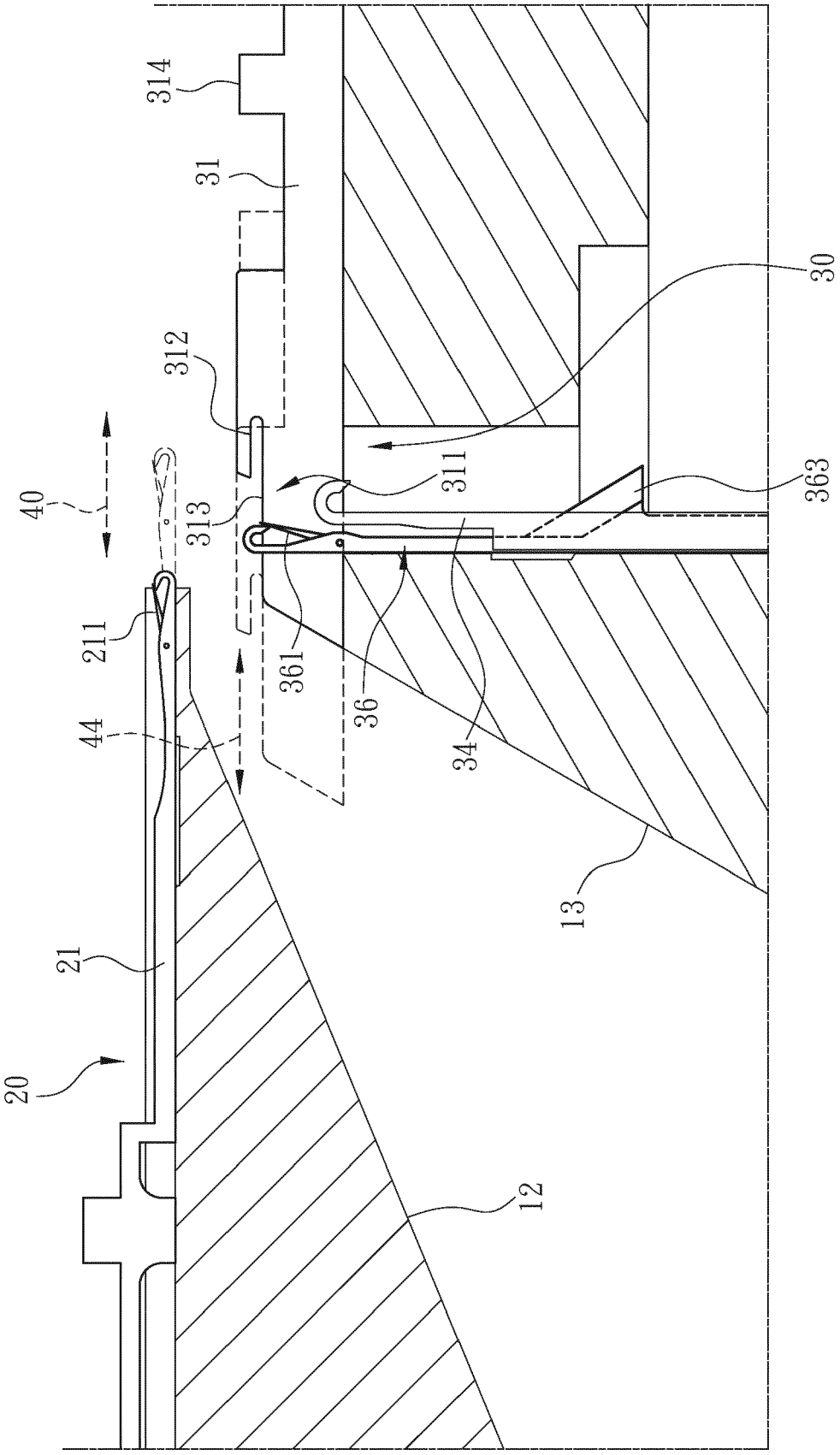

Fig. 6

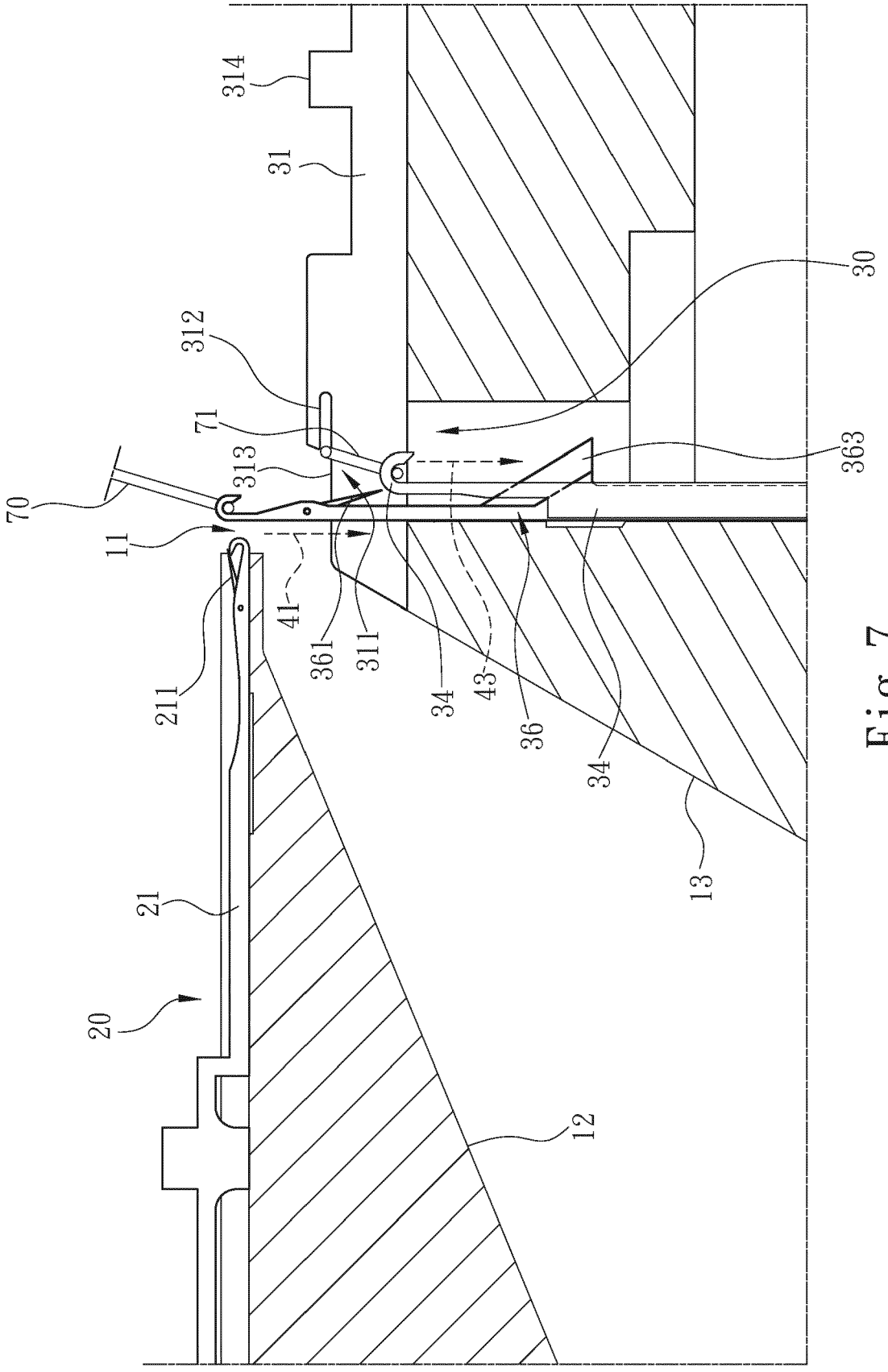

Fig. 7

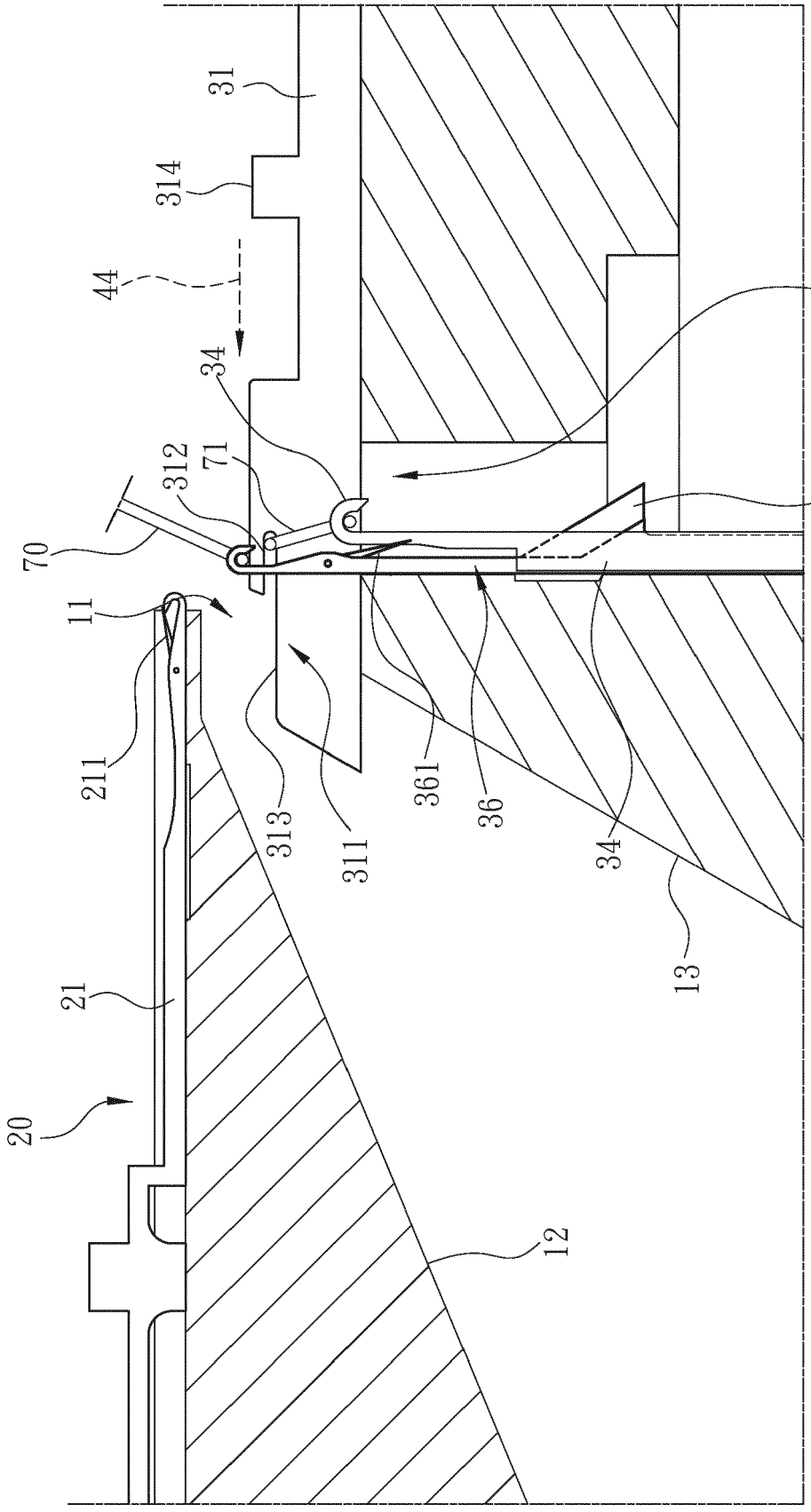

Fig. 8

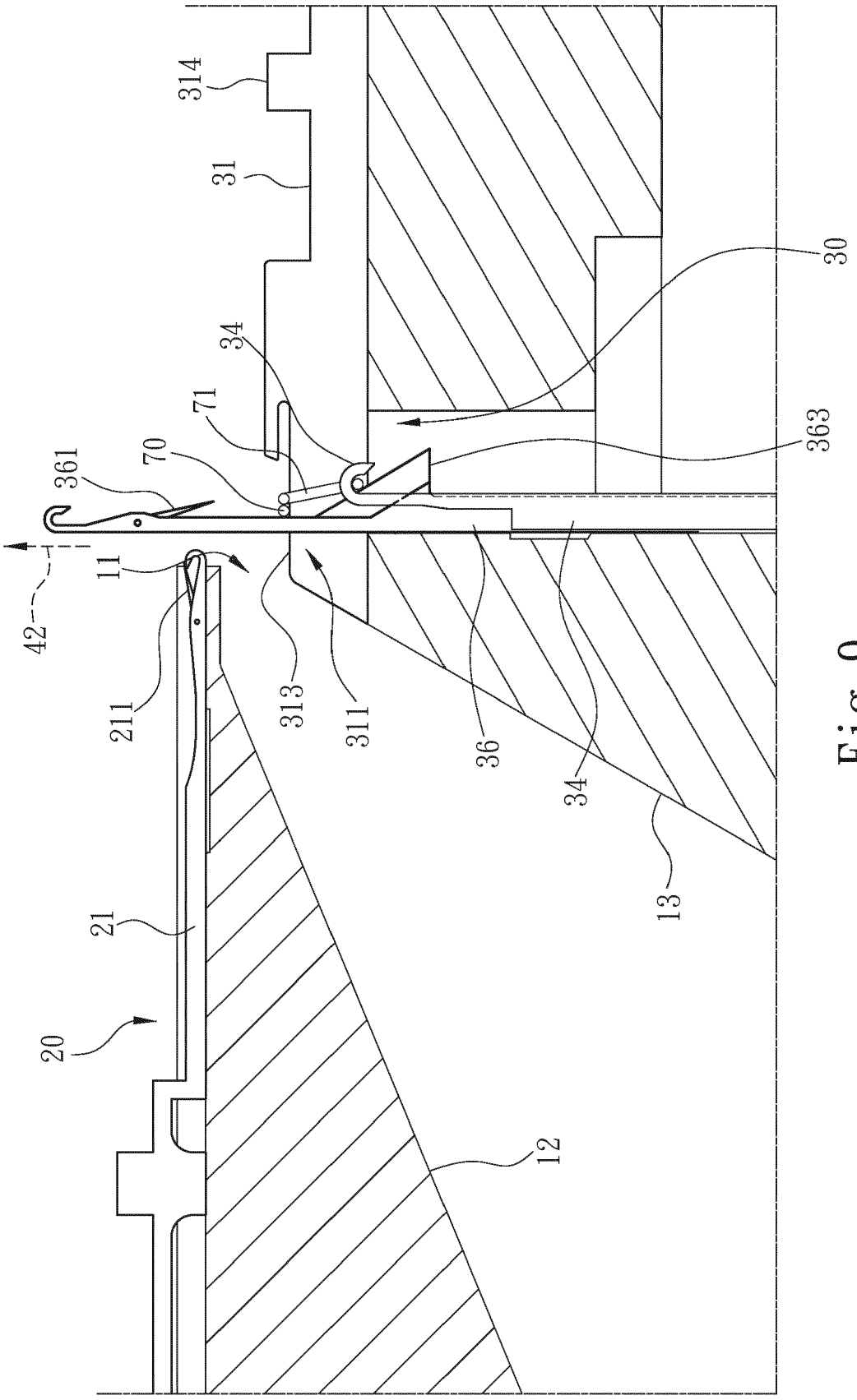

Fig. 9

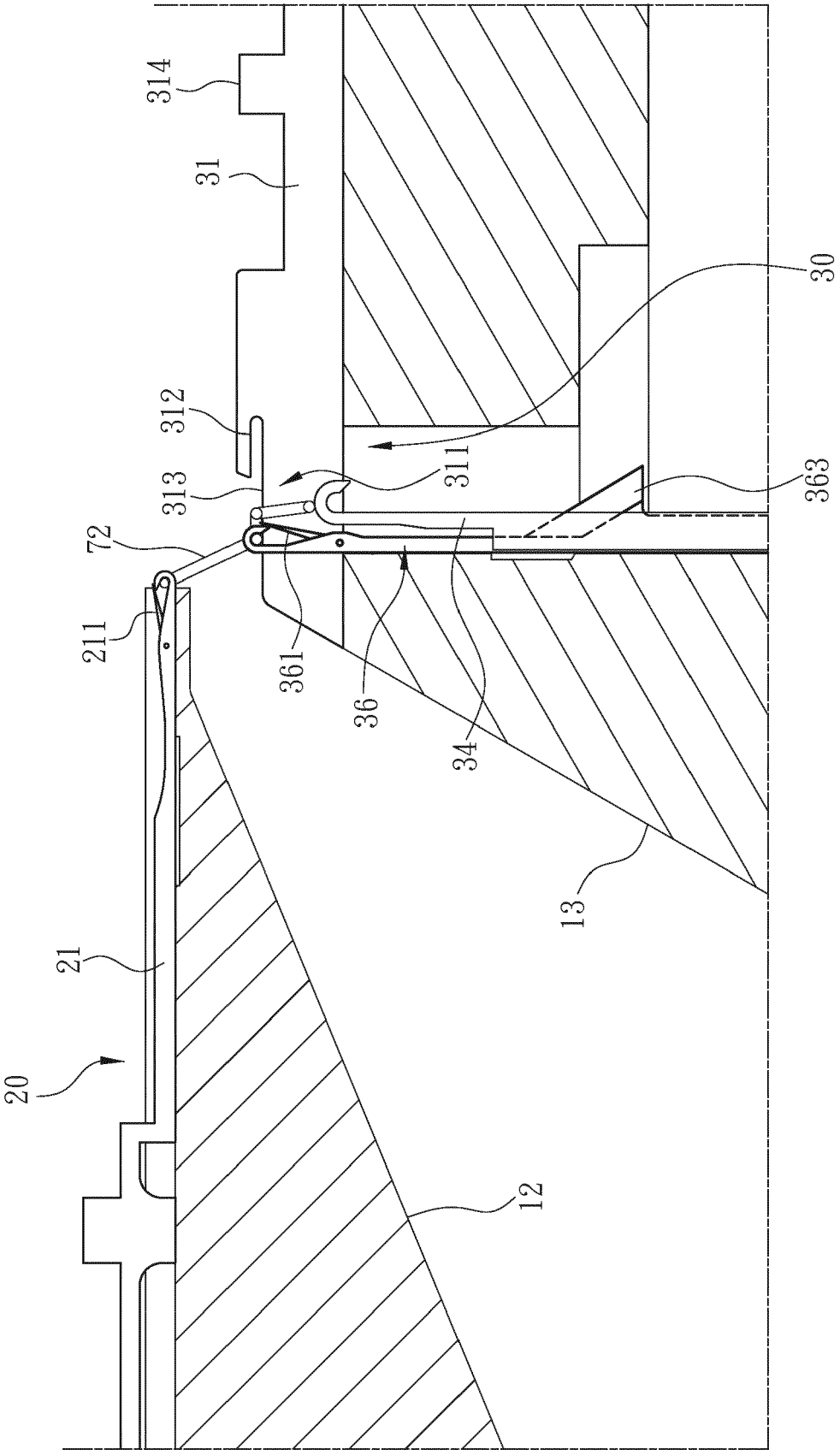

Fig. 10

Fig. 11

Fig. 12

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 16 7540

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	WO 2015/163587 A1 (SONG YOU CHUL [KR]) 29 October 2015 (2015-10-29) * figures 7-16 * * paragraphs [0004], [0036], [0042], [0047], [0057] *	1-5	INV. D04B9/12 D04B35/04
A	GB 2 062 696 A (NISHIKI KEORI KK; WOOL DEV INT) 28 May 1981 (1981-05-28) * page 2 - lines 110-115; figure 5 *	1-5	
A	GB 1 124 858 A (BUCK ROBERT) 21 August 1968 (1968-08-21) * page 1 - lines 15-58 *	1-5	

TECHNICAL FIELDS SEARCHED (IPC)

D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 July 2019	Messai, Sonia

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 19 16 7540

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.

16-07-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015163587 A1	29-10-2015	KR 101457067 B1	31-10-2014
		WO 2015163587 A1	29-10-2015
GB 2062696 A	28-05-1981	DE 3042335 A1	21-05-1981
		GB 2062696 A	28-05-1981
		JP S5673146 A	17-06-1981
GB 1124858 A	21-08-1968	CH 455127 A	30-04-1968
		ES 334798 A1	16-11-1967
		FR 1506000 A	15-12-1967
		GB 1124858 A	21-08-1968
		US 3426551 A	11-02-1969
		US 3550401 A	29-12-1970

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4592212 A **[0002]**
- US 4409800 A **[0002]**
- US 9890486 B **[0002]**
- GB 988865 A **[0002]**