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Taipei Hsien (TW)Remarks:

Amended claims in accordance with Rule 86 (2) EPC.

(54) **Knitting machine for manufacturing plush fabrics**

(57) A knitting machine for manufacturing plush fabrics includes latch-less cylinder needles (11) in a cylinder (10), latch needles (21) located on a needle dial (20) and a cutting unit (30). The loop (41) formed by a plush thread (40) can be directly knitted in a fabric formed by ground threads (50) to form a longer plush on the fabric surface. By changing the dimension of the needle dial (20), the

interval of the peripheral edge of the needle dial (20) and the cylinder needle (11) can be increased so that the plush thread (40) held on the hook (112) of the cylinder needle (11) can be stretched by the latch needle (21) to become a longer loop. Finally, the loop (41) is severed by the cutting unit (30) to form a plush fabric of a longer plush.

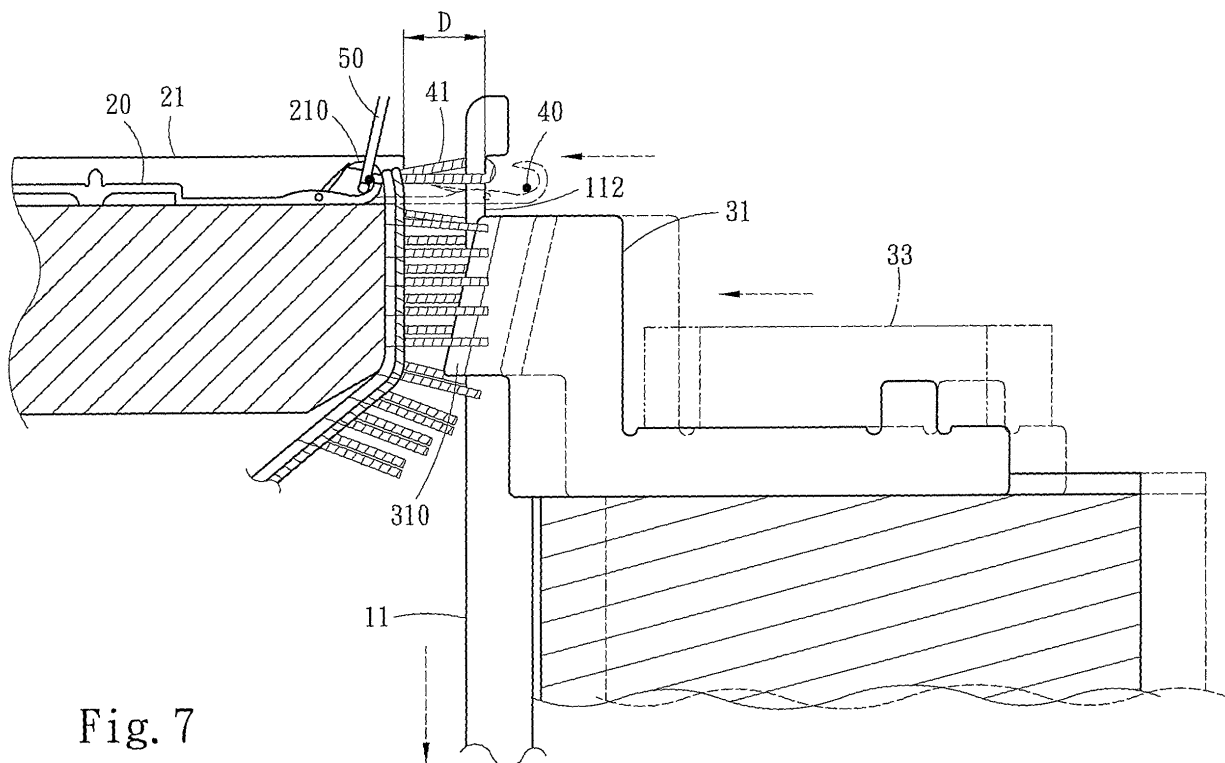


Fig. 7

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a circular knitting machine and particularly to a knitting machine for manufacturing plush fabrics with a longer plush.

BACKGROUND OF THE INVENTION

[0002] Plush fabrics are generally produced by knitting machines, also called artificial wool knitting machines. The techniques of using circular knitting machines to produce plush fabrics are known in the art. For instance, U.S. patent No. 6,735,987 has latch needles located in a cylinder and a plurality of sinkers located horizontally on a needle dial that interact with each other to hold a plush thread on the front edge of the sinkers to form a longer loop.

[0003] U.S. patent Nos. 6,128,930, 6,094,944 and 5,463,882 basically include latch-less cylinder needles located in a cylinder, latch needles located on a needle dial and a cutting unit that interact to produce plush fabrics. The loop is formed on the hook of the latch-less cylinder needle, and is severed by two sinkers that have a blade on the front side and slide on two sides of the cylinder needle to form the plush.

[0004] In the patents 6,128,930 and 5,463,882, the length of the plush is determined by the interval of the hook of the cylinder needle and the edge of the needle dial. In general, the plush fabrics produced by such techniques have plush length about 3mm. To make toys and puppets with the artificial furs or pelts, the plush length of 3mm cannot create a real-like appealing. To increase the plush length, the interval of the hook of the cylinder needle and needle dial edge must be greater. This may be accomplished by increasing the diameter of the cylinder. Then the sinker ring to hold the blade on the periphery of the cylinder also must have a greater diameter. As a result, the relative position and the dimensions of the blades and cylinder needles have to be changed. It will result in a greater gap between the blade and the cylinder needle and make severing of the loop difficult or impossible.

SUMMARY OF THE INVENTION

[0005] Therefore the primary object of the present invention is to provide a knitting machine for manufacturing plush fabrics, and especially a plush knitting machine for producing plush at a length up to 12mm.

[0006] According an embodiment of the invention, the plush knitting machine includes latch-less cylinder needles located in a cylinder, latch needles located horizontally on a needle dial and a cutting unit. The interval of the peripheral edge of the needle dial and the cylinder needles can be increased by changing the dimension of the needle dial. The plush thread forms a loop on the

hook of the latch-less cylinder needle, then the latch needle on the needle dial pulls the plush thread to form a longer loop. Finally the cutting unit severs the loop to form a plush fabric with a longer plush.

[0007] The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is a schematic view of an embodiment of the present invention.

FIG. 2 is a schematic view of an embodiment of the cutting unit of the present invention.

FIG. 3 is a schematic view of the present invention showing the cutting unit severing a loop to form a plush.

FIGS. 4 through 7 are operation flow according to an embodiment of the invention to produce plush fabrics.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0009] Please referring to FIG. 1, the circular knitting machine has a knitting unit to produce plush fabrics, namely to transform threads to fabrics. The embodiment of the invention includes:

Latch-less cylinder needles 11 located in a cylinder 10, latch needles 21 located on a needle dial 20 and a cutting unit 30. The cutting unit 30 includes two sinkers 31 and 32 formed in one set (referring to FIG. 2) and a cam 33. The sinkers 31 and 32 are driven by the cam 33 to slide on two sides of each cylinder needle 11 at the same time. The sinker 31 has a blade 310 which can sever a loop 41 formed by a plush thread 40 to become lengthy plush (referring to FIG. 3).

[0010] According to the embodiment, the dimension of the needle dial 20 may be changed so that the interval D of the needle dial peripheral edge 22 and a first hook 112 of the cylinder needle can be increased to 10-15mm. Hence the plush thread 40 held on the first hook 112 can be pulled by the latch needle 21 to form a longer loop 41. Finally, the cutting unit 30 severs the loop 41 to form a plush fabric with the plush length up to about 12mm.

[0011] Refer to FIGS. 4 through 7 for the manufacturing process for producing the plush. First, the plush thread 40 is fed between a front edge 110 of a cylinder needle and a second hook 210 of a latch needle, and a ground thread 50 is fed between a rear end 111 and the needle dial peripheral edge 22 (referring to FIG.4); while

the latch needle 21 is moved leftwards (referring to FIG. 5) and retracted, the cylinder needle 11 starts to move upwards so that the first hook 112 is raised to an elevation where the plush thread 40 can be picked up; the plush thread 40 is latched by the second hook 210 of the latch needle and held on the first hook 112 of the cylinder needle to form the loop 41; the latch needle 21 is retracted continuously to pick up the ground thread 50 and carry it to a sloped side 23; guided by the sloped side 23, the latch needle is moved gradually beneath the second hook 210; then the ground thread 50 is moved below the plush thread 40 (referring to FIG. 6); thereafter the cylinder needle 11 is moved downward to stretch the loop 41 through the first hook 112. Thus through the interactions of the cylinder needle 11 and the latch needle 21, the loop 41 formed by the plush thread 40 can be directly knitted in the fabric formed by the ground thread 50. Finally the loop 41 can be severed by the cutting unit 30 to form the plush fabric with a longer plush.

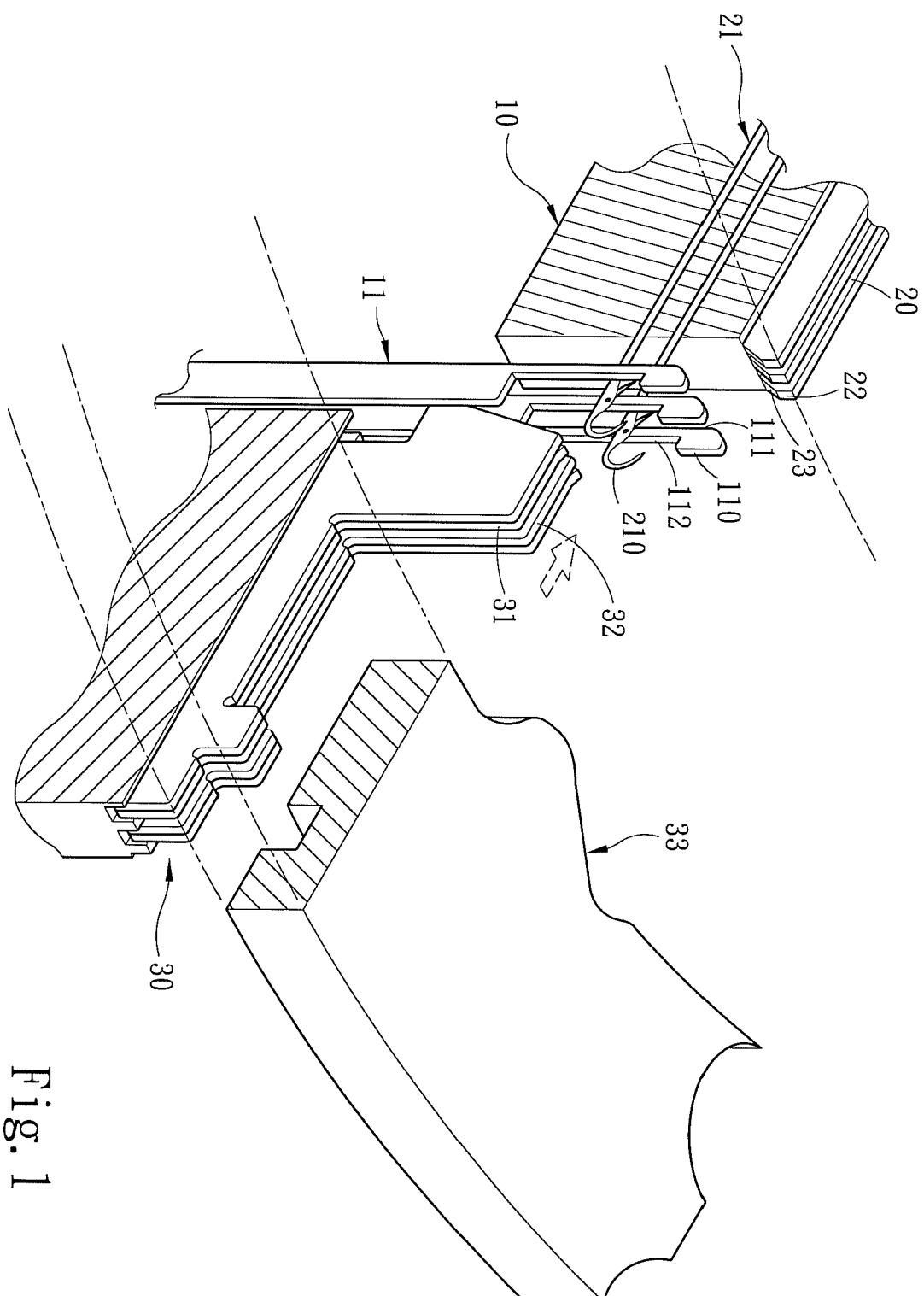
a length of up to 12 mm.

Claims

1. A knitting machine for manufacturing plush fabrics, comprising latch-less cylinder needles (11) in a cylinder (10), latch needles (21) located on a needle dial (20) and a cutting unit (30); wherein a plush thread (40) is held on a hook (112) of each latch-less cylinder needle (11) and stretched by one latch needle (21) to form a longer loop (41), the longer loop (41) being severed by the cutting unit (30) to form a plush fabric having a longer plush; wherein the needle dial (20) has a peripheral edge which is spaced from the hook (112) of the cylinder needle at an interval of 10-15mm to allow the plush thread (40) to form the longer loop.
2. The knitting machine of claim 1, wherein the plush formed by severing of the loop (41) has a length of 12mm.

Amended claims in accordance with Rule 86(2) EPC.

1. A knitting machine for manufacturing plush fabrics, comprising latch-less cylinder needles (11) in a cylinder (10), latch needles (21) located on a needle dial (20) and a cutting unit (30); said cutting unit being configured for severing a plush thread (40) held on a front edge (112) of a latch-less cylinder needle (11) and extending to a latch needle (21) spaced from the front edge (112) of the cylinder needle (11); **characterized in that** the dimension of the needle dial (20) is adjustable such that the peripheral edge of the needle dial (20) is spaced radially from the front edge (112) of the cylinder needle (10) at an interval (D) of 10 to 15 mm for producing plushed at



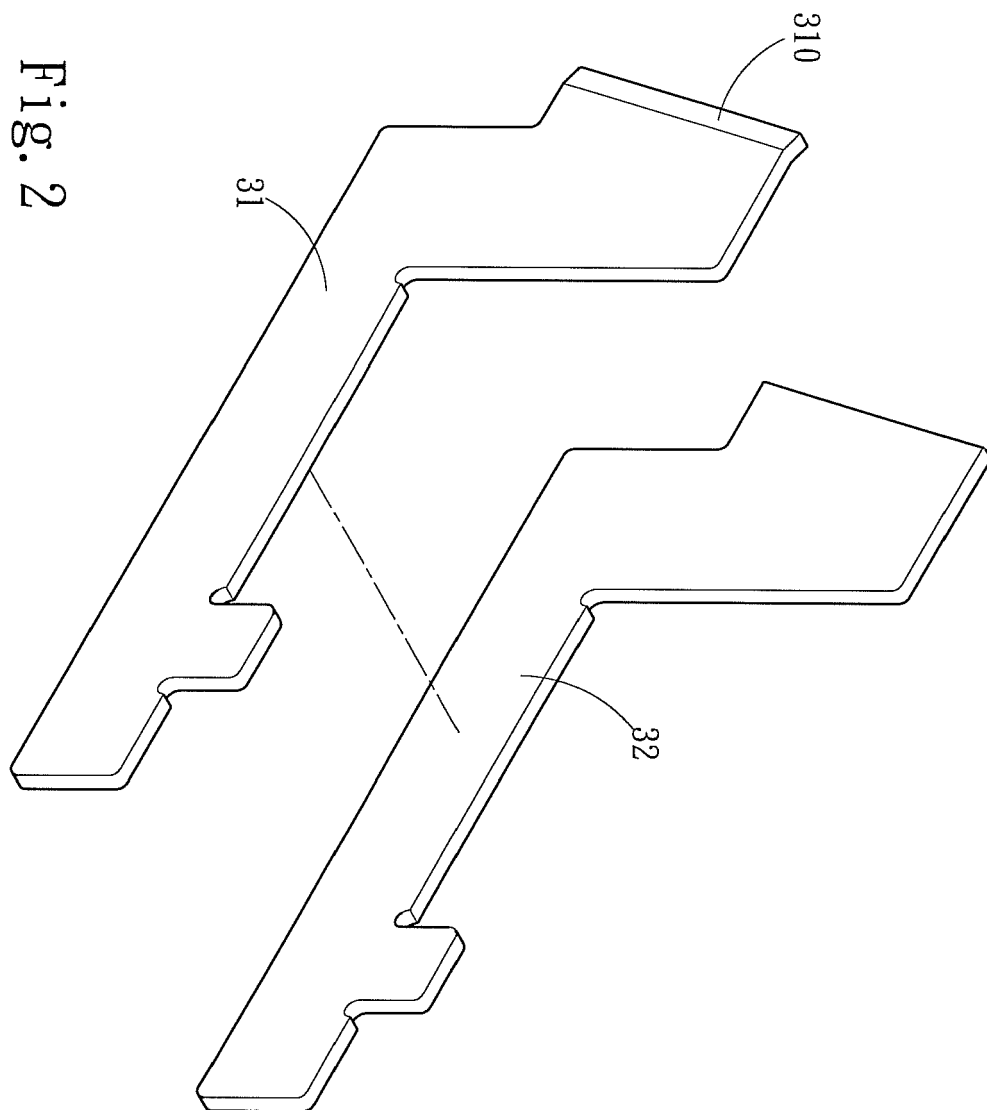


Fig. 2

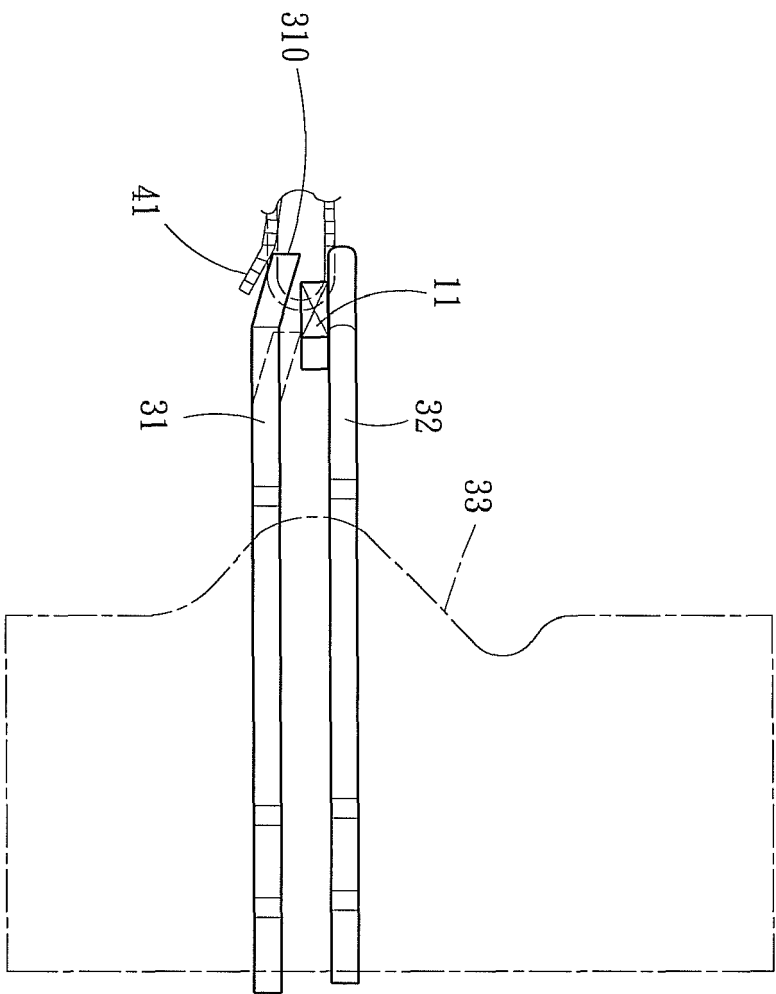


Fig. 3

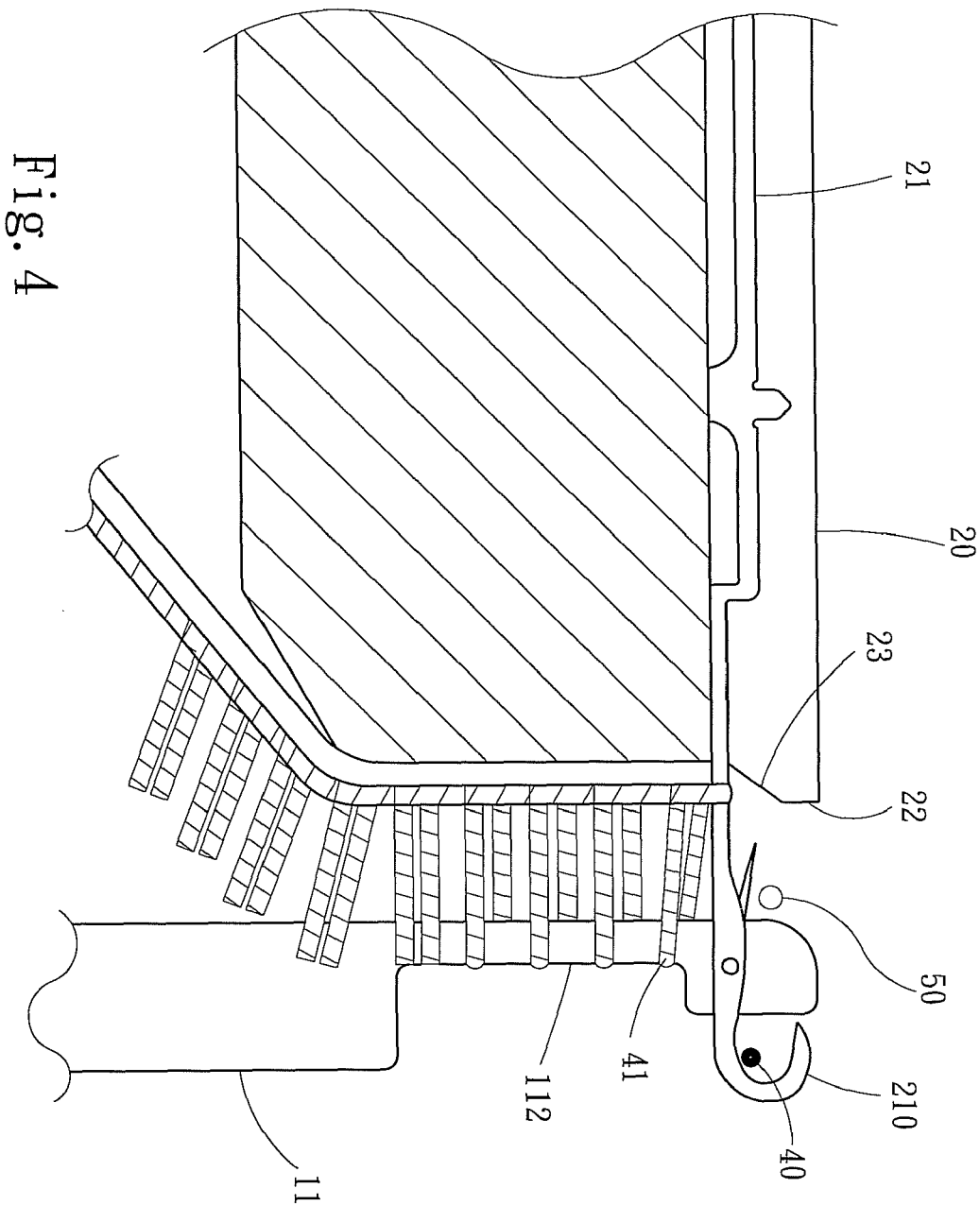


Fig. 4

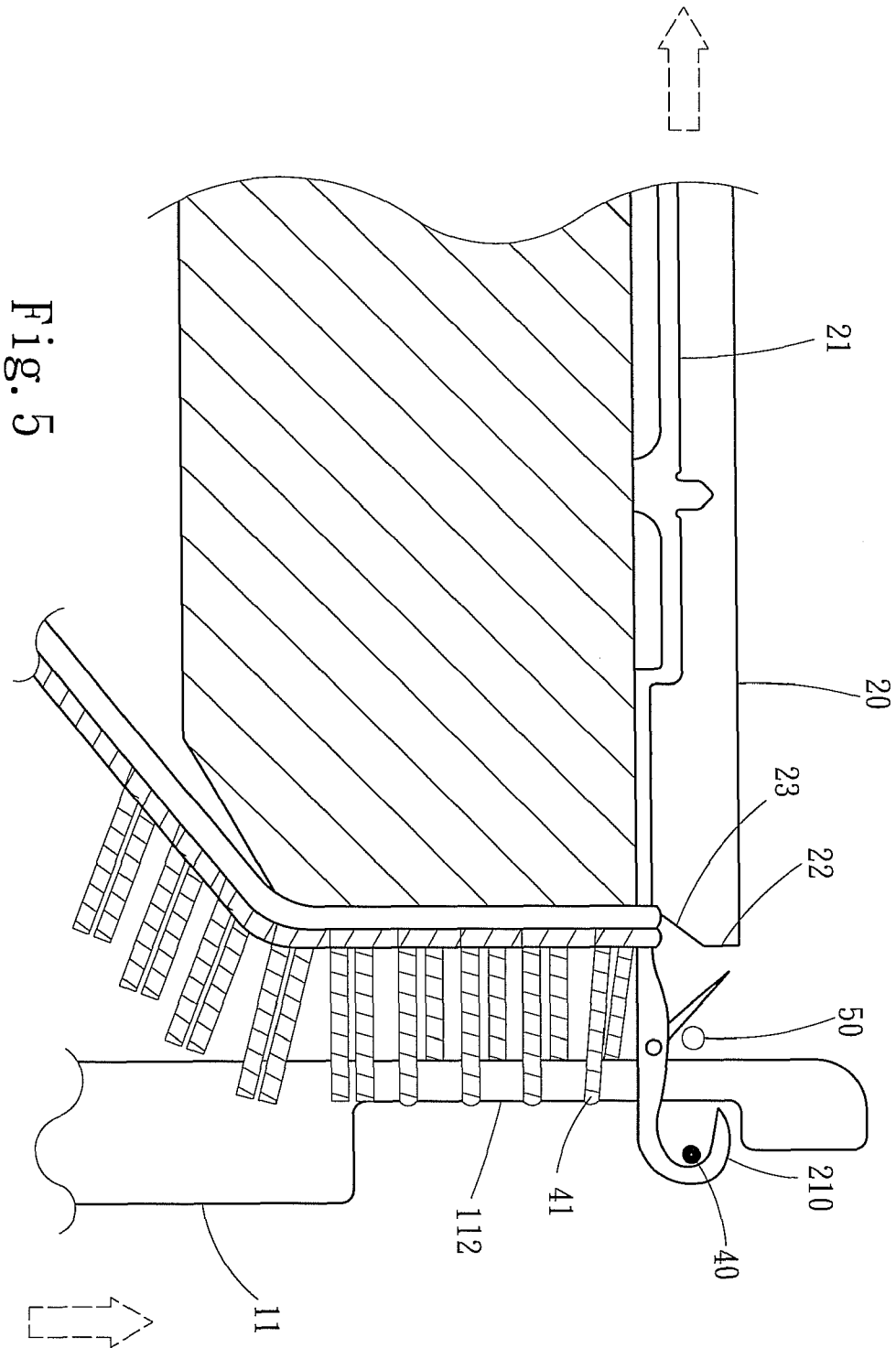
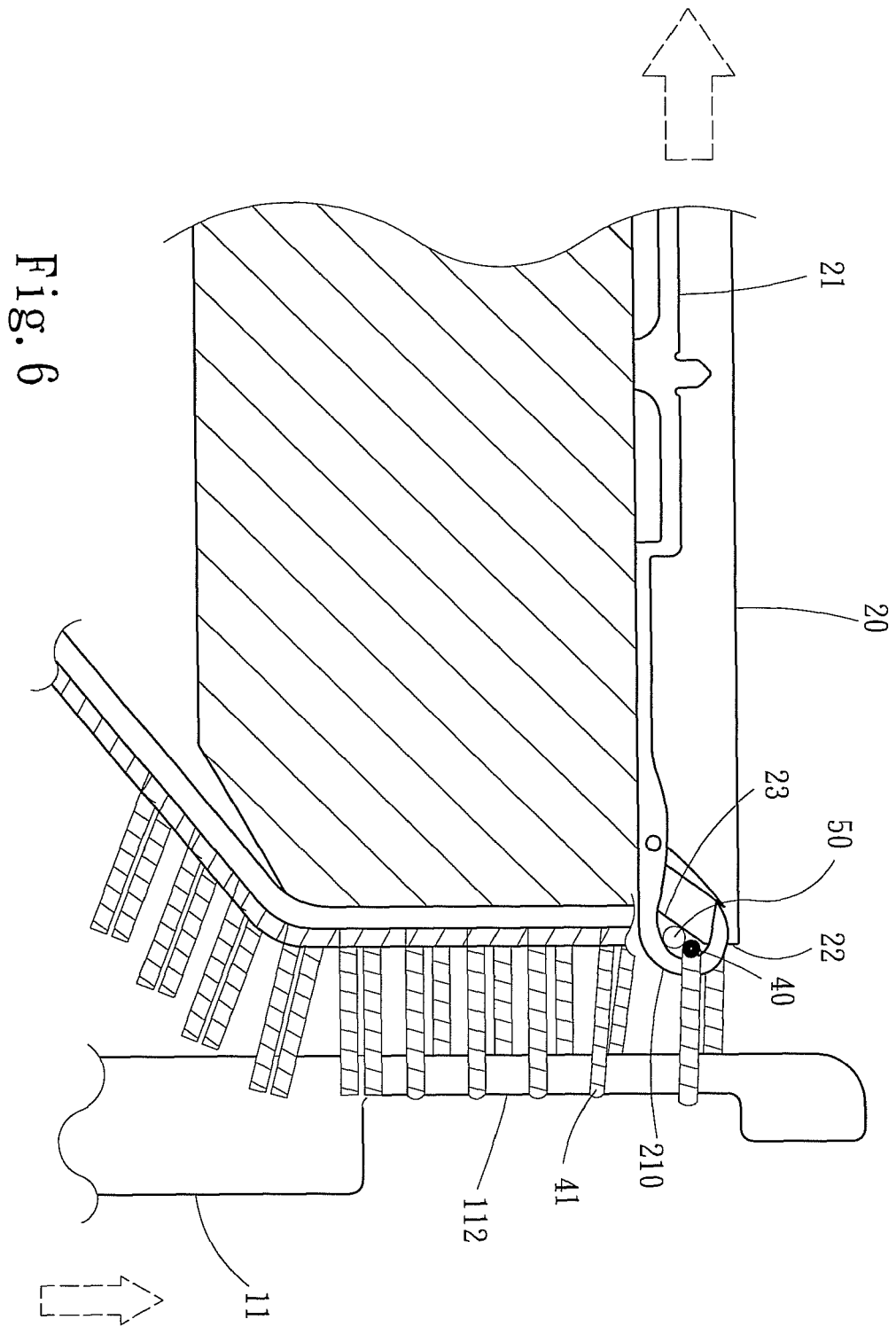


Fig. 5



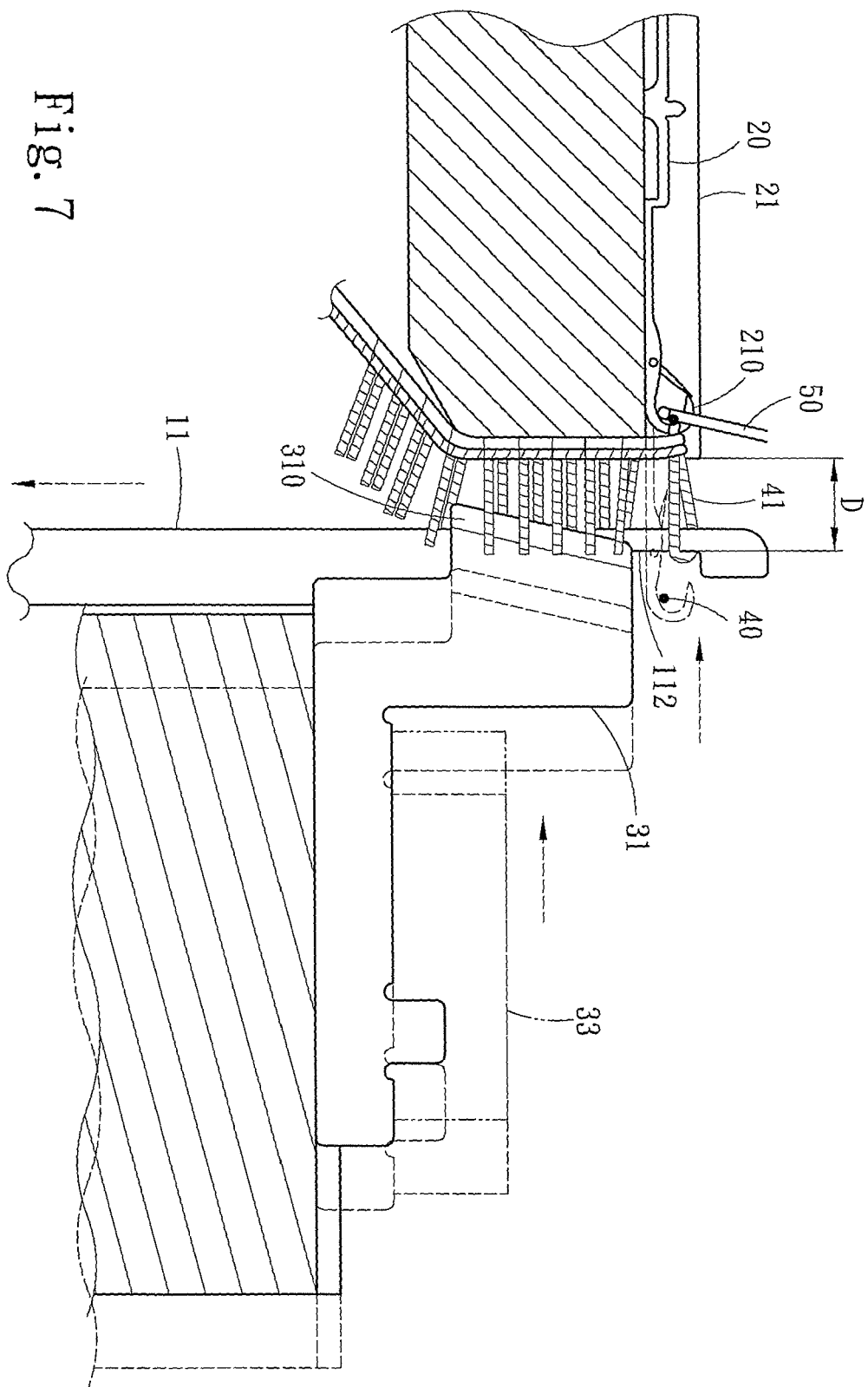


Fig. 7



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,Y	US 5 463 882 A (YEH ET AL) 7 November 1995 (1995-11-07) * column 3, lines 1-10; claim 1; figure 7 *	1	INV. D04B9/12
Y	CH 456 829 A (AMES TEXTILE CORPORATION) 31 May 1968 (1968-05-31) * column 7, lines 18-25; claim 1; figures 9,10 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			D04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 July 2006	Examiner Sterle, D
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	

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 11 0242

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
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07-07-2006

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REFERENCES CITED IN THE DESCRIPTION

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