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

(11) EP 0 717 797 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
08.01.1997 Bulletin 1997/02

(21) Application number: **94927035.9**

(22) Date of filing: **05.09.1994**

(51) Int Cl.[6]: **D04B 15/06**, D04B 15/90

(86) International application number:
PCT/IT94/00145

(87) International publication number:
WO 95/07382 (16.03.1995 Gazette 1995/12)

(54) DEVICE FOR HOLDING DOWN THE STITCHES BEING FORMED IN A FLAT KNITTING MACHINE

VORRICHTUNG ZUM NIEDERHALTEN DER MASCHEN AN EINER FLACHSTRICKMASCHINE

DISPOSITIF PERMETTANT D'APLATIR LES MAILLES FORMEES DANS UNE TRICOTEUSE RECTILIGNE

(84) Designated Contracting States:
AT DE DK ES GB GR PT

(30) Priority: **06.09.1993 IT BO930360**

(43) Date of publication of application:
26.06.1996 Bulletin 1996/26

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Description

TECHNICAL FIELD

The present invention relates to the technical field concerning knitting machines.

BACKGROUND ART

Various flat knitting machines are known, which include a pair of needle beds and a carriage that is mobile along a horizontal path over the needle beds.

The carriage has the task of setting into operation the needles, that are inserted into grooves of the needle beds, in accordance with a pre-fixed program.

The carriage also supplies the group of operating needles with a thread that is fed by various reels.

The needle beds of the knitting machine feature a kind of comb situated in correspondence with the region where the stitches are made, and the needles operate among the teeth of this comb.

Among these teeth there is formed a transverse member that defines a geometrical line along which the stitches are made.

In the above mentioned machines the necessity arises of holding the stitches being formed in a lowered position to prevent them from being pulled up by the needles that are moving upwards.

The needles are in fact raised upward both for the formation of the stitches, and for transferring the stitches from one needle bed to the other one.

For this purpose the traditional knitting machines are generally equipped with a so-called stitch retaining device, that has the task of holding down the stitches that have just been formed.

This stitch retaining device though operates downstream of the group of needles set into operation, so that it does not assure an optimal effect.

According to another configuration, hook means are used in order to grip the stitches just formed, as it is disclosed by the US-A-4.697.439 owned by the Applicant.

According to another solution, auxiliary swinging needle beds are mounted outside of the needle beds destined to the formation of the stitches, and are equipped with a kind of comb designed to insert among the teeth of these last needle beds.

It must be also noted that the transverse member along which the stitches are made and then held down, is presently made integral with the needle bed, through proper mechanical working.

This fact does not allow for obtaining perfectly smoothed surfaces, and consequently the friction with the fabric increases.

Furthermore, the teeth of the needle beds, also made integral with the needle beds through mechanical working, apparently are those parts which more often get broken or damaged.

In case of breaking it is necessary to flush a portion of the needle bed and to report a substitutive part thereon, this part also being obtained by mechanical working. All this results in complications and high costs.

Document WO-A-92/13126 describes a flat knitting machine that has removable holding down plating for float stitches with an inverted V-shaped bed to which comb platens are fixed.

In addition to these, there are holding down platens, which can be moved. The bed has tricks at each side for the needles, having hooks and the comb platens hook over wires and spring under the bed at each side.

The holding down platens swivel on the centre which lies in a groove and has a hook that lies between the two wires only on one side of the machine. The working hook is employed to hold a float stitch when one is created. The holding down platens are employed when the pattern has float stitches which need to be pressed down to avoid contact with continuing needle movements.

Document EP-A-0 424 717 describes a flat-bed knitter that has webs and sinker for adjustment on high-speed working. The adjustable sinkers for the flat-bed knitter, seen along the length of the needle beds, each have a stitch-forming web between the needle and the static looping edge at an angle to the fabric take-off direction. The edges of the sinkers run below their bridging projections from the comb gap to a point behind a knitting surface of the needle beds.

They run at an angle to the fabric take-off direction, in each section and in each adjustment position of the sinkers, which deviates from the corresponding angle of the fixed looping edge of the stitch-forming web.

The arrangement is designed for flat-bed knitters operating at high speeds, and the sinkers can be controlled and adjusted for maximum efficiency without affecting other operating functions.

DISCLOSURE OF THE INVENTION

The object of the present invention is to propose a device that holds down the stitches in an optimal way while being formed, that operates in correspondence with the region where the stitches are formed.

Another object of the present invention is to give assurance about working of the device as well as to allow for an easy maintenance for the region destined to the formation of the stitches.

The above mentioned object are achieved by means of a flat knitting machine according to claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristic features of the invention are set out in the following, with particular reference to the accompanying drawings, in which:

- Fig. 1 shows a plan view of a portion of a knitting

machine needle bed, particularly of the region where the stitches are made;

- Fig. 2 shows a cross-section view of the needle bed of Fig. 1, taken along the line II-II;
- Fig. 3 shows a side view of a member designed to form the stitches, that is an exploded view with respect to Fig. 2;
- Figs. 4 and 5 show the same plan view and cross-section view of the needle bed respectively, with the stitch formation members mounted thereon;
- Fig. 6 shows a cross-section view of the needle bed as seen according to a sectional plane parallel to the one of Fig. 5;
- Fig. 7 shows a side view of a stitch pressing means, that is an exploded view of Fig. 6;
- Fig. 8 shows the same cross-section view of Fig. 5, with the pressing means already mounted;
- Fig. 9 shows a cross-section view taken along the line IX-IX of Fig. 8.

BEST MODE OF CARRYING OUT THE INVENTION

Having reference to the above mentioned figures, reference numeral 1 indicates the needle bed of a flat knitting machine, particularly the region where the stitches are formed.

The needle bed 1 has a plurality of grooves 2 arranged side by side and aimed at receiving and holding respective needles 3. In the needle bed 1, among the grooves 2, there are made slits 4 parallel to the grooves.

The slits 4 have their bottoms profiled like a curved line, so that a kind of bowl is defined in each of them.

More particularly, the slits 4 have each one a forepart 4a and a rearpart 4b which are narrower that a midportion of the slit, and which are located on a midplane between two subsequent grooves 2.

As it clearly appears from Fig. 1, the midportion extends at one side in such a way that it is asymmetric with respect to the same midplane.

The slits join respective underlying notches 5, that are made in the same needle bed 1.

The slits 4 are aimed at receiving and holding respective shaped plates 6, which have thickness corresponding to the width of the forepart 4a and rearpart 4b of the slits (see Fig. 3).

The plates 6 have each one, at an end, a head 7 that protrudes from the needle bed 1 when the plate is mounted thereonto.

The head 7 has a lip 8 designed to grip the needle bed 1, in a region corresponding to the forepart 4a of the related slit (see figures 4 and 5).

The head 7 of each plate 6 has a hole 9, through which a stem 10 passes. The stem 10 has the task of making a stop for the stitches being formed.

The plates 6 are bound to the needle bed by means of a rod 11 that passes through respective slots 12, made in a central part of each plate 6, and that lies into corresponding seats 13 made in the needle bed, in correspondence with the notches 5.

The plates 6 are also bound to each other by means of a bar 14 that is arranged transversal to them and that is inserted into corresponding openings 15 designed to act as a guide therefor.

The vertically enlarged midportion of each slit 4 is adapted to hold a pressing means 16, that substantially includes another shaped plate (see Fig. 7).

The pressing means 16 features a head 17 that is designed to work beside the head 7 of the adjacent plate 6. The pressing means 16 is swingable, with respect of the plane on which it lies, as indicated by the arrow A in Fig. 8. More precisely, the pressing means 16 can swing about a fulcrum defined by the rod 11 that passes through a recess 18 made in the same pressing means 16.

Consequently, the pressing means can be shifted from a raised position to a working lowered position, that is indicated by a dashed line 16a in Fig.8.

The swing motion of the pressing means is controlled by a flat cam 19, fastened to the carriage 20 of the machine, that goes in engagement with a butt 21 extending from each one of the pressing means 16.

Therefore, when the pressing means 16 are shifted by the carriage 20 to the lowered position, in suitable time relation with operation of the needle 3, they hold the stitches, while being formed, against the stop defined by the stem 10 that passes through the heads 7 of the plates 6.

It must be stressed that the pressing means operate in a region where the stitches are formed, taking alternate positions among the needles 3, without any interference with the stitch formation.

The pressing means are in fact mounted in a way that they can swing and be inserted into the slits 4 which also define a holding seat for the plates 6, that are arranged aside of the respective pressing means. However the pressing means are fully independent from the plates 6.

Moreover, the pressing means are arranged immediately aside of the respective needles 3.

INDUSTRIAL APPLICABILITY

The industrial applicability of the claimed invention results well clear from the need that exists for stitch retaining devices which must be reliable and effective, and from the advantages that the present invention brings about.

The comb that cooperates with the formation of the stitch is made by means of the removable plates 6, and this allows for an easy and cheap replacement operation in case one or more of the operating head 7 get broken or damaged.

It must be stressed that this replacement operation does not require mechanical working, but only the replacement of a piece produced in series is necessary, these pieces being easily stored in a spare parts store.

Also the cost of the plates is very low in that they are obtained from a metal sheet. However, when the plates are mounted, they are firmly held and locked by the transversal rod 11 and the bar 14, so that the whole assembly is suitably stiff and compact.

It must be also noted that the transverse member that defines the geometrical line along which the stitches are formed, includes the stem 10 that passes through the holes 9 of the heads 7 of the plates 6.

The stem 10 is made very smooth, so as to reduce as much as possible the friction with the stitches.

Moreover, the subject invention has been described, with reference to the enclosed drawings, only as a mere example, not limitative, therefore it is obvious that all the modifications or variants suggested either by practice or the activation and usage thereof are limited only be the scope of the following claims.

Claims

1. A flat knitting machine comprising a device for holding down the stitches being formed, this machine including:

   a mobile carriage (20) that runs horizontally over at least a needle bed (1) featuring grooves (2) inside which there are inserted needle (3) that can slide;
   a plurality of plate means (6) which form a kind of comb that cooperates to form the stitches, the said plate means (6) also featuring each at one end a head (7) that protrudes from the said needle bed (1), when the plate means are mounted thereonto, this head having a lip (8) designed to grip the needle bed (1) in correspondence with a forepart (4a) of the related slit (4), with the said head (7) of the said plate means (6) crossed by a stem (10) designed to make a stop for the stitches being formed;
   a plurality of pressing means (16) respectively located side by side near the said plate means (6) and inserted into the said slits (4), the said pressing means being independent from the said plate means (6) and mounted in such a way that they are swingable, so that when they are in lowered position, they hold down the stitches being formed on the needle bed (2);
   the said device being **characterised in that** the said plate means are removably inserted into related slits (4) made in the said needle bed (1) and parallel to, and ordinately set among, the said grooves (2) for the needles (3) and the said plate means (6) are bound to the said needle bed (1) by means of a rod (11) passing through respective slots (12) made in a central part of said plate means (6), and lying in corresponding seats (13) made in the said needle bed (1).

2. Device as in claim 1, **characterised in that** the said rod (11) also acts as a fulcrum for the said pressing means (16).

3. Device as in claim 1, **characterised in that** the said pressing means (16) are made to swing by a flat cam (19) fastened to the said carriage (20) of the knitting machine, this flat cam being designed to guide a butt (21) extending from the said pressing means (16).

4. Device as in claim 1, **characterised in that** the said pressing means (16) include plates, each having a head (17) and being designed to work aside of a corresponding head (7) of the said plate means (6).

5. Device as in claim 1, **characterised in that** each of the said slits (4) has a forepart (4a) and a rearpart (4a) located on the midplane between two of the said grooves (2), which are narrower than a midportion of the slit that is instead enlarged at one side up to reach a part of a related groove (2) so as to house a related pressing means (16) therein.

6. Device as in claim 1, **characterised in that** the said plate means (6) are bound to each other by means of a bar (14) arranged transversal to them and inserted into corresponding openings (15) designed to act as a guide therefor.

Patentansprüche

1. Eine Flachstrickmaschine mit einer Vorrichtung zum Niederhalten der gerade gebildeten Maschen, diese Maschine enthaltend:

   einen beweglichen Schlitten (20), der horizontal über mindestens ein Nadelbett (1) läuft, welches Nuten (2) aufweist, in denen gleitbare Nadeln (3) eingesetzt sind;
   mehrere Plattenvorrichtungen (6), die eine Art Kamm bilden, der an der Maschenbildung mitwirkt, wobei die genannten Plattenvorrichtungen (6) jeweils an einem Ende einen Kopf (7) aufweisen, der über das genannte Nadelbett (1) herausragt, wenn die Plattenvorrichtung darauf montiert ist, und der Kopf einen Rand (8) aufweist, der dazu dient, das Nadelbett (1) in Höhe eines Vorderabschnittes (4a) des zugehörigen Schlitzes (4) zu greifen, wobei der genannte Kopf (7) der genannten Plattenvorrichtung (6) von einem Stab (10) durchquert wird, der als Stoppanschlag für die gerade gebildeten Maschen dient;
   mehrere Andrückvorrichtungen (16), die jeweils Seite an Seite neben den genannten Plattenvorrichtungen (6) angeordnet und in die ge-

nannten Schlitze (4) eingesetzt sind, wobei die genannten Andrückvorrichtungen unabhängig von den genannten Plattenvorrichtungen (6) und in einer Weise schwenkbar montiert sind, daß sie, wenn sie sich in der unteren Stellung befinden, die im Nadelbett (2) gebildeten Maschen niederhalten;
die genannte Vorrichtung ist **dadurch gekennzeichnet, daß** die genannten Plattenvorrichtungen abnehmbar in entsprechende Schlitze (4) eingesetzt sind, die in dem genannten Nadelbett (1) gefertigt und dabei parallel zu und gleichmäßig verteilt zwischen den genannten Nuten (2) für die Nadeln (3) angeordnet sind; und daß die genannte Plattenvorrichtung (6) mit dem genannten Nadelbett (1) mittels einer Stange (11) verbunden ist, die durch entsprechende, im mittleren Teil der genannten Plattenvorrichtung (6) gefertigte Schlitze (12) geführt ist und in entsprechenden, im Nadelbett (1) gefertigten Aufnahmen (13) liegt.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannte Stange (11) auch als Angelpunkt für die genannte Andrückvorrichtung (16) dient.

3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannte Andrückvorrichtung (16) durch einen flachen Nocken (19) zum Schwingen gebracht wird, der an dem genannten Schlitten (20) der Strickmaschine angebracht und so ausgeführt ist, daß er einen Schaft (21) führt, der von der genannten Andrückvorrichtung (16) hervorragt.

4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannte Andrückvorrichtung (16) Platten enthält, die jeweils einen Kopf (17) aufweisen und dazu vorgesehen sind, neben einem entsprechenden Kopf (7) der genannten Plattenvorrichtung (6) zu arbeiten.

5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** jeder der genannten Schlitze (4) einen Vorderabschnitt (4a) und einen Hinterabschnitt (4b) aufweist, die auf der Mittelebene zwischen zwei der genannten Nuten (2) liegen und schmaler sind als der mittlere Abschnitt des Schlitzes, welcher dagegen auf einer Seite bis hin zu einem Teil der zugehörigen Nut (2) verbreitert ist, so daß eine dazugehörige Andrückvorrichtung (16) darin aufgenommen werden kann.

6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die genannten Plattenvorrichtungen (6) durch eine Leiste (14) miteinander verbunden sind, die in Querrichtung zu ihnen angeordnet und in entsprechende, als Führungen hierzu dienende Öffnungen (15) eingeführt ist.

Revendications

1. Une machine à tricoter rectiligne comprenant un dispositif pour rabattre les mailles venant d'être formées, cette machine comprenant :

   un chariot mobile (20) coulissant horizontalement au-dessus d'au moins une fonture (1) présentant des rainures (2) dans lesquelles des aiguilles (3) pouvant coulisser sont introduites ; une pluralité de moyens à plateau (6) formant une sorte de peigne coopérant à la formation des mailles, chacun de ces moyens à plateau (6) en question présentant également à une extrémité une tête (7) qui dépasse de la fonture (1) susmentionnée, lorsque les moyens à plateau y sont fixés dessus, cette tête ayant un bec (8) destiné à accrocher la fonture (1) au niveau d'une partie avant (4a) de la fente correspondante (4), avec ladite tête (7) de ces moyens à plateau (6) en question traversée par une tige (10) destinée à arrêter les mailles venant d'être formées ;
   une pluralité de moyens de pression (16) respectivement placés côte à côte à côté des moyens à plateau (6) susmentionnés et introduits dans les fentes (4) susmentionnées, lesdits moyens de pression étant autonomes par rapport à ces moyens à plateau (6) en question et montés de façon à pouvoir osciller, de manière à rabattre les mailles venant d'être formées sur la fonture (2) lorsqu'ils sont en position abaissée ; ledit dispositif étant caractérisé en ce que lesdits moyens à plateau sont introduits de façon amovible dans les fentes correspondantes (4) réalisées dans ladite fonture (1), sont parallèles aux rainures (2) susmentionnées dans lesquelles coulissent les aiguilles (3) et placés de façon ordonnée entre ces mêmes rainures (2), lesdits moyens à plateau (6) étant fixés à ladite fonture (1) au moyen d'une tringle (11) passant à travers des fentes correspondantes (12) réalisées dans une partie centrale de ces moyens à plateau (6) en question, et reposant dans des logements correspondants (13) aménagés dans ladite fonture (1).

2. Dispositif selon la revendication 1, caractérisé en ce que ladite tringle (11) agit également comme un point de support pour lesdits moyens de pression (16).

3. Dispositif selon la revendication 1, caractérisé en ce que lesdits moyens de pression (16) sont réalisés pour pouvoir osciller par l'intermédiaire d'une

came plate (19) fixée au chariot mobile (20) susmentionné de la machine à tricoter, cette came plate étant destinée à guider un about (21) dépassant de ces moyens de pression (16) en question.

4. Dispositif selon la revendication 1, caractérisé en ce que lesdits moyens de pression (16) comprennent des plateaux, chacun d'entre eux présentant une tête (17) et étant destinés à opérer de façon séparée par rapport à la tête correspondante (7) des moyens à plateau (6) susmentionnés.

5. Dispositif selon la revendication 1, caractérisé en ce que chacune des fentes (4) susmentionnées a une partie avant (4a) et une partie arrière (4b) placée à mi-chemin entre deux des rainures (2) susmentionnées, qui sont plus étroites qu'une portion moyenne de la fente qui est à l'inverse élargie d'un côté vers le haut pour atteindre une partie d'une rainure correspondante (2) de façon à pouvoir y loger un moyen de pression (16) correspondant.

6. Dispositif selon la revendication 1, caractérisé en ce que lesdits moyens à plateau (6) sont fixés les uns aux autres au moyen d'une barre (14) qui leur est transversale et introduite dans des ouvertures correspondantes (15) destinées en conséquence à agir comme un guide.

FIG.1

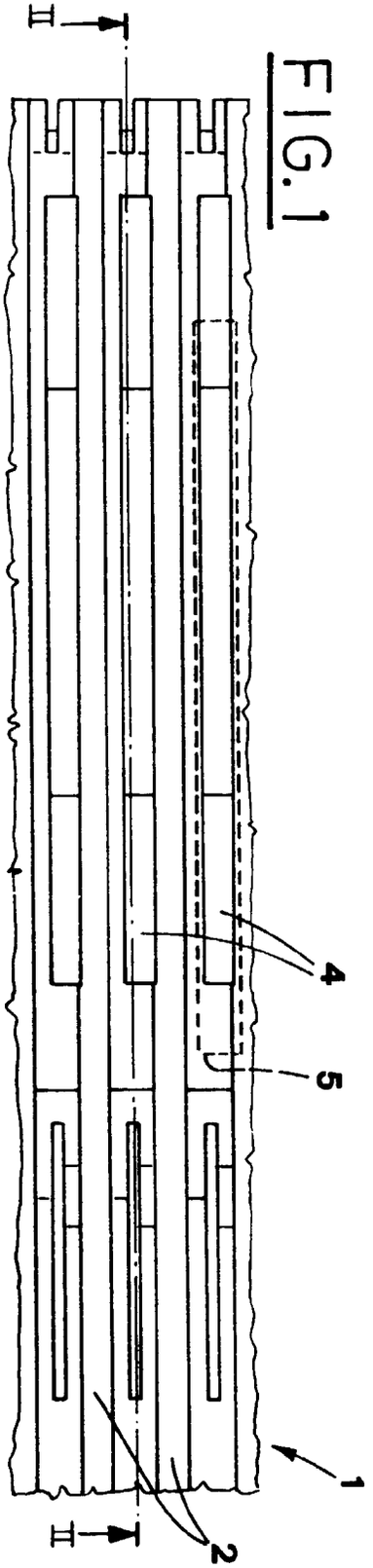

FIG.2

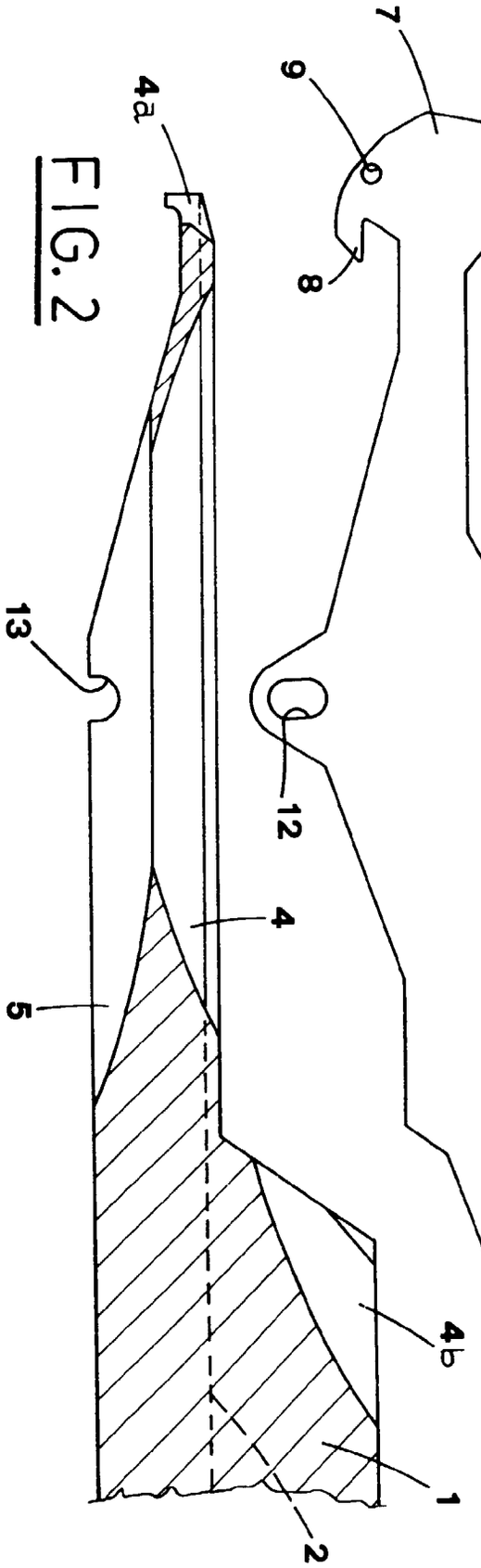

FIG.3

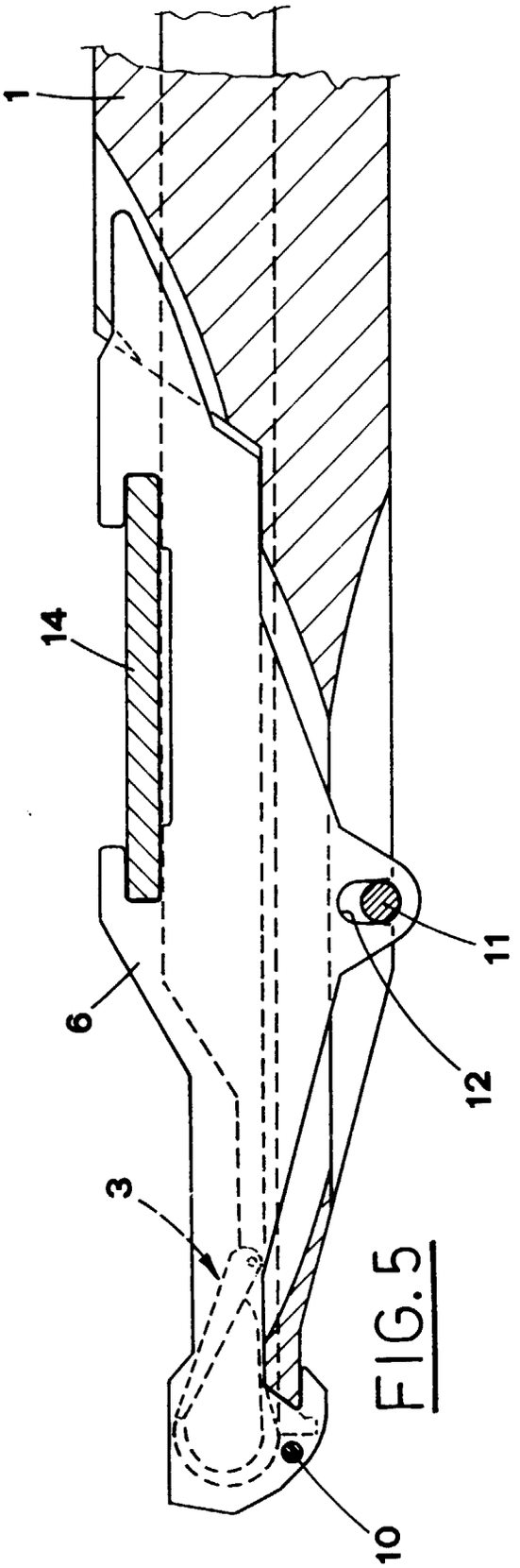

FIG.5

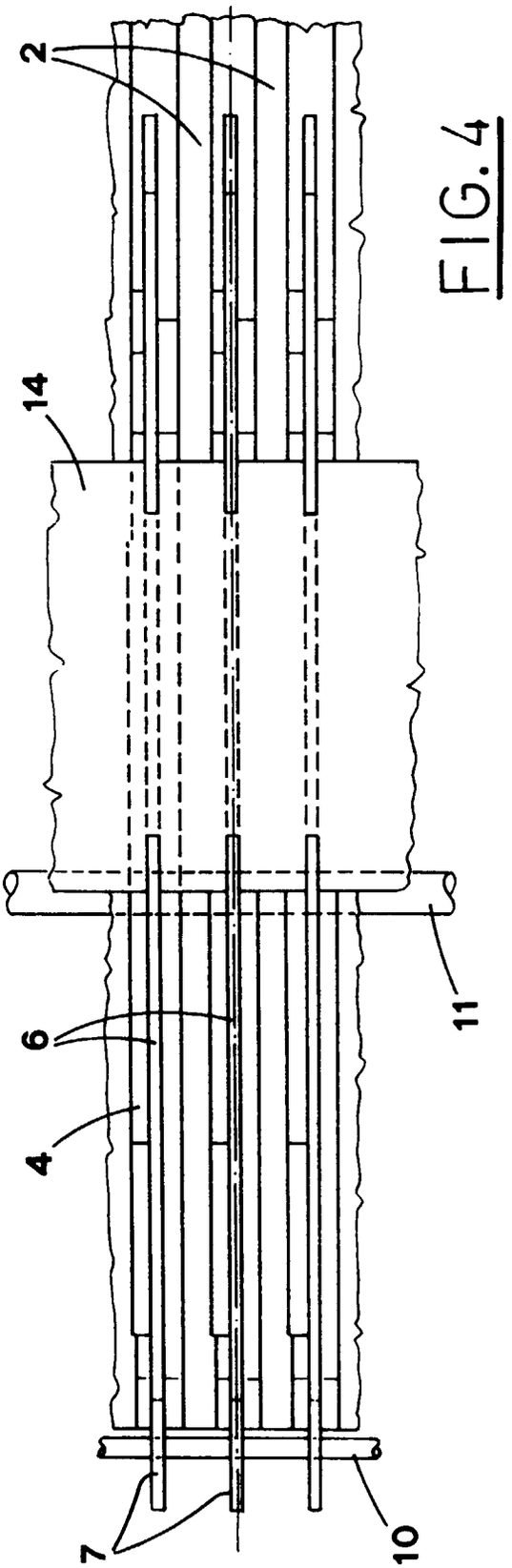

FIG.4

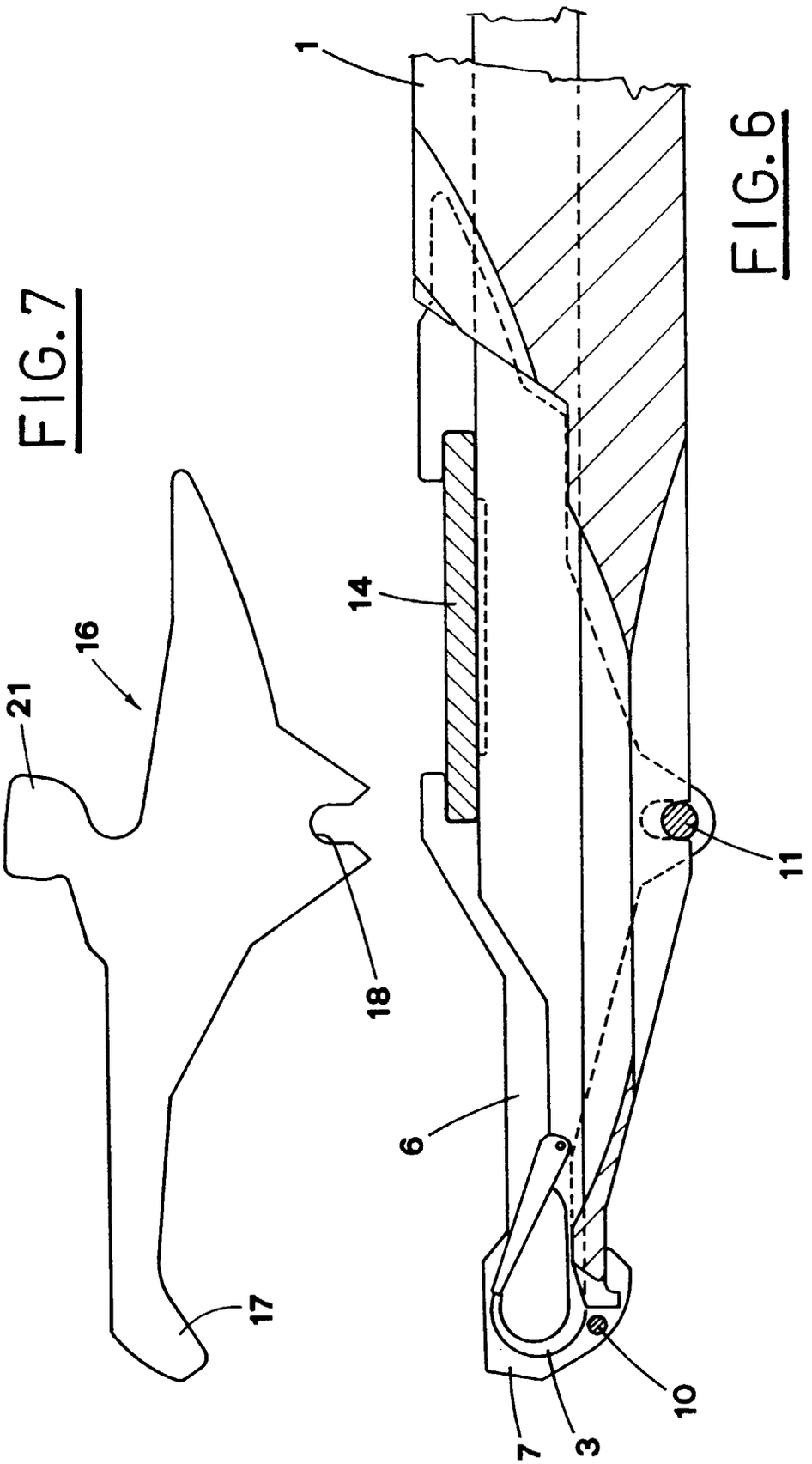

FIG.6

FIG.7

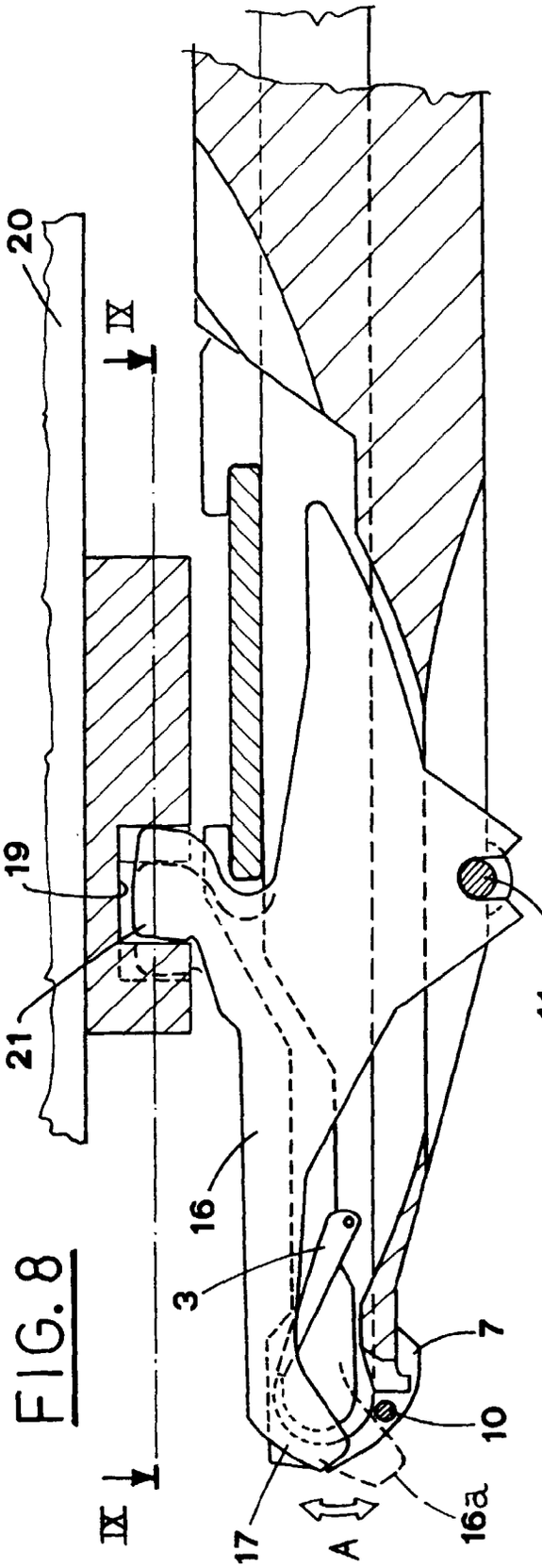

FIG.8

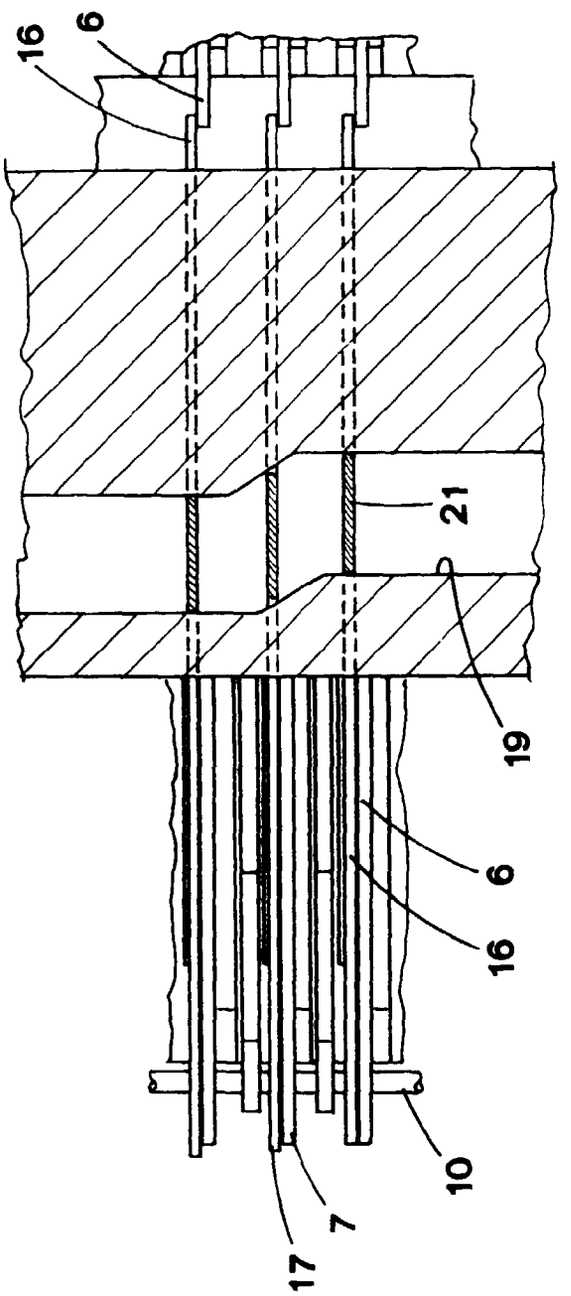

FIG.9