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(54) **TOOL HOLDING FIXTURE FOR BENDING BRAKES**

WERKZEUGHALTEVORRICHTUNG FÜR ABKANTBIEGEPRESSEN

FIXATION DE PORTE-OUTIL POUR PRESSES A CINTRER

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Description

Technical field

[0001] This invention relates to bending brakes and more particularly to the means for retaining and locking the working utensils used by these brakes.

Background art

[0002] Bending brakes generally comprise a structure supporting two vertically-positioned substantially coplanar opposing toolplates, of which one can move vertically.

[0003] To the facing edges of the toolplates are fixed the means for retaining and locking the punch and die respectively, each of these being formed from a plurality of tools aligned in succession, they having the same shape but different lengths.

[0004] When the type of work changes, one or more tools have also to be changed, this being generally done by withdrawing or inserting the tools laterally in the direction of the edge of the metal sheet. Withdrawing, adding or changing a tool is a particularly delicate and even dangerous operation, in particular with regard to the upper tools, which can also be very long and heavy.

[0005] For this reason, fixtures have been developed for bending brakes which enable the tool to be withdrawn vertically, in the brake working direction.

[0006] These fixtures are rather complicated because they have to comprise safety means to prevent any accidental fall of the tool when it is released.

[0007] One of these fixtures is fully described in EP 0494714, in which the tool retention and locking means comprise a lower channel into which the upper portion of the tool, also known as the shank, is inserted.

[0008] The tool can be inserted from below into a seat having the same form as the shank, and locked in position by a plurality of pneumatically operated pistons which enter a longitudinal groove provided in the tool shank. Each tool also has a safety device comprising a lever for operating a peg movable within a hole in the tool shank. When the tool has been inserted into the seat in said retention and locking means, this peg is maintained elastically inserted in a longitudinal cavity in one of the vertical walls of said seat.

[0009] When a tool, for example one of those which form the upper punch of the brake, is to be changed, the locking pistons are retracted so that the tool is supported only by the peg.

[0010] At this point the tool can be withdrawn in the direction of the sheet edge, or by pressing said lever it can be withdrawn in the vertical direction.

[0011] This solution is costly to implement, and in addition the peg present in the safety device is easily damaged during use, so being unable to perform its safety function.

[0012] Another of these fixtures is fully described in EP-A-0256245, disclosing a fixture according to the preamble of claim 1.

[0013] This fixture has a very complicated structure located out of the body.

[0014] The object of the invention is to overcome the aforementioned drawbacks within the framework of a rational, reliable and low-cost solution.

Disclosure of the invention

[0015] The invention attains this and further objects by virtue of the characteristics defined in the claims.

[0016] To better clarify the constructional and operational characteristics of the invention a preferred embodiment thereof is described hereinafter by way of non-limiting example and is illustrated on the accompanying drawings.

[0017] Figure 1 is an isometric schematic view of the brake on which the device of the invention is mounted.

[0018] Figure 2 is an isometric view of the invention.

[0019] Figure 3 is a front view in the direction III of Figure 2.

[0020] Figure 4 is a section on the line IV-IV of Figure 3.

[0021] Figure 5 is a section on the line V-V of Figure 3.

[0022] Figure 6 is a section on the line VI-VI of Figure 3.

[0023] From the figures it can be seen that the bending brake 1 comprises a movable upper toolplate 2 and a fixed lower toolplate 3.

[0024] The upper toolplate 2 lowerly carries a series of aligned tools 4 having the same shape but different lengths, they forming overall the punch of the brake 1. Likewise the fixed lower toolplate 3 carries a series of aligned tools 5 forming the die of the brake 1. In detail, the tools 4 forming the punch and the tools 5 forming the die are secured to the respective toolplates 2 and 3 by a series of mutually contacting aligned clamps 6, as shown in Figures 1 and 2.

[0025] The clamps 6 are fixed to the respective upper and lower toolplates by usual means indicated by 7.

[0026] In the illustrated example, each clamp 6 has a length of 50 cm, and consists of a beam 61 having two successive recessed regions indicated by 610 and 611 respectively.

[0027] The recessed region 610 receives a plate 62 fixed to it by screws, not shown.

[0028] The plate 62 defines with the recessed region 611 a seat 63 for receiving the shanks 41 and 51 of the tools 4 and 5 respectively. The plate 62 comprises a succession of in-line holes 60 each arranged to receive two balls 64 occupying together a space longer than the thickness of the plate 62.

[0029] A push rod or pin could be conveniently used instead of the balls. In the shank of each tool 4 and 5, which is inserted into the channel 63, there are provided two opposing longitudinal grooves 40, both arranged to face the line of holes 60 to partly receive one of said two

balls.

[0030] It should be noted that when the shank 41, 51 is inserted into the respective seat 63, the axis of the grooves 40 is slightly displaced from the axis of the holes 60, so that the pressure of the balls maintains the shank pressed into its seat.

[0031] On that side facing the plate 62, the beam 61 supports a series of leaf springs 9 fixed in a position inclined towards the beam by a line of bolts 91, and such that their lower portion elastically rests against the line of balls 64.

[0032] That portion facing the balls 64 is separated by cuts 92, between which individual independent elastic portions 93 of each leaf spring 9 are defined.

[0033] The beam 61 also comprises a line of holes 100 communicating with a common upper manifold 101 via ducts 102.

[0034] The holes 100 are dead, with their opening facing the plate 62.

[0035] A cup-shaped piston 103 with its axial dimension slightly less than the depth of the holes 100 is inserted into each hole 100.

[0036] In front of each hole 100, the plate 62 comprises a hole 65 receiving a pin 66 which at one end is received within the piston 103 and at the other end rests against the leaf spring 9.

[0037] On the opposite side to that supporting the leaf spring 9, the beam 61 has a central vertical recess 8 extending through its entire height.

[0038] Within said recess there is supported, parallel to the axis of the beam 61, a shaft 81 which carries two cams 82 close to its ends and is rigid with a central operating lever 83.

[0039] In front of each of the cams 82 both the beam 61 and the plate 62 have a through hole 84 receiving a pin 85 which rests against the central leaf spring 9.

[0040] Turning the operating lever causes the pin 85 to emerge and withdraw the spring through a distance greater than that resulting from operating the pistons 103.

[0041] The operation of the invention is apparent.

[0042] On feeding pressurized fluid to the pistons 103 the pressure of the leaf springs 9 on the balls 64 is released, so that the tool shank is free to slide within its seat to enable the tool to be withdrawn in a direction parallel to the axis of the beam 61.

[0043] The central tool lying in front of the central leaf spring 9 in contact with the pins 85 can also be withdrawn downwards by operating the lever 83, which moves the ball 64 completely into the hole 60.

[0044] The tools are inserted from the central position of each clamp 6, in the following manner.

[0045] Pressurized fluid is fed to all the pistons 103, to annul the pressure of the leaf springs 9 on the balls 64.

[0046] The lever 83 is then operated manually, and a first tool is inserted from below into its retention seat.

[0047] On returning the lever 83 to its initial position, the tool is prevented from falling downwards, but is not prevented from sliding within the retention seat, hence it can be slid away from the central portion of the beam, which is freed to receive the next tool, and so on.

[0048] Finally, it should be noted that this embodiment refers to a brake having a movable upper toolplate and a fixed lower toolplate. However in certain embodiments and for certain types of work the upper toolplate can be fixed and the lower toolplate movable, or both toolplates movable.

Claims

1. A fixture for fixing the tools (4,5) to the toolplate (2,3) of sheet metal bending brakes, comprising a clamp (6) having a channel (63) for receiving the tool shank, means (64) for supporting the shank in said channel while leaving it free to slide along the channel, and means for locking the shank in said channel, wherein in one of the opposing walls of the channel there are provided, parallel to the channel axis, at least two aligned holes (60) into which there is inserted freely slidable a movable body (64) having a dimension greater than the wall thickness of said one of the opposing walls, **characterised by** means consisting of a leaf spring (9) fixed onto the outside of the clamp for maintaining said movable body into said channel and first means (66) counteracting said elastic means (9) to annul their pressure against said movable body.

2. A fixture as claimed in claim 1, **characterised in that** said movable body consists of a pair of balls (64).

3. A fixture as claimed in claim 1, **characterised in that** the lower part of said leaf spring (9) is separated into portions (93) which deform independently of each other.

4. A fixture as claimed in claim 1, **characterised in that** said first counteracting means are a series of controlled-stroke fluid cylinder-piston units (103) acting on pins (66) which are slidingly located within holes in the wall of said channel and act on said leaf spring.

5. A fixture as claimed in claim 1, **characterised in that** in the centre of that wall opposite the wall on which the leaf spring is located, the clamp comprises, extending through its entire height, a recess in which there is located a shaft (81) which can be rotated by the action of a lever (83), to operate second means for counteracting said elastic means in order to set them in a completely inactive position.

6. A fixture as claimed in claim 5, **characterised in that** said second counteracting means comprise at

least one cam (82) keyed onto said shaft (81) and acting on a pin (85) which is located within a corresponding through hole in the clamp wall and is in contact with the spring on the other side of the clamp.

7. A fixture as claimed in claims 1 and 6, **characterised in that** the contour of said cam (82) is such as to deform the spring outwards by an amount such as to enable the movable body (64) to retract into the respective hole.

Patentansprüche

1. Spannvorrichtung zum Befestigen von Werkzeugen (4, 5) an der Werkzeugplatte (2,3) von Blechbiegebremsen, die ein Klemmelement (6) mit einem Kanal (63) zur Aufnahme des Werkzeugschaftes, eine Einrichtung (64) zum Tragen des Schaftes in dem Kanal, wobei er entlang des Kanals frei gleiten kann, und eine Einrichtung zum Arretieren des Schaftes in dem Kanal aufweist, wobei in einer der einander gegenüberliegenden Wände des Kanals parallel zu der Kanalachse mindestens zwei ausgerichtete Löcher (60) vorgesehen sind, in welchen frei gleitend ein bewegbarer Körper (64) eingeführt ist, der eine Größe aufweist, die größer ist als die Wanddicke einer der einander gegenüberliegenden Wände,
dadurch gekennzeichnet, dass
die Einrichtung aus einer an der Außenseite des Klemmelementes befestigten Blattfeder (9) zum Halten des bewegbaren Körpers in dem Kanal und aus einer der elastischen Einrichtung (9) entgegenwirkenden ersten Einrichtung (66) zur Aufhebung ihres Druckes gegen den bewegbaren Körper besteht.

2. Spannvorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
der bewegbare Körper aus einem Paar von Kugeln (64) besteht.

3. Spannvorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
der untere Teil der Blattfeder (9) in sich unabhängig voneinander verformende Abschnitte (93) unterteilt ist.

4. Spannvorrichtung nach Anspruch 1
dadurch gekennzeichnet, dass
die erste entgegenwirkende Einrichtung aus einer Reihe von Flüssigkeits-Zylinder-Kolben-Einheiten (103) mit gesteuertem Hub besteht, die auf Stifte (66) einwirken, die innerhalb von Löchern in der Wand des Kanals gleitend bewegbar angeordnet sind und auf die Blattfeder einwirken.

5. Spannvorrichtung nach Anspruch 1,
dadurch gekennzeichnet, dass
das Klemmenelement in dem Mittelpunkt der Wand, die der Wand gegenüberliegt, auf welcher die Blattfeder angeordnet ist, eine sich über ihre gesamte Höhe erstreckende Aussparung aufweist, in welcher ein Schaft (81) positioniert ist, der durch die Einwirkung eines Hebels (83) gedreht werden kann, um eine zweite Einrichtung zum Entgegenwirken gegen die elastischen Einrichtungen zu veranlassen, diese in eine vollständig inaktive Position zu verstellen.

6. Spannvorrichtung nach Anspruch 5,
dadurch gekennzeichnet, dass
die zweiten entgegenwirkenden Einrichtungen mindestens einen auf den Schaft (81) aufgekeilten Nocken (82) aufweisen, der auf einen innerhalb eines entsprechenden Durchgangsloches in der Klemmenelementwand positionierten und mit der Feder auf der anderen Seite des Klemmenelementes in Berührung stehenden Stift (85) einwirkt.

7. Spannvorrichtung nach den Ansprüchen 1 und 6,
dadurch gekennzeichnet, dass
das Profil des Nockens (82) so ausgebildet ist, dass er die Feder um einen solchen Betrag nach außen verformt, dass der bewegbare Körper (64) in dem jeweiligen Loch eingefahren werden kann.

Revendications

1. Dispositif de montage destiné à fixer des outils (4, 5) à la plaque porte-outils (2, 3) de cintreuses de métal en feuille, comprenant une pince (6) ayant un canal (63) destiné à loger une joue d'outil, un dispositif (64) de support de la joue dans le canal, laissant celle-ci libre de coulisser le long du canal, et un dispositif de blocage de la joue dans le canal, dans lequel, dans l'une des parois opposées du canal sont disposés, parallèlement à l'axe du canal, au moins deux trous alignés (60) dans lesquels est inséré un corps mobile (64) qui peut coulisser librement et dont la dimension est supérieure à l'épaisseur de paroi de l'une des parois opposées, **caractérisé par** un dispositif constitué d'un ressort à lame (9) fixé à l'extérieur de la pince et destiné à maintenir le corps mobile dans le canal, et un premier dispositif (66) antagoniste du dispositif élastique (9) et destiné à annuler la pression de celui-ci contre le corps mobile.

2. Dispositif de montage selon la revendication 1, **caractérisé en ce que** le corps mobile est constitué de deux billes (64).

3. Dispositif de montage selon la revendication 1, **ca-**

ractérisé en ce que la partie inférieure du ressort à lame (9) est séparée en portions (93) qui se déforment indépendamment les unes des autres.

4. Dispositif de montage selon la revendication 1, **caractérisé en ce que** le premier dispositif antagoniste est constitué d'une série d'ensembles à vérin à fluide (103) à course réglée agissant sur des broches (66) qui sont disposées afin qu'elles puissent coulisser dans des trous de la paroi du canal et qui agissent sur le ressort à lame.

5. Dispositif de montage selon la revendication 1, **caractérisé en ce que**, au centre de la paroi opposée à la paroi sur laquelle est placé le ressort a lame, la pince comporta une cavité qui s'étend sur toute la hauteur et dans laquelle est disposé un arbre (81) qui peut être entraîné en rotation par l'action d'un levier (83) pour la manoeuvre d'un second dispositif antagoniste du dispositif élastique afin que celui-ci soit placé en position totalement inactive.

6. Dispositif de montage selon la revendication 5, **caractérisé en ce que** le second dispositif antagoniste comporte au moins une came (82) clavetée sur l'arbre (81) et agissant sur une broche (85) qui est disposée à l'intérieur d'un trou débouchant correspondant formé dans la paroi de la pince et est au contact du ressort de l'autre côté de la pince.

7. Dispoeitif de montage selon les revendications 1 et 6, **caractérisé en ce que** le contour de la came (82) est tel qu'elle déforme le ressort vers l'extérieur avec une amplitude qui permet au corps mobile (64) de reculer dans le trou respectif.

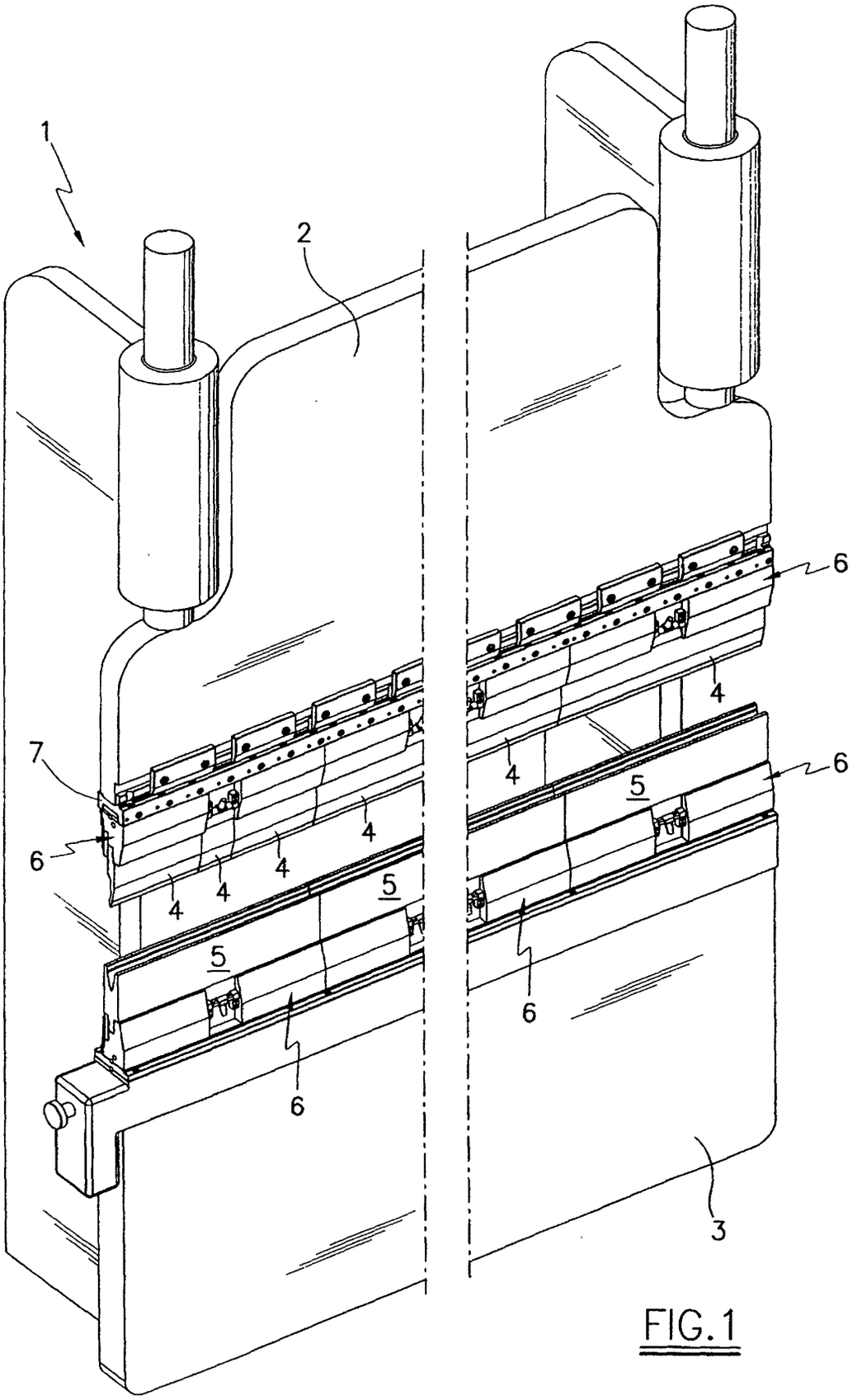


FIG.1

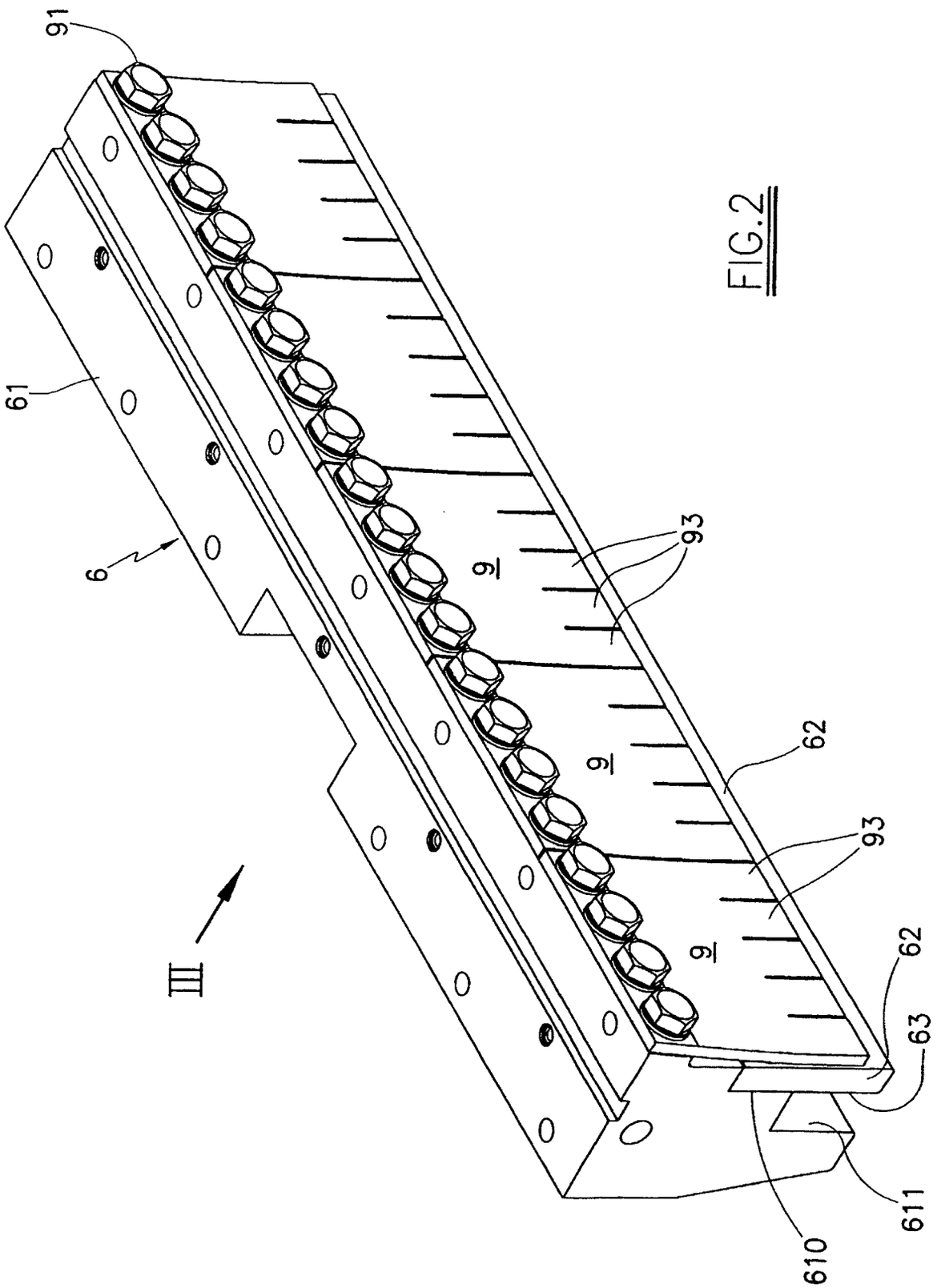


FIG.2

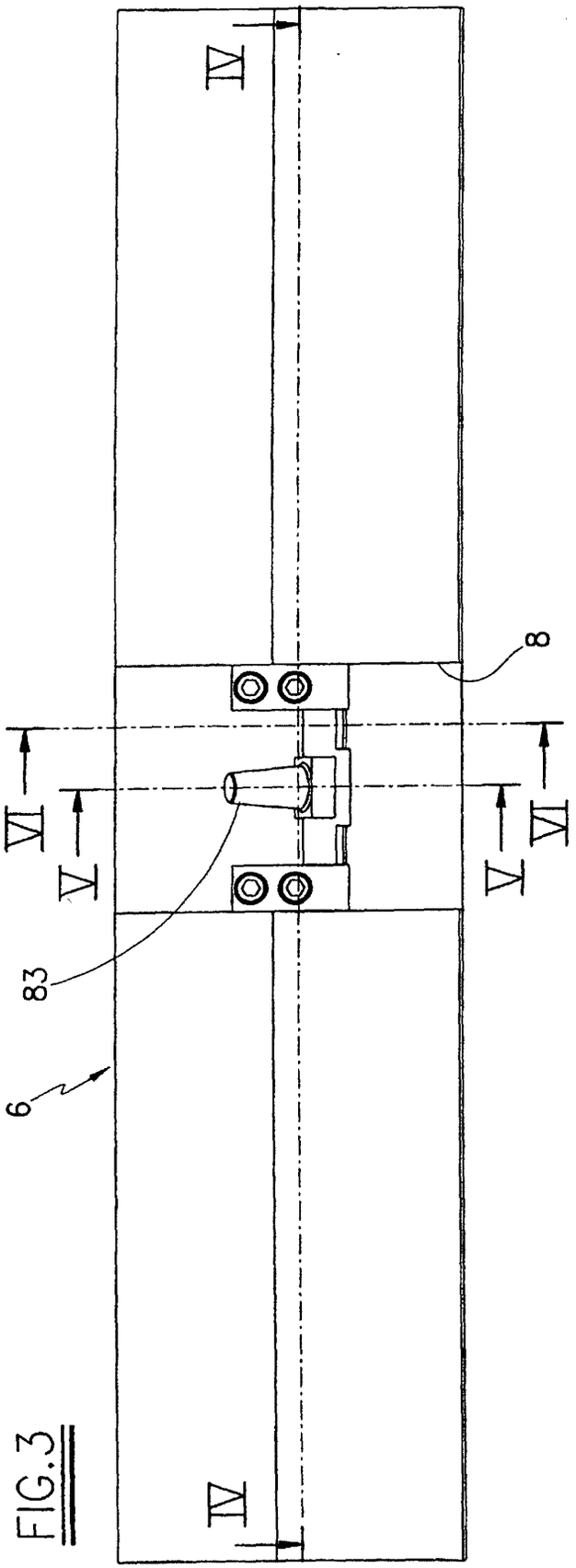


FIG.3

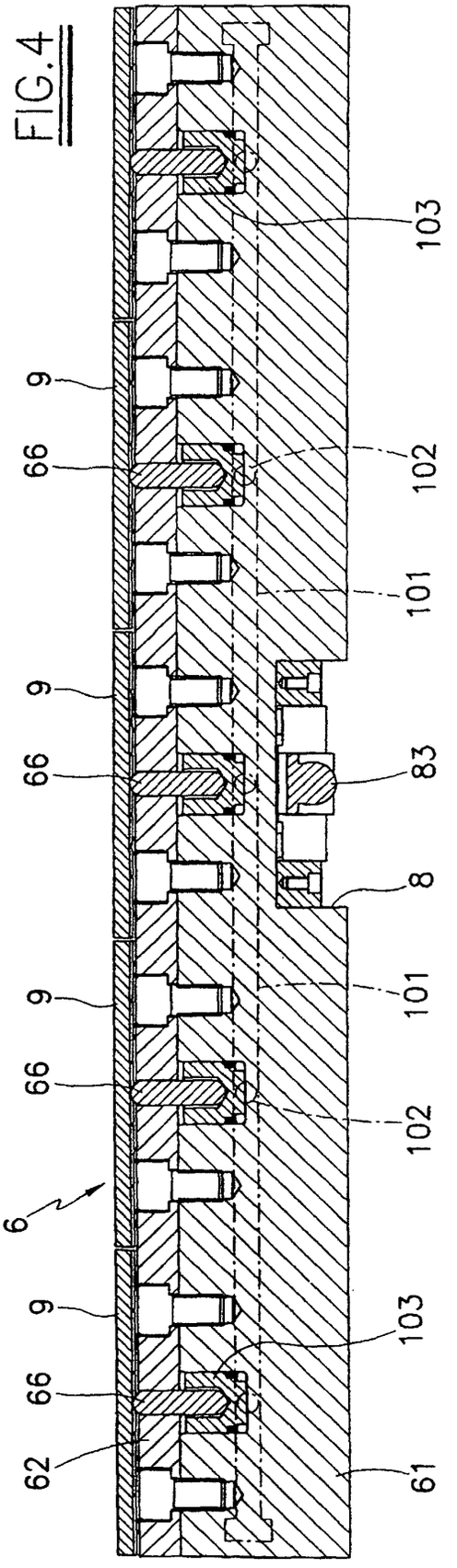


FIG.4

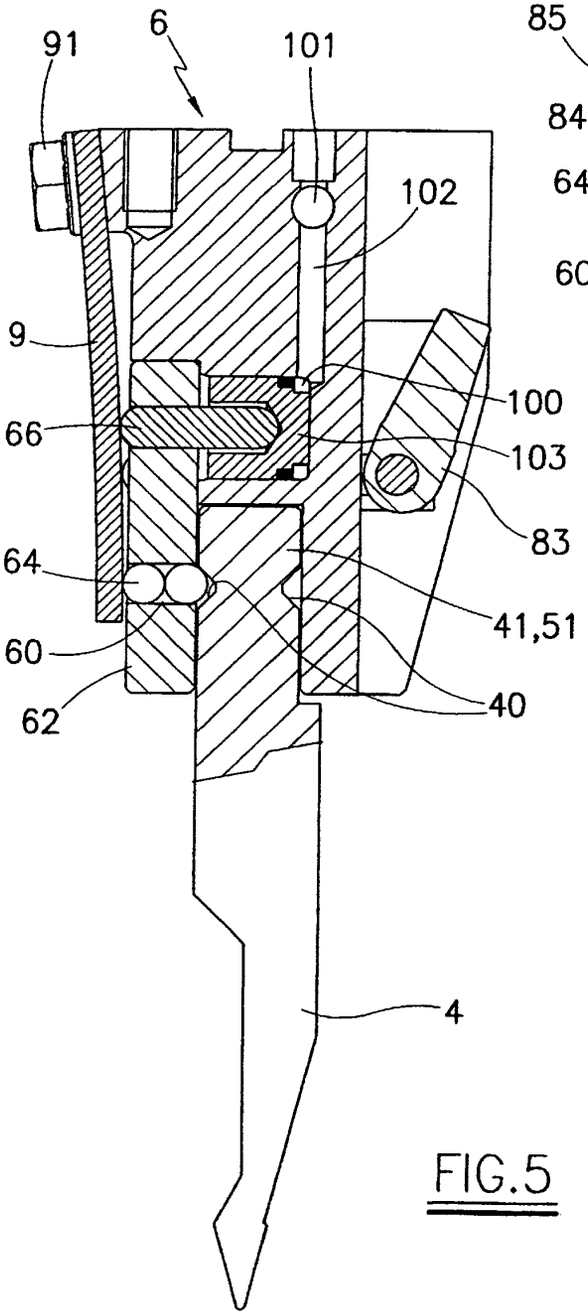

91
6
101
102
9
66
100
103
83
64
41,51
60
62
40
4

FIG.5

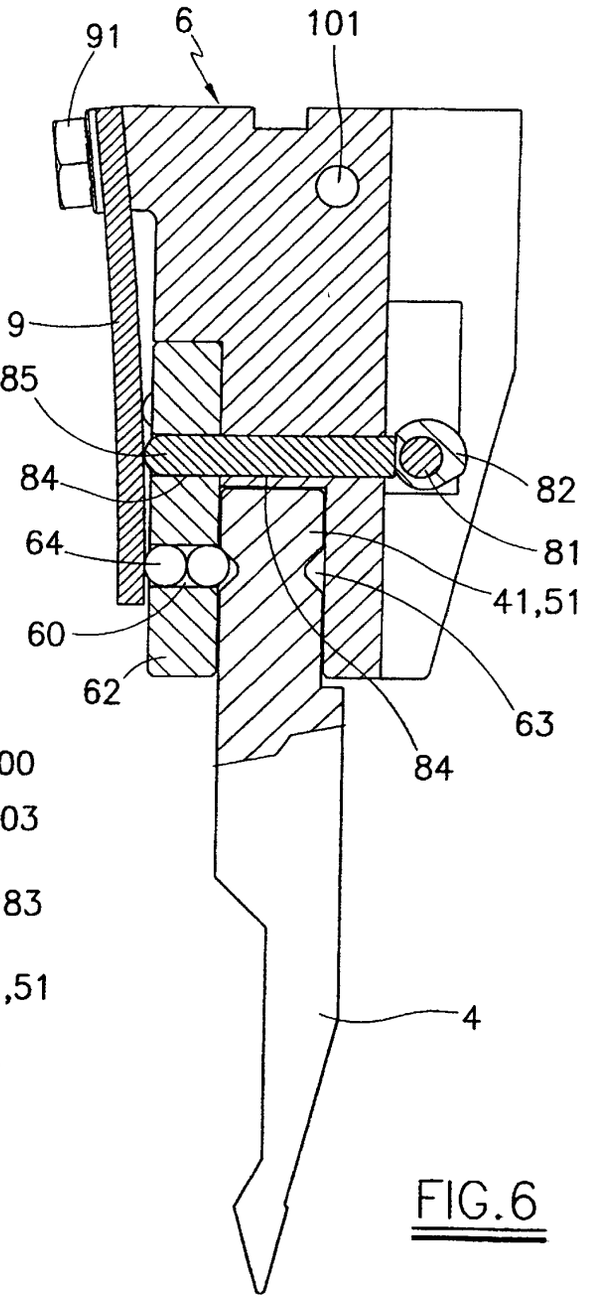

91
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FIG.6