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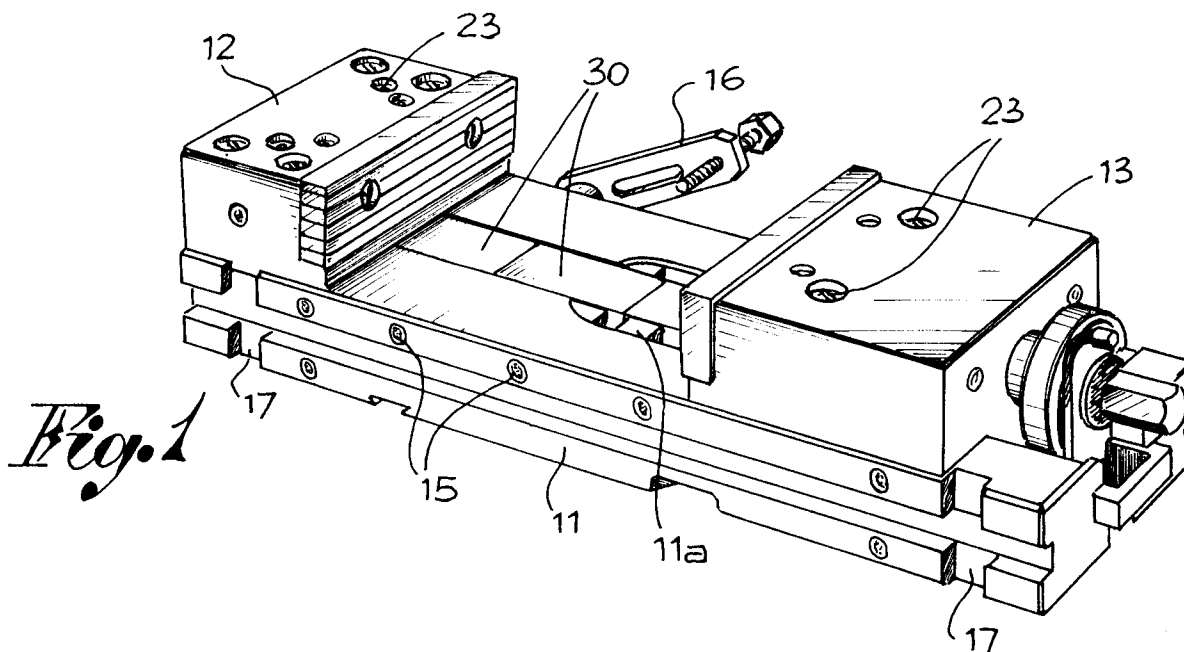
(71) Applicant : **CUTER S.p.A.**
29 Via Palazzolo
I-25037 Pontoglio (Brescia) (IT)

(72) Inventor : **Cuter, Pietro**
4 Via Martiri Ungheresi
I-25037 Pontoglio(Brescia) (IT)

(74) Representative : **Manzoni, Alessandro**
MANZONI & MANZONI - UFFICIO
INTERNAZIONALE BREVETTI P.le Arnaldo n.
2
I-25121 Brescia (IT)

(54) **Modular vices.**

(57) The invention relates to a vice in which the ram with a flat base (11) a slightly wider than the jaw holders (12, 13) and is fitted with threaded holes (15) in its sides for holding tools or for fixing the ram and has verticle millings (17) for connecting two or more aligned rams or added modules and has a row of datum or anchorage holes (22, 22a) on its flat base which are aligned on two orthogonal directions.



The present invention relates to vices for the locking of items being worked on, and in particular regards improvements to modular vices.

Various embodiments of vices, even modular ones, are already known but are susceptible to improvements from the constructive, functional and application points of view.

It is in fact the aim of the present invention to propose modular vices which have had improvements made to various parts in order to increase accuracy and performance, to simplify their use and to render them more reliable and versatile.

In each vice manufacture the ram has two longitudinal and transversal continuous slots on the lower surface which cross each other and are necessary for the fitting of the vice onto a support plane.

Holes with a constant distance between their centers are at least formed in the longitudinal slot to act as anchorage means of the vice. However, the presence of said slots reduces the size of the face of the ram and weakens its section therefore resulting in that the ram is locked it can bend along its axle negatively affecting the good functioning and accuracy of the vice until movements of the mobile carriage along the ram become impossible.

In order to attempt to eliminate these inconveniences, a vice ram having discontinued grooves of limited extensions in relation to the length and width of the ram have been proposed to replace the continuous crossed slots. This allows for the effective face dimensions to be increased and for the bending of the ram when it is locked to be eliminated up to a certain point but complicates the manufacture and especially the rectification and finishing operations of said grooves.

Furthermore, in both the above mentioned embodiments, the ram, therefore the vice, can only be fitted to support planes with tee slots whilst it cannot be fitted and anchored to prismatic supports, so-called cubes, or to plates bearing a grid of holes.

Another aim of the present invention is to completely eliminate the above mentioned inconveniences and disadvantages of the known vices on one hand and to supply a simpler and more economical embodiment of a vice ram which is of universal use on the other hand. In fact, the ram, therefore the vice, will indifferently be fitted to support planes with grooves or tee slots as well to all prismatic supports and/or plates bearing grids of holes with preset and standardized distances between the centers.

Further details of the invention will appear clearer following the description with references being made to the attached drawings in which:

Fig. 1 is a prospective view of a vice in accordance with the invention;

Fig. 2 is a plan view of the vice in Fig. 1;

Fig. 3 is a partial section side view of the vice;

Figs. 4 and 5 show two vice rams aligned and

joined in accordance with two different orientations;

Fig. 6 shows a detail of the joining method of two ram vices;

Fig. 6a is a similar view of the joining of two added modules;

Fig. 7 is a section view of the carriage and the relative control means in the maximum opening condition;

Fig. 8 is a view on the arrow "A" in Fig. 7;

Fig. 9 is a section view of the carriage and the relative control means in the maximum closing condition;

Fig. 10 is a partial section view on the arrow "B" in Fig. 9;

Fig. 11 shows a vice complete with a circular base;

Fig. 11a is a transversal partial section view of the circular base; and

Fig. 12 is a top view of a vice ram complete with positioning and anchorage holes;

Fig. 13 is a transversal section view on the arrows XIII-XIII in Fig. 12 with dotted lines of the vice carriage;

Fig. 14 shows a first shape of a datum lock; and Fig. 15 shows another shape of a lock.

The here proposed vice is essentially made up from a ram (11), a fixed jaw holder (12) and a mobile carriage jaw holder (13). Where necessary, the vice can be anchored to a rotating base (14) from the inside of the ram (11) without the use of brackets therefore leaving the vice cleaner and without further parts which could get in the way of the locking of the item.

The ram (11) is at least slightly wider than the fixed and mobile jaw holder (12,13). Threaded holes (15) are formed in both sides of the ram (11) for a double function. In the first place said holes (15) make up as many anchorage points for a lateral accuracy stop (16) with centesimal repeatability which is rectified for the items to be positioned and locked in the vice. An item stop can thus be used even when the items are of particular shapes or of large dimensions. In the second place said lateral holes (15) immediately offer the possibility of anchoring the vice on one side at an angle of 90° on any type of tool or support plane without the need of adjustments. This is also due to the fact that the jaws are narrower than the ram and therefore their use is not hindered when the vice is placed on one side.

The ram (11) is fitted with vertical millings or grooves (17) near the ends of both its sides which allow for an accurate and secure coupling of two or more rams aligned in order to form a longer vice or for the connecting of added modules to the ram of a vice.

Such an aligned connection can be carried out by placing the rams (11) one behind the other (Fig. 4) or one opposite the other, head to head, (Fig. 5) therefore without the need of a further more expensive

fixed double jaw.

In each case the connection of the rams is carried out through a pair of coupling blocks (18,19). A first block (18) has fixed teeth (18a) designed to be inserted in the verticle grooves (17) on one side of the rams; the other block (19) has one fixed tooth (19a) and a mobile tooth (19b) which can be adjusted and blocked by a screw (20). The mobile tooth (19b) has two oblique sides (Fig. 6) and sets in an oblique slots (21) formed in the coupling block (19). This coupling, and the possibility of adjusting it due to the mobile tooth in an oblique plane, ensures the perfect alignment of the vice rams and the absolute certainty of the blocking in order to prevent the connected rams from moving away from each other during the blocking, or worse still during the machining of the items between the jaws.

The lateral millings or slots (17) can also be used with another lateral coupling block with a pitch which is equal to the opening of the vice in order to prepare a longer vice by making use of two rams, but with the same strength of one.

The ram (11) also has (Figs. 12, 13) a row of datum holes (22) and another row of anchorage holes (22a). All the holes (22,22a) are through holes and in a perpendicular direction to the base of the ram.

The datum holes (22) are all of a predetermined diametre, for example of 16 mm with finishing (F7) and are aligned on two orthogonal directions, more precisely on the center line of the longitudinal guide (11') of the ram (11) and transversally to it. The anchorage holes (22a) are also aligned on the center line of the guide (11'), are placed between the datum holes (22) and each one has two areas of a different diametre, for example one lower area of a smaller diametre towards the base (Fig. 3) and an area of a larger diametre towards the guide (11'). Both the datum holes (22) and the anchorage holes (22a) have a different distance between the centres as well as being modular or multiple of a datum level which permits the application and fixing of the ram and, with it, of the vice to prismatic supports (cubes) or plates with grids of holes with predetermined distance between the centres as well as to grooved planes or plates.

Datum locks (116) with a flat rectangular base (117), (Fig. 14) can be by choice inserted in the datum holes (22) when dealing with fitting the ram onto a conventional grooved plane or plate or cylindrical locks (118), (Fig. 15) can be inserted when dealing with the positioning of the ram on a prismatic ram or on a plane with a grid of holes. Both types of locks (116, 118) obviously have a diametre and finishing level which is equal to that of the datum holes (22) and each one has a peripheral annular seal (119) for its forced insertion into the hole to which it has to be applied.

On the other hand, the anchorage holes (22a) have screws (not shown) inserted in them in order to

anchor the ram, thus the vice, onto the desired support.

The holes in the ram devised in this way render the vice suitable to be used immediately, and without the need for expensive screws with a ground shank for the datums, on cubes or plates with grids of holes of any pitch that can be found on the market.

The sides of the longitudinal guide (11) for the mobile carriage (13) are hollowed out (Fig. 13) in order to facilitate manufacture and to limit the finishing process up to only the surfaces (11'') against which the carriage beats when blocked.

Possible added modules which can contribute to the lengthening of a vice or to form a ram complete with a vice by themselves will have the same characteristics of the ram (11) described above, in particular with regards to the lateral vertical millings or grooves for the aligned coupling and the differentiated center line holes for the anchorage onto prismatic supports or planes with grids of holes.

The coupling between the added modules can also be carried out with attachment blocks with multiple teeth (19'), (Fig. 6a), in order to obtain a total lengthening and to reach the maximum opening without creating blind areas where the resulting vice cannot block. Such lateral attachments do not require to have space recovered for the teeth seeing that the verticle grooves (17) can be rectified.

As far as the jaw holders are concerned, both the fixed one (12) and the mobile carriage (13) are fitted on the top with at least a pair of holes (23) each which are defined by a cylindrical part with a smooth surface (23a) and by a threaded part at the bottom (23b), (Fig. 3).

Said holes (23a, 23b) are used for anchoring onto the jaw holders (12, 13) and to perfectly align elements, tools or special jaws at the same time with only two hardened and ground precision screws which are available on the market. Thus, the thread (23b) of said holes (23) never works by cutting but only by traction. Furthermore, the holes (23) can be clogged by brass screw plugs (24) when they are not needed in order to protect them against the penetration of chips and can be fitted with seals to protect them against the penetration of liquids which could lead to rusting.

The mobile carriage (13) is guided on the ram (11) in the guide (11') between two shoulders fitted with positioning and stopping notches (11a). The carriage (13) is controlled by a screw (24) which rotates in a sleeve (26) and is engaged in a threaded hole (25) defined by a nut (27') fixed to the carriage itself through a pin (27''). As can be seen in Figs. 7 and 9, the sleeve is axially guided, with the possibility of rotating, in a slot (28) formed in the carriage (13) and has an internal end that rests against a collar (25a) which is integral to the screw (25) through an anti-friction element. Such an end never comes out of the slot (28); on the other hand the external end of the sleeve (26) has a

flange (26a) designed to interact with the notch (11a) of the ram (11), the flange also having two notches (26b) which permit the axial sliding of the sleeve when aligned to the shoulders of the ram.

Substantially, the control screw (25) does not push the head against a side of the carriage (13) but interacts with the thread of the nut (27") always remaining protected inside the carriage and by the sleeve (26) against accidental knocks and the clogging of chips.

The flange (26a) of the sleeve (26) acts as a position clutch and is fitted with a safety bolt (29) able to guillotine insert itself between the shoulders of the ram (11) when the clutch flange is coupled to the stop notches (11a). The carriage, the screw and the sleeve with the bolt make up a single unit without any element which sticks out.

Therefore, the clutch flange (26a) is not anchored to the base of the guide for the carriage but to the notches (11a), thus without the danger of being badly positioned because of possible chips present in the ram. The vice therefore works even if encumbered by chips on the inside. Furthermore there is no need for keys or other things for the moving of the clutch and on the other hand the safety bolt indicates the correct positioning and prevents accidental uncoupling. The opening and closing conditions are shown in Fig. 7 and 10 of the drawing and can be defined by a spring stop (26').

Whatsoever, the mobile carriage (13) has a very long guide and has a gib (13') on its base extended on the side of the guide of the sleeve (26) of the screw which also constitutes a safety stop for the control screw. The long guide and the gib configured in this way give embodiment a much more accurate and stable coupling of the ram-carriage in parity to slack than in known manufactures.

As mentioned above, the vice can be assembled on a rotating base (14), (Fig. 11, 11a) made up from three rings which have a graduated scale for the indication of the rotation and having holes for datum pins and holes for anchorage screws.

Finally, it should be noted that even when the ram is encumbered by chips it does effect the functionality of the vice.

However, protection blocks (30), for example in nylon, are placed in the guide for the carriage in order to have the maximum cleanness and reliability. These blocks couple to each other and to the carriage thus preventing the penetration of chips into said guide.

Claims

1) An improved vice having a ram (11), a jaw holder (12) fixed on the ram, a mobile carriage jaw holder (13) slidable along the ram and a possible rotating base (14) on which the ram is fixed, characterized in

that the ram (11) is slightly wider than the fixed (12) and mobile (13) jaw holder, and in that both its sides have threaded holes (15) for the anchoring of tools or for the fixing of the vice on one side and has verticle millings or grooves (17) near its ends which are used for the connecting of two or more aligned rams or added modules.

2) A vice in accordance with claim 1 where the ram has at least one longitudinal guide (11') on the upper surface for the mobile carriage jaw holder and has means for the fixing of the stationary jaw holder, characterized in that the ram has a base with a flat surface (11) and in that a row of datum holes (22) and a row of anchorage holes (22a) are formed in an orthogonal direction to said base, the datum holes (22) being aligned on two orthogonal directions, one of which coincides with the center line of said longitudinal guide, the anchorage holes (22a) being placed between the datum holes aligned on the center line of said guide.

3) A vice in accordance with claim 2, characterized in that at least the datum holes (22) aligned on the center line of said longitudinal guide have a different modular distance between their centers.

4) A vice in accordance with claim 2, characterized in that the anchorage holes (22a) have a different modular distance between their centers.

5) A vice in accordance with claims 2 and 3, characterized in that said datum holes (22) are designed to hold corresponding datum locks (116, 118) whilst the anchorage holes are designed to hold screws for the fixing of the vice, each datum lock being cylindrical (16) with a possible rectangular flat base (117), the cylindrical part of the lock being fitted with an annular peripheral seal (119).

6) A vice in accordance with any of the preceding claims, characterized in that said connecting of two or more aligned rams is carried out by a pair of coupling blocks (18, 19), one block (18) having fixed teeth (18a) designed to be inserted in the verticle grooves (17) on one side of the ram, the other block (19) having a fixed tooth (19a) and a mobile tooth (19b) which engage in the verticle groove on the other side of the ram, the mobile tooth (19b) being positionable in an oblique slot (21) formed in said block and blocked through a screw (20).

7) A vice in accordance with any of the preceding claims, characterized in that the fixed (12) and mobile (13) jaw holders are each fitted with at least one pair of holes (23) on the top, each hole having a smooth part of the surface and a lower threaded part.

8) A vice in accordance with any of the preceding claims, characterized in that the ram (11) has two shoulders between which a mobile carriage (13) is driven and which have position and stop notches (11a), in that said mobile carriage (13) is controlled by a screw (25) which rotates and is protected in a guide sleeve (26) and engaged with a nut (27') fixed in the carriage, in that the sleeve (26) is axially slidable in a

slot formed in said carriage and has a flange (26a) designed to be inserted and to interact with said positioning notches (11a) during the blocking/unblocking of the carriage through the control screw, and in that the flange (26a) of said sleeve (26) is coupled with a safety bolt (29) in order to stabilize the coupling of said flange with said notches. 5

9) A vice in accordance with any of the preceding claims, characterized in that protective blocks (30) are inserted on the ram (11) in the guide (11') and are coupled between each other and to the carriage. 10

10) A vice in accordance with any of the preceding claims, characterized in that the ram is fixed onto a rotating base (14) made up from three assembled concentric rings and having holes for positioning pins and holes for the fixing screws. 15

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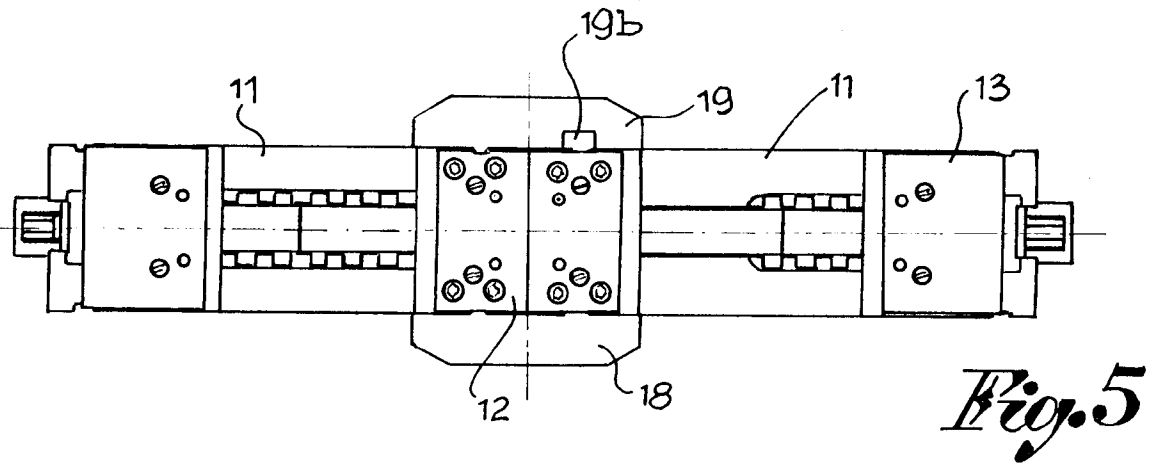
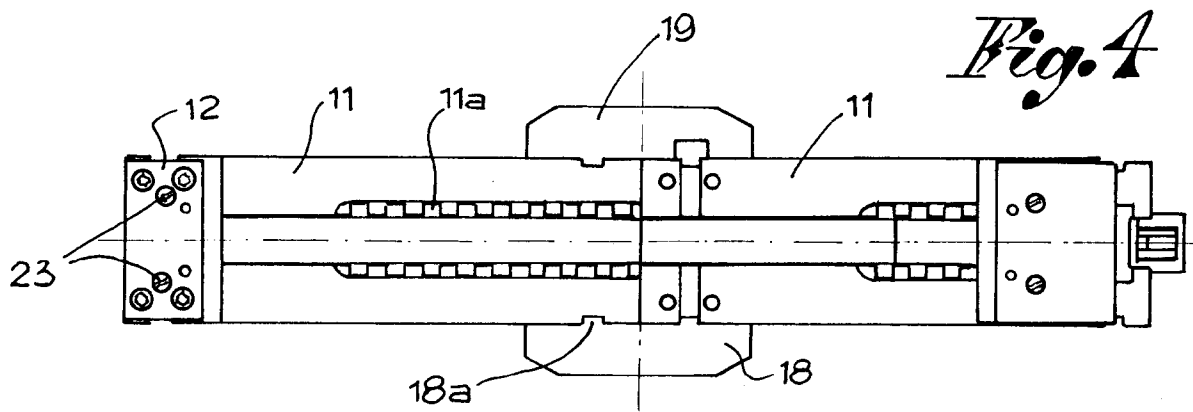
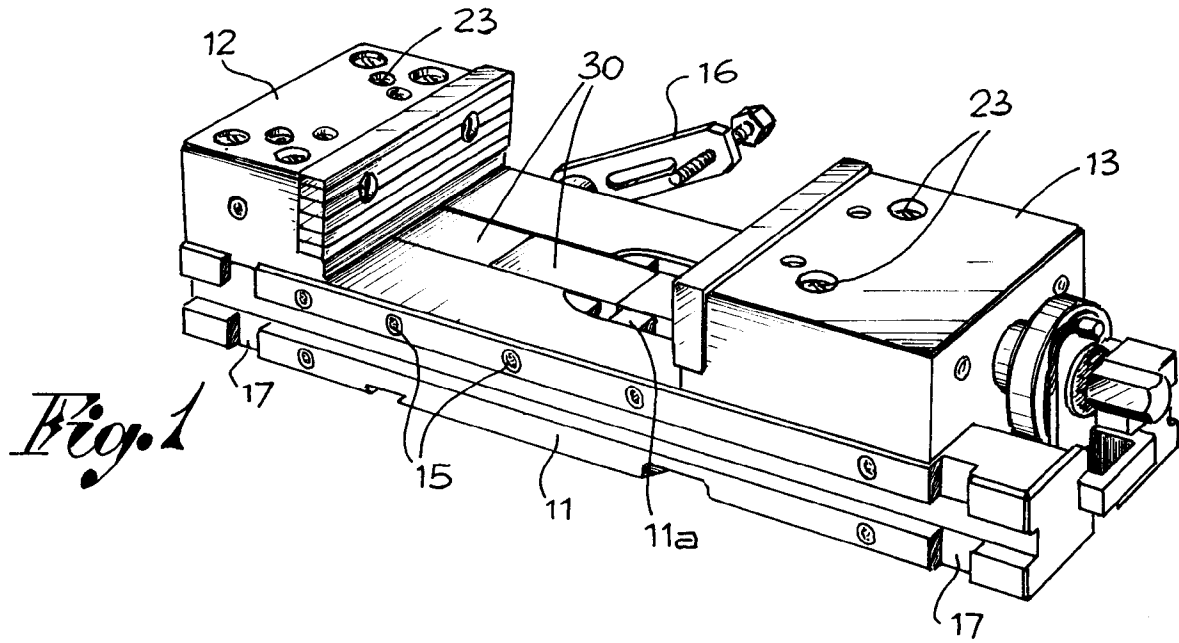
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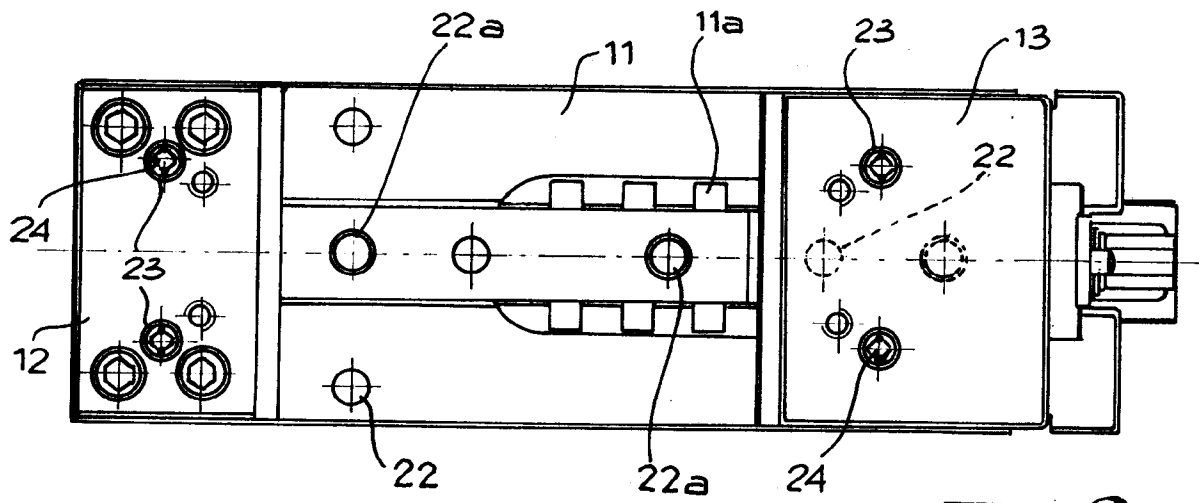


Fig. 2

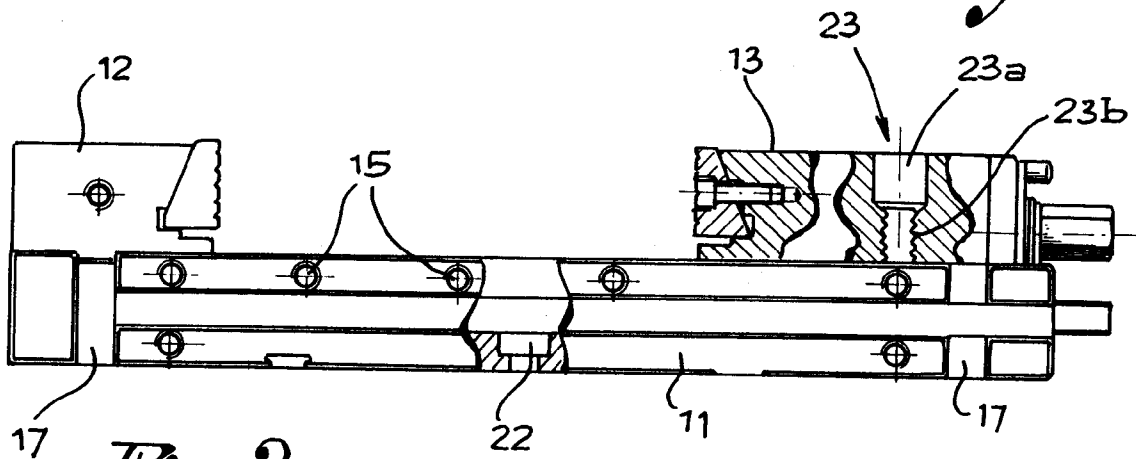


Fig. 3

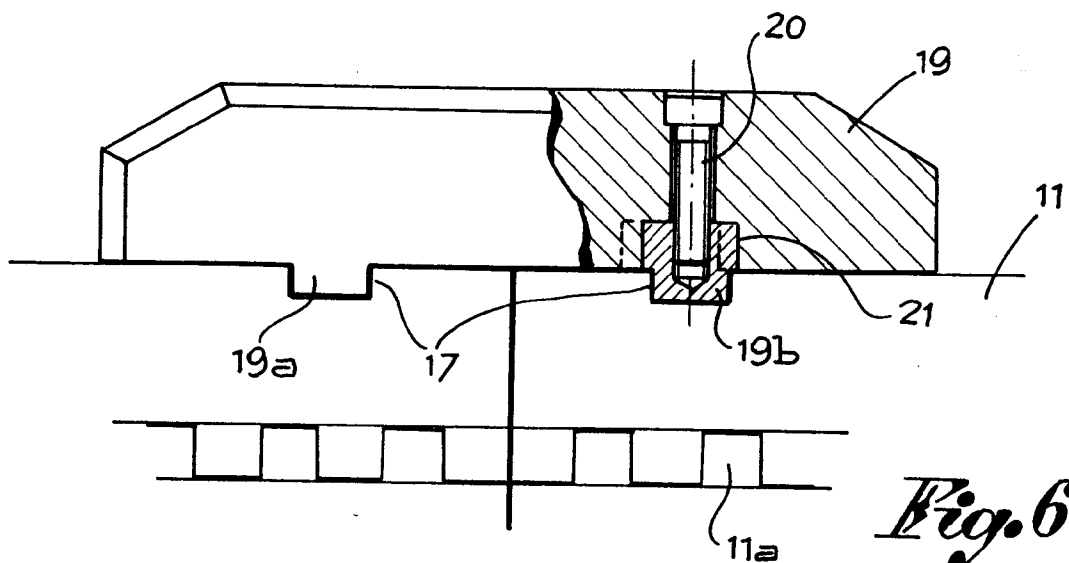


Fig. 6

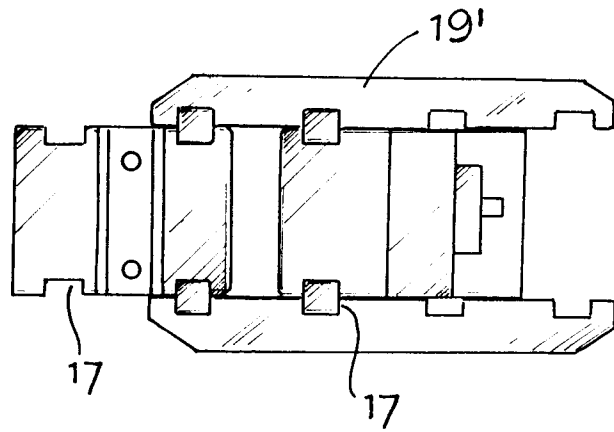


Fig. 6a

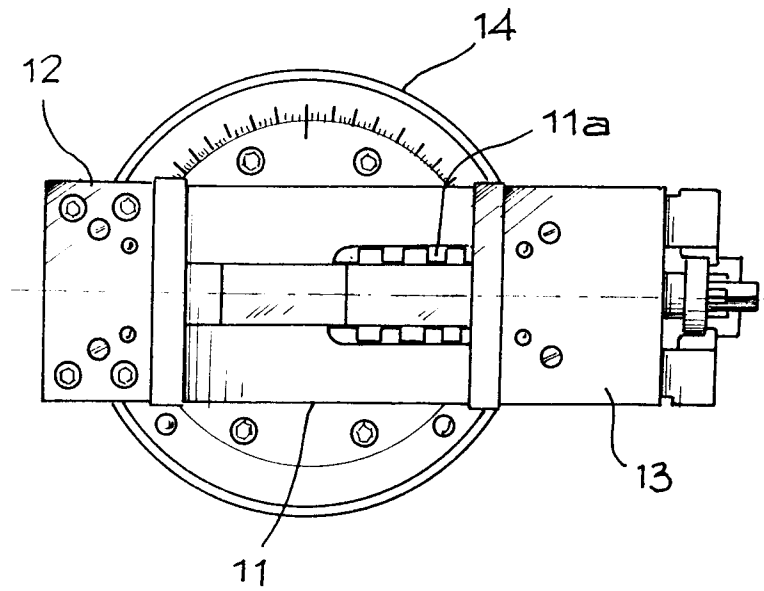


Fig. 11

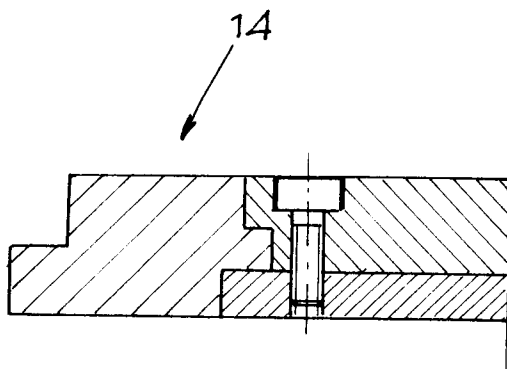


Fig. 11a

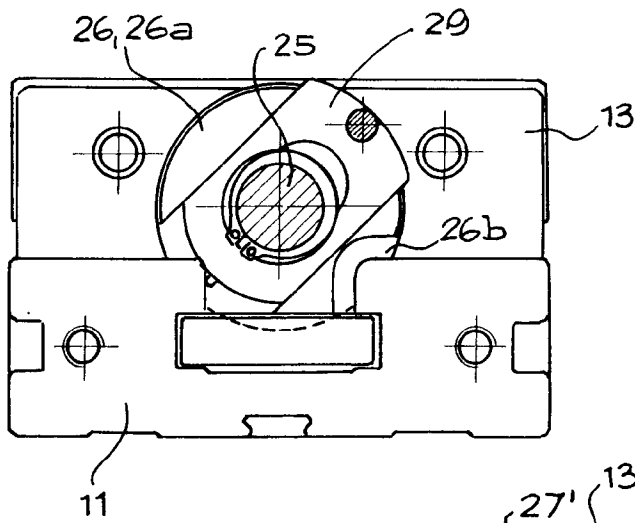


Fig. 7

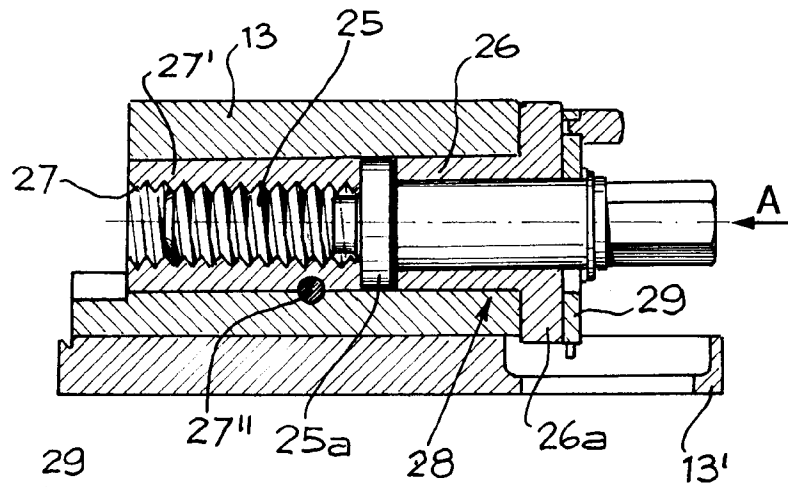


Fig. 8

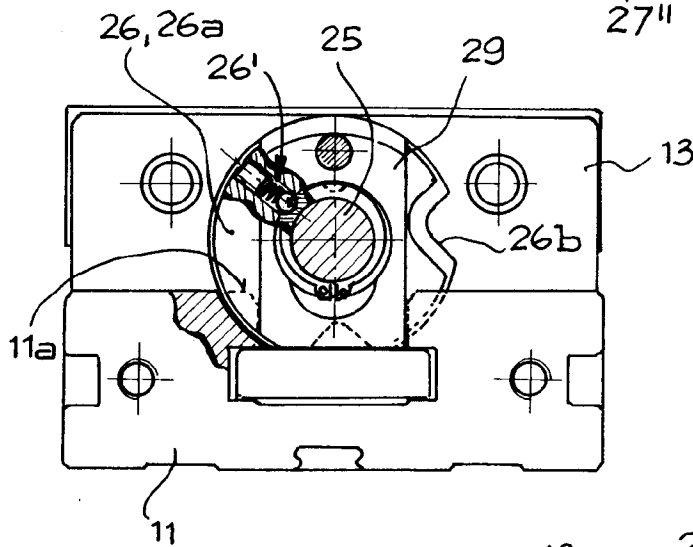


Fig. 9

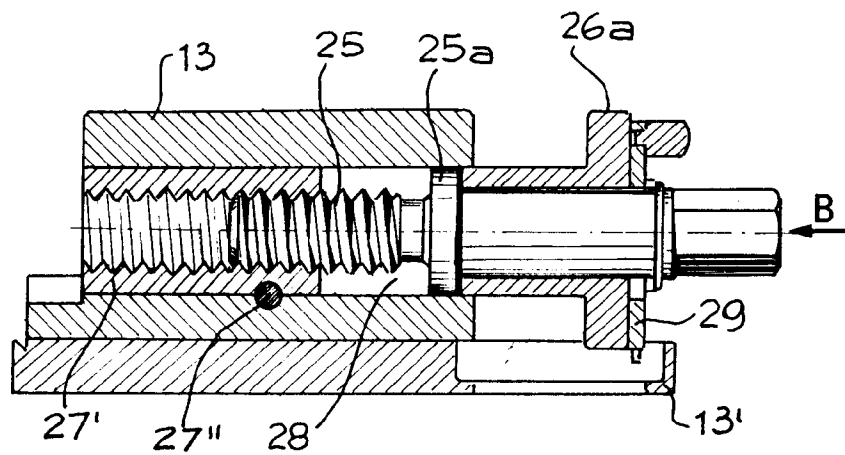


Fig. 10

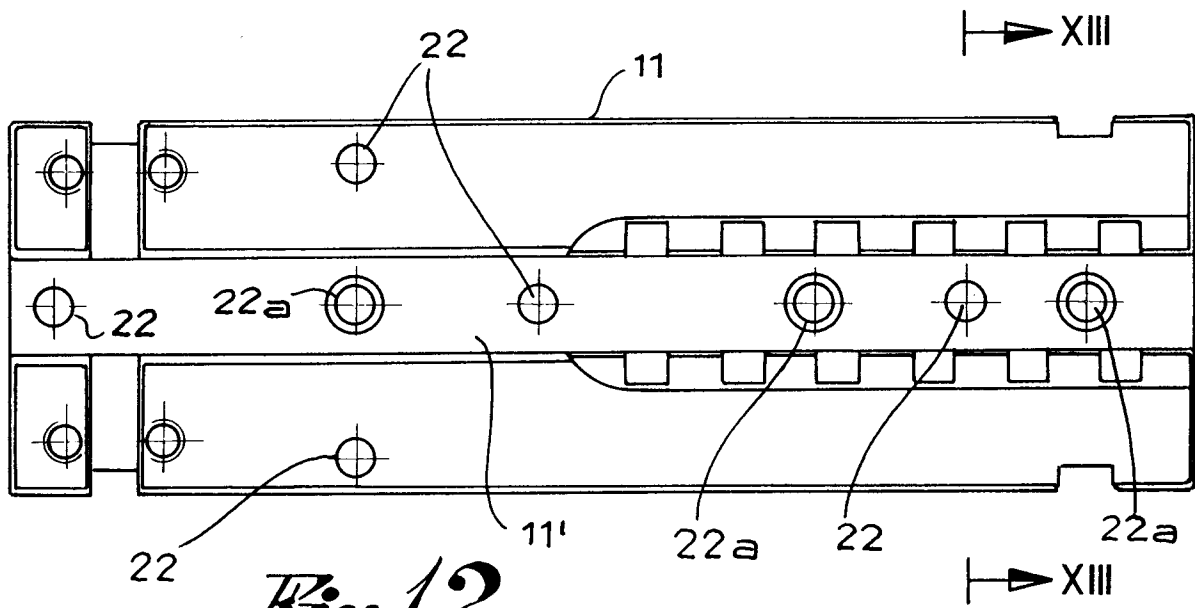


Fig. 12

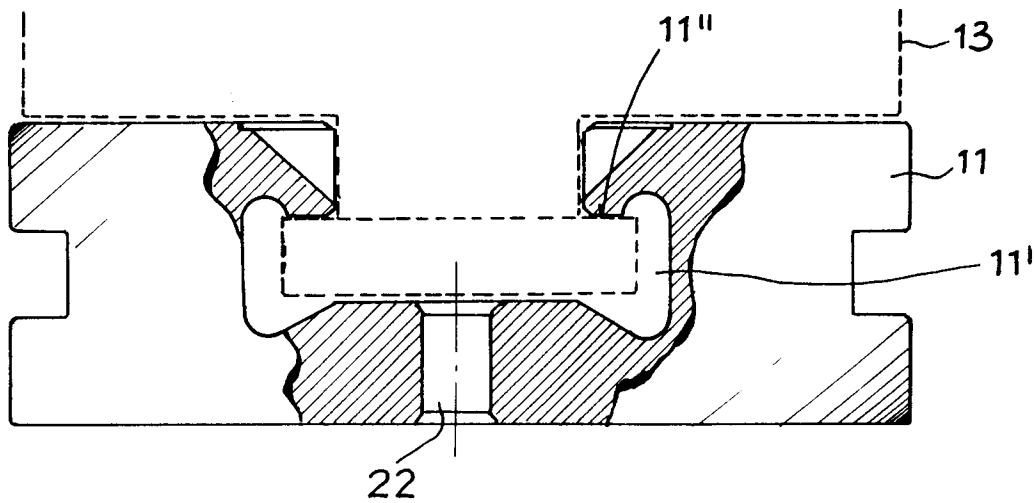


Fig. 13

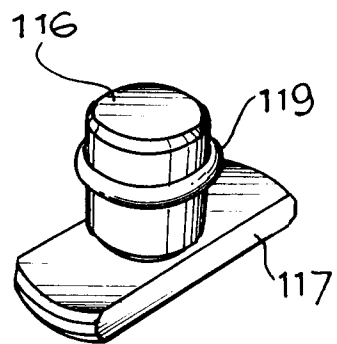


Fig. 14

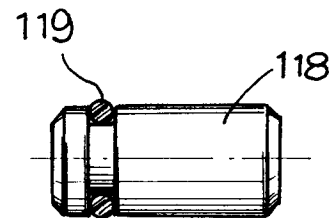


Fig. 15



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0417

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2 408 350 (MAUSER-SCHAERER GMBH) * page 19, line 1 - page 20, line 4; figures 1,21 * * page 26, line 7 - line 18 * ---	1	B25B1/24 B25B1/10
A	US-A-4 413 818 (J.O.LENZ) * abstract; figures * * column 3, line 14 - line 25 * ---	1	
A	US-A-2 345 708 (A.A.LINES) * page 2, left column, line 26 - line 29; figures 1,3 * ---	1	
A	DE-U-8 904 873 (GREMOLITH AG) * page 4, line 4 - line 5; figure 1 * ---	1	
A	DE-U-7 028 338 (SIEMENS AG) * claims; figures * ---	1	
A	FR-A-1 234 812 (L.DUVERT) * figures 1,3 * ---	10	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	FR-A-2 613 968 (ETABLISSEMENTS PEREZ) * figure 1 * -----	8	B25B B23Q
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 OCTOBER 1992	Examiner MAJERUS H.M.P.
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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