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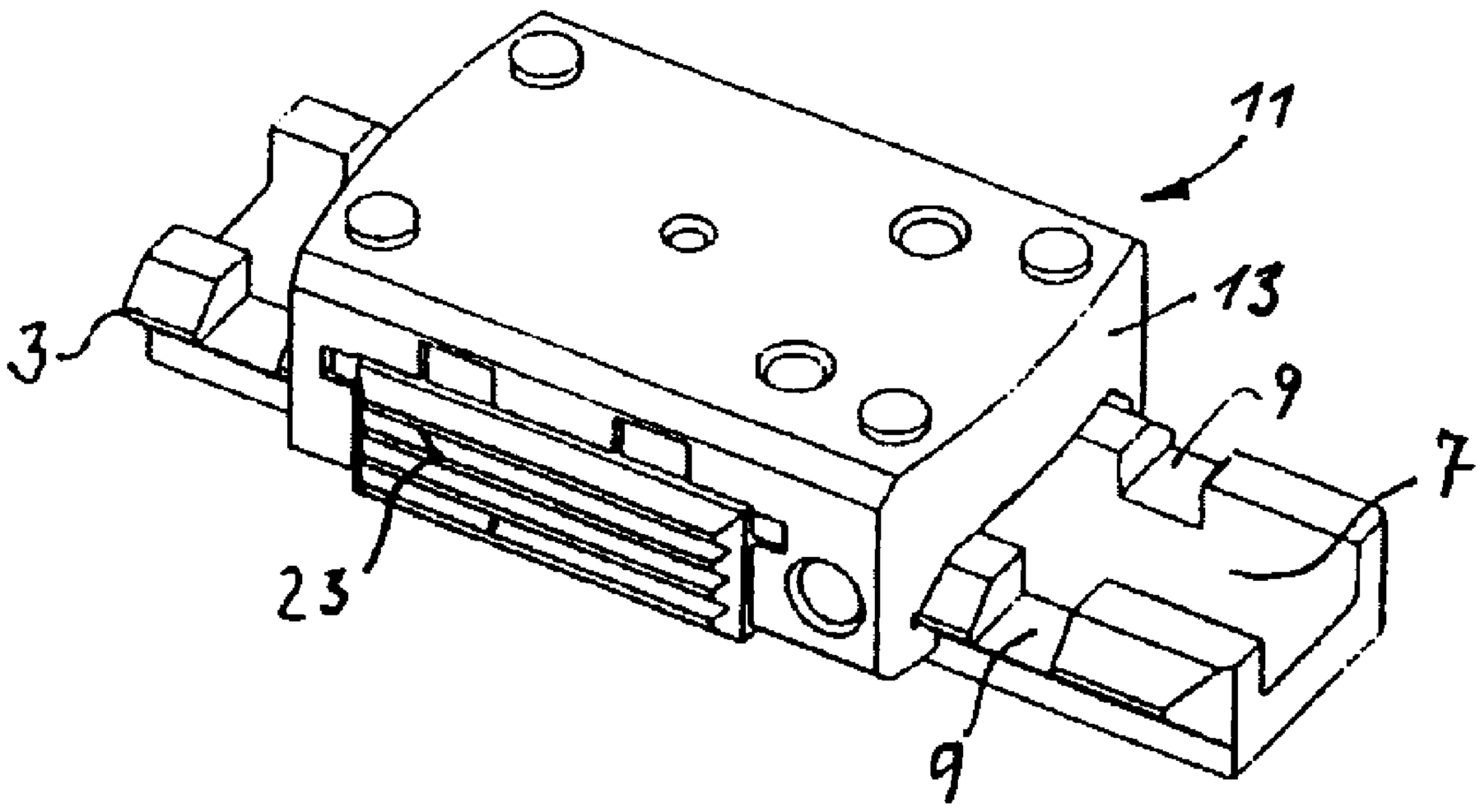

(57) Abrégé/Abstract:
The inventive mounting device, which is located on a fire arm, has a longitudinal mounting channel (1) on which a mounting base (11) can be placed, said mounting base serving as a device support. The mounting base is only held in place by the pressure of a predetermined spring force instead of being clamped tight in such a way that it cannot be freed without releasing the clamping device, as is customary. Therefore, it is also possible to produce the longitudinal mounting channel (1) from a plastic that can only be subjected to a limited compressive load per unit area.

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(54) Title: MOUNTING DEVICE FOR FITTING A TELESCOPIC SIGHT TO A FIRE ARM

(54) Bezeichnung: MONTAGEEINRICHTUNG ZUR ANBRINGUNG EINES ZIELFERNROHRES AN EINER SCHUSSWAFFE

(57) Abstract

The inventive mounting device, which is located on a fire arm, has a longitudinal mounting channel (1) on which a mounting base (11) can be placed, said mounting base serving as a device support. The mounting base is only held in place by the pressure of a predetermined spring force instead of being clamped tight in such a way that it cannot be freed without releasing the clamping device, as is customary. Therefore, it is also possible to produce the longitudinal mounting channel (1) from a plastic that can only be subjected to a limited compressive load per unit area.

(57) Zusammenfassung

Die erfindungsgemässe Montageeinrichtung auf einer Schusswaffe weist eine Längs–Profilschiene (1) auf, auf die ein Montagesockel (11) als Geräteträger aufsetzbar ist. Dabei wird der Montagesockel (11) nicht, wie üblich, so festgeklemmt, daß er nicht ohne Lösen der Klemmeinrichtung freikommt, sondern nur mit einer vorwählbaren Federkraft angedrückt. Deshalb ist es auch möglich, die Längs–Profilschiene (1) aus einem Kunststoff herzustellen, auf den eine nur begrenzte Flächenpressung aufgebracht werden darf.

PCT/EP00/03601

Mounting Apparatus

Description

The invention concerns a mounting apparatus for the installation of a telescopic sight, or the like, on a longitudinal structural rail placed or fabricated on a barreled weapon. The said rail exhibits respectively on both sides an outwardly facing, longitudinal groove or a longitudinal projection, into or onto which, a removable mounting base, possessing a ridge or groove, which is complementary for each of the sides of said mounting base, can be slidingly inserted in an axial direction as is outlined in Claim 1.

US 3 877 166 and EP 0 444 300 A3 are called into reference for the state of the technology.

There are a great many types of mounting apparatuses for the adjustable securement of telescopic sights and the like on weapons. In all, the common basic endeavor is, to fasten the mounted telescopic sight as securely as is at all possible, so that its relative positioning with the weapon never changes.

In the case of expensive hunting weapons, mostly mounting apparatuses which are custom-made by hand are employed, which possess the most precise, complex surfaces. Where sport weapons and military weapons are concerned, on the other hand, preference is given mostly to more simple and robust mounting apparatuses, which revert to the basic form of the so-called insertion types. In the present invention, the concern is with such mounting apparatuses.

In the case of such an insertion mounting, on the weapon itself, a rail with a dovetail recess is installed or integrally designed thereon. On the telescope tube, or the like, is a removable foot or a mounting base with a complementary profile, which permits a sliding engagement on the said rail with little play.

The rail can be placed on the upper side of the weapon, so that its surface, at normal firing position, runs horizontally. This can, however, be installed on the side of the weapon, so that at normal firing position, the surface runs vertically. The said rail may be installed at other positions and then coupled with the weapon, such as in the case of a vehicular MG-gun mount. The length of the rail need be only a few centimeters. On the other hand, it can be significantly longer.

A clamping device, in the simplest version, a set screw, penetrates through the mounting base and serves the purpose of affixing this securely to the dove tail excision of the rail. The shaft of the set screw, when this is done, is arranged in such a manner between the mounting base and the rail, that the position of the telescopic tube, in the axial direction of the weapon is always reliably reproducible. Such a mounting apparatus is to be seen in the US-A-3 887 166 (Ward). This known mounting apparatus is advantageous, because it is compactly made and of small size. The disavantage lies in a complicated insertion procedure and in discovering the proper fastening position, as well as in the necessarily high level of precision in manufacture.

It is also possible to subdivide the mounting base longitudinally and to move a first part relative to a second out of engagement with the rail. In this case, the mounting base must not be thrust in an axial direction to engage the rail, but can be affixed on this at an optional position by means of displaceable parts. When these parts return into their original positions then they engage the rail and clamp this securely. Such a mounting apparatus is made known by EP 0 444 300 A2 (Repa). In this text a longer, off-center linked lever is shown, which, proximal to its end is pivotably fastened on a part of the mounting base. The short end of the pivoting lever is connected to the other part of the mounting base by means of a knee-linkage mechanism, which allows this other part to press with considerable force from the outside against the rail, that is, in a direction contrary to the first part. Since the knee-linked lever mechanism is bent when idle, it exercises a force in the direction of a reverse movement of the movable part.

On this account, a strong plate-type spring packet is provided, which compensates for this retromovement and at the same time, holds the pivoting lever securely in the bent position of the knee lever mechanism.

The last described mounting apparatus is advantageous, because it can be quickly installed and removed, and because the plate-type spring packet can compensate for inexactness in the manufacture. The disadvantage, however, lies in its bulky body, which is necessary because of the long, pivoted lever.

Using this state of the technology as a starting point, the purpose of the invention is to so comprehensively improve the known mounting apparatuses, that their advantages remain in force, but their disadvantages are, to the greatest possible extent, removed.

This purpose is achieved, in accord with the invention, by means of the object of Claim 1, also, in that, in the case of a mounting apparatus that resembles EP 0 444 300

A2 (Repa), that mechanism for clamping will be avoided and instead of this, the clamping force for securement of the two parts of the mounting base on to the rail will be supplied by a spring arrangement. Further, the force of the spring, in regard to the placement and removal of the mounting base to the rail, may be overcome by the fingers of the user, since said force does not essentially overstep about 5 kg (See Claim 1).

At this point, an old tradition of more than a century is broken, in accordance with which tradition one of the securements of the mounting base to the weapon must be absolutely form fit and axially transverse. This type of securement excluded relative displacement of the holder and the weapon in a transverse direction under all conditions. The invention binds the mounting base with the rail by means of an engagement element, which element maintains a gripping action only by a limited spring force, which is releasable by external effort. The relative positioning in a transverse manner is entirely possible.

Up to this time, a precondition of every mounting apparatus was, that under all circumstances, the retention of the telescopic sight on the weapon must be protected. Following this design, then if the weapon should fall from a highly placed blind, for instance, even though the stock might break off, the telescopic sight must remain in place.

Knowledge, gained from the invention, teaches that by a definite impact force against the telescopic sight, night aiming telescopes, or the like, the impacted instrument is subject to damage, which at least makes a repair necessary and precludes its immediate reuse.

An example would be, if a weapon with a night aiming scope fell from a two meter height onto a street pavement. In this case, the night-scope would yield no further images. On this account, it is better if the scope does not have to remain fastened onto the weapon. More likely, in that case, the possibility exists that the momentum of the falling night-scope so loads the invented spring arrangement that the locking of the night-scope apparatus is released. From this standpoint, it may well be considered, that when the apparatus is mounted in accord with the invention, then, upon the dropping of the weapon with the mounted scope, this scope, because of its being released from the weapon, is indeed thereby protected. If the mounting was by the prior state of the technology, damage would have been unavoidable.

It is of further advantage, in that in accord with the invention, all long clamp-levers and also the considerable amount of precision in craftsmanship are done away with, since the spring arrangement has the capability of compensating for inexactness without difficulty. In any case, a set screw is necessary, in order to adjust the clamping force of the spring loading.

The invented mounting apparatus, however, gives preference to the form fit connection between the rail and the mounting base, in order to prevent the base from slipping out as a result of external forces (Claim 2). In the case of the two known mounting apparatuses, as mentioned in the introductory passages, the mounting base is secured on the rail by such a clamping action, that it cannot be disengaged without damage.

Indeed, in the US-A-3 877 166 (Ward) likewise, a form fit connection by means of a transverse bolt is taught, but this serves only for the positioning of the mounting base, not for the retention of the same against accidental axial sliding along the weapon. This sliding is sufficiently prevented, in the state of the technology, by means of the tight clamping, so that in the said US-A-3 877 166 (Ward) design, an additional form fit holding means is not required.

In the case of the present invention, on the other hand, a projection on the mounting base engages in a form fit manner into a transverse groove of the rail, because the clamping action due to the force of the spring does not, in every case, suffice, in order to prevent the mounting base from slipping from the weapon upon which it is carried.

However, it is to be mentioned, that the spring force of the invented mounting apparatus, as a rule does suffice, to hold a telescopic sight, or the like, immovably on a weapon when the weapon is normally manipulated. The user, on this account, would detect, as a rule, no difference between the mounting apparatus of the invention and a mounting apparatus of the state of the technology mentioned in the introductory passages. The exception to this would be, that the mounting base is clearly smaller, and that the clamp-lever is absent with the result that the manipulation has been simplified.

It is possible, to construct on both sides of the rail, respectively a projecting edge against which the two parts of the mounting base can engage with an outward directed force from the inside, since they are being held apart by the force of the spring. Extensions of these parts, which can be held by the fingers of the user, need only to be pressed together for their removal. At least one chamfering on the two parts can take care, that the mounting base, while being attached, need only be pressed against the rail. The chamfers engaging into the edges of the rail, press the two parts of the mounting base

together, thus overcoming the force of the spring. In a trough-like rail, designed in this way, dirt can easily collect, especially if it is horizontally mounted on the upper side of the weapon.

On this account, the two side edges of the rail are held by encasement from the outside, since otherwise, an insufficient seating on the rail would result. The force of the spring loads the two parts of the mounting base against one another. Additionally, in the spring arrangement, a sliding part is run into a fixed part, and the sliding part extends beyond the side of the fixed part to form a hand grip. If one finger presses on this hand grip, while another finger braces the fixed part, then, the force of the spring is overcome and the two engaging edges (with respectively a groove or a ridge) are moved away from the complementary side edges of the rail (with respectively a ridge or a groove).

Further, that sliding part, which is provided with the hand grip, is designated as a depressible part, while the other part is, as said, a fixed part. The pushing of the depressible part into the fixed part assures, that a mounting base, constructed of two parts, can be sufficiently longitudinally stable.

A particularly simple design on the mounting base is a transverse pin, round in cross section, which, in the case of a mounting base which is being set in place, extends itself parallel to a cross groove and seats itself therein. This arrangement does allow placing the transverse pin in the depressible part. It is, however, more practical, to place the said transverse pin in the fixed part of the mounting base, since in that case, the danger does not exist, that the movement of the depressible part is prevented by the impingement of the transverse pin on the said cross groove (Claim 3).

Preferentially, the transverse pin is placed next to the depressible part, thus, when viewed in the longitudinal axial direction of the rail, either before or behind the depressible part, so that the transverse pin does not need to penetrate the depressible part, (Claim 4).

In the case of a hunting weapon, which is used by an individual marksman and with only an single telescopic sight, it suffices to place only one transverse groove in the rail, as this is taught in the US-A-3 877 166 (Ward). In the case of the mounting apparatus in accord with the invention, however, several cross grooves are designed into the rail (Claim 5).

Thus the mounting base with the transverse pin can be set into the most appropriate, respective cross groove. In this way, it is also possible to arrange a telescopic sight at the optimal distance away from the eye, if the marksman is wearing a thick safety vest and winter clothing. Optional other apparatuses can be obtained for the one and the same weapon, such as a night-sight telescope, a laser aiming device, a sighting telescope for special munitions, a grenade launcher, or the like. These, in accord with length and weight, possess one or more mounting bases and, with the transverse pin of one or another mounting base, be placed respectively in an appropriate cross groove of a rail.

It is of a particular advantage, in the case of a further embodiment of the present invention, to extend the rail forward, somewhat toward the end of the forward stock, or indeed all the way to the muzzle. An optical or illuminated bead can likewise be set in place as can entire combinations of optical telescope sights and image enhancers or image transducers, in order to obtain a high capacity, aiming device for night use, or to have at hand an infrared night scope. These often lengthy constructed pieces of equipment can then be attached with two, or even with still more mounting bases. Where this is the case, the attachment by means of a chamfer on the under edge of the depressible part is facilitated, in that the engaging edge is proximal to the rail. In the course of mounting, the aiming equipment needs then, only to be pressed against these edges. In any case, for the removal of each mounting base, only one hand is necessary, which presses in the depressible part. It is, however, possible to augment the depressible part with a capture device, or a retainer, in order to keep it in the depressed position. In this case, the said chamfer is not required.

For several decades, pressure cast molding has been used in the manufacture of precision parts for weapon construction. In this process, either zinc (because of its low melting point and sufficient structural strength) or plastics. It would be well, to economically manufacture at least the rail likewise out of such material (Claim 6).

The materials, however, have the inherent disadvantage, that they yield under too high a pressure.

If a steel pin is struck to make a press fit in a boring of a zinc workpiece, a day later, without any trouble, the said pin can be easily removed from the boring, because it occupies only a light transition fit therein.

The said material, in this case, has recrystallized to the point, that the crystalline matrix, under tension, has reoriented itself. Known mounting apparatuses with a rail

made of plastic or zinc, on this account, are scarcely useable. In the case of such construction, it is practically unavoidable, but that an extreme clamping force acting on the material of the rail will give rise to a yielding.

Under these circumstances, a plastic rail on a weapon would be of particular advantage if the rail is to extend itself at least beyond approximately the length of the forward stock, more or less to form a device carrier for universal application. Namely, a plastic rail could be still lighter in weight than a light metal rail.

Nevertheless, and in a surprising manner, the mounting apparatus of the invention, makes possible the use of zinc or plastic for the rail. The reason for this, is that the spring force, with which the parts of the mounting base are kept in firm combination with the rail, is strictly specified. Even in cases of unfavorable tolerances and inaccurate adjustment, the force of the spring, which supplies the clamping action, remains somewhat at the same magnitude. A clamping based on threaded engagement, on the other hand, when the adjustment is inexact, can cause a substantial increase of the clamping force, which can lead even to the pulling out of the clamping screw. The prerequisite is a spring arrangement, which changes its spring force somewhat linearly to the spring travel, and does this only in a small amount, not, for instance, in the manner of a plate spring as presented in EP 444 300 A2 (Repa). A spring arrangement of one or two prestressed, helical compression springs of wire have proven well in service.

In order to avoid damaging surface pressures, the dimensioning does not have to be all too small and, as a rule, are greater that in prior mounting apparatuses. As to the width of a rail, when made of plastic, measured transverse to the longitudinal axis of the weapon, and specifically the distance between the two gripping edges, a dimension of 20 to 25 mm has proven effective. The length of the gripping section of the mounting base, runs about the same. The material of the mounting base is, preferably, light metal, perhaps an aluminum alloy, since such metal, when under the loading of the spring arrangement, can transmit higher surface pressures than are allowable for plastic or zinc.

The invention will be described and explained in greater detail with the aid of one embodiment and the attached, schematic drawing. The drawing shows in:

Fig. 1 a longitudinal section through a mounting apparatus in accord with the present invention wherein the telescopic sight, or the like, which is to be carried on the mounting base, has been omitted for clarity of illustration,

Fig. 2 a side view of the mounting apparatus of Fig. 1, seen

from the "Z" aspect. (X, Y and Z axes, per Fig. 8),

Fig. 3 a top view on the mounting apparatus of Fig. 1,
Fig. 4 section A-A of Fig. 2,
Fig. 5 section B-B of Fig. 2,
Fig. 6 section C-C of Fig. 2,
Fig. 7 section D-D of Fig. 2, and

Fig. 8 the mounting apparatus of Fig. 1, seen in perspective from an elevated, inclined viewpoint.

All Figures show the same mounting apparatus, which show an enlargement of 1.5 times. All reference numbers throughout, in all Figures, represent, respectively, the same objects.

Generally, concepts such as "above", "forward" and the like, are based on the normal firing position of a weapon, in which the shooting direction is horizontal. "Forward" indicated in the shooting direction.

The mounting apparatus encompasses a rail 1 of plastic, which is preferably formed by the injection process, molded on a core of glass fiber reinforcement, or the like, and exhibits:

- a massive underpart 2, which has an approximately rectangular cross-section and is mounted on the upper part of a weapon,

- two upper parts 4, which are located on both sides of the underpart 2 and each show a square cross-section which extends itself outward into an equilateral triangle, and indeed so, that the exposed apex of this square-triangle extends outward and respectively forms

- the longitudinal gripping edges 3, 5 which extend themselves outward beyond the underpart 2.

Between the two upper parts 4, a longitudinal, upward opening, groove 7 has been excised. This groove serves to save weight and besides this, contributes to maintaining a somewhat equal wall thickness in the rail 1, so that casting faults are avoided. In the rail

1, are installed, transverse to its longitudinal axis, a plurality of cross grooves 9, which extend themselves through the upper part 4 of the rail and in depth, do not quite reach the bottom of the longitudinal groove 7. The shape of these transverse grooves 9 have the form of squat, horizontal rectangles.

The rail 1 extends itself from a position on the weapon above the that part of the stock near to the breech up to a position above the forward end of the stock and, in this securement, is only fastened at two places. At one of these two places, the rail 1 is secured in all three coordinate directions, at the other, only in two coordinate directions, similar to a bridge cantilevered with one end in abutment and the other free. The advantage of such construction being to allow heat expansion to occur relative to the weapon, without danger of distortion.

On the rail 1, is seated a mounting base 11, which is comprised of a depressible part 15 and a fixed part 13. The fixed part 13 possesses on both ends, and respectively at both sides, a claw 17, 19, which is shaped complementary to the gripping chamfer 5 of the rail 1, and thus engages said chamfer 5. In this arrangement, one of the claws, i.e. 17 of the pair 17, 19, is designed to be shorter in its length (that is in the direction of the extension of the rail 1) than is the other claw 19. The body of the claw is penetrated by driven in transverse pin 21, which pin, in the case of setting of the mounting base 11 on the rail 1, engages in a cross groove 9 thereof, with little or no play.

The depressible part 15, in a transverse direction, is slidably movable into the fixed part 13. The depressible part 15 extends beyond a longitudinal side of the fixed part 13 – in this case, from the side of a gripping edge 5 – and possesses at that place a handgrip 23, which protrudes from the side of the mounting base 11 and may be pressed by hand into the interior of said mounting base 11.

Within the mounting base 11, lie two, mutually opposing surfaces of the two parts 13, 15, between which two compression springs 25 are placed. A detent rod 27, which is driven in to the fixed part 13, provides an abutment against the sliding depressible part 15, thus terminating its travel.

As is obvious, the depressible part 15 is pressed from an at-rest position, in which the hand grip 23 extends beyond the side of the fixed part 13. On the opposite side, on the depressible part 15, is placed a lateral, longitudinal web, projecting downward. In that side of the web, proximal to the rail 1, a gripping groove 29 is formed. This groove

29 engages, in mutual complementarity, the edge 3. In the at rest situation, of the depressible part 15, the gripping groove 29 is obviously pressed by the force of the compression springs against the said edge 3, so that the mounting base 11 is then held essentially immovable on the rail 1. By pressing the handgrip 23 with the finger of one hand, which is opposed by another finger on the fixed part 13 – or the telescopic sight, which is mounted thereon – the gripping groove 29 can be moved out of contact with the gripping edge 3, and then the mounting base 11 can be removed from the rail 1. The same squeeze release is valid for the setting of the mounting base 11 onto the rail1.

The flat, upper surface of the mounting base 11 is designed for the attachment of the telescopic sight, or similar equipment.

The clamping of the mounting base 11 on the rail 1, is carried out with the force of the compression springs 25. Insofar as the friction resulting from the clamping action does not suffice to hold the mounting base 11 in the iongitudinal direction, the cross pin 21 serves to provide this retention power by engaging itself in one of the transverse grooves 9.

The length of the two claws 17, 19 is practically the same as the length of the engaging groove 29. The maximum surface pressure on the rail 1 arises from the shorter of these claw lengths, from the force of the springs 25 and as a consequence of the geometry of the gripping edges 3, 5 as well as the claws 17, 19. This force is so measured, that the plastic of the rail 1, experiences no deformation from the gripping of the claws 17, 19 and the engagement groove 29.

In the case of the illustrated mounting base 11, the position or the alignment is respectively so chosen, that the handgrip 23 lies to the left for a right handed marksman, and to the right for a left handed marksman, so that this handgrip 23 can be pressed by the thumb of the used hand, while the other hand holds the weapon underneath the forward stock..

Claims

Claimed is:

1. A mounting apparatus for the attachment of a telescopic sight, or the like, onto a rail (1) installed or constructed on a weapon, which rail possesses on both sides respectively a longitudinally extending groove opening toward the outside, or respectively a longitudinally extending web (3, 5), by means of which, for instance, a removable mounting base (11) with a web or a groove (17, 19, 29) slidingly engages longitudinally, which groove or web, for instance, is placed on one of the side edges of the mounting base 11, wherein:

- the mounting base (11) exhibits at least two parts (13, 15) which are slidable against one another in transverse direction, and which two parts (13, 15) are so movably and mutually loaded by a spring arrangement (25), that this loading alone, as a result of said spring arrangement (15), generates the grip effective between the rail (1) and mounting base, and
- the spring arrangement (25) exercises a spring force, which is overcome by the squeezing of the two parts (13, 15) between the thumb and forefinger of one hand for the releasing of the said grip.

2. A mounting apparatus, in accord with Claim 1, therein characterized, in that the rail (1) possesses at least one recess (9) into which a projection (21) on the thereto proximal side of the mounting base (11) engages upon its attachment to said rail (1).

3. A mounting apparatus in accord with one of the above Claims 1 or 2, therein characterized, in that the mounting base (11) clampingly engages the rail (1) from the outside, and in that the one part (15) of the mounting base (11) is led inside the other part (13) and can be pressed therein upon overcoming the force of the spring.

4. A mounting apparatus in accord with Claim 2 or 3, therein characterized, in that the recess is constructed as a transverse groove (9), and that the projection of the mounting base (11), which is installed to engage in said transverse groove (9) of the rail, is designed as a cross pin (21), which, preferably, is secured in the fixed part (13) of the mounting base (11).

5. A mounting apparatus in accord with Claim 4, therein characterized, in that the cross pin (21) is placed beside the depressible part (15).

6. A mounting apparatus in accord with one of the foregoing claims, therein characterized, in that the rail (1) possesses a plurality of cross grooves (21).

7. A mounting apparatus in accord with Claim 6, therein characterized, in that the rail extends itself over a substantial part of a firearm, and in the case of a rifle as the firearm, then preferably up to the front end of the forward stock

8. A mounting apparatus in accord with Claim 6 or 7, therein characterized, in that the rail (1) is made of zinc or plastic.

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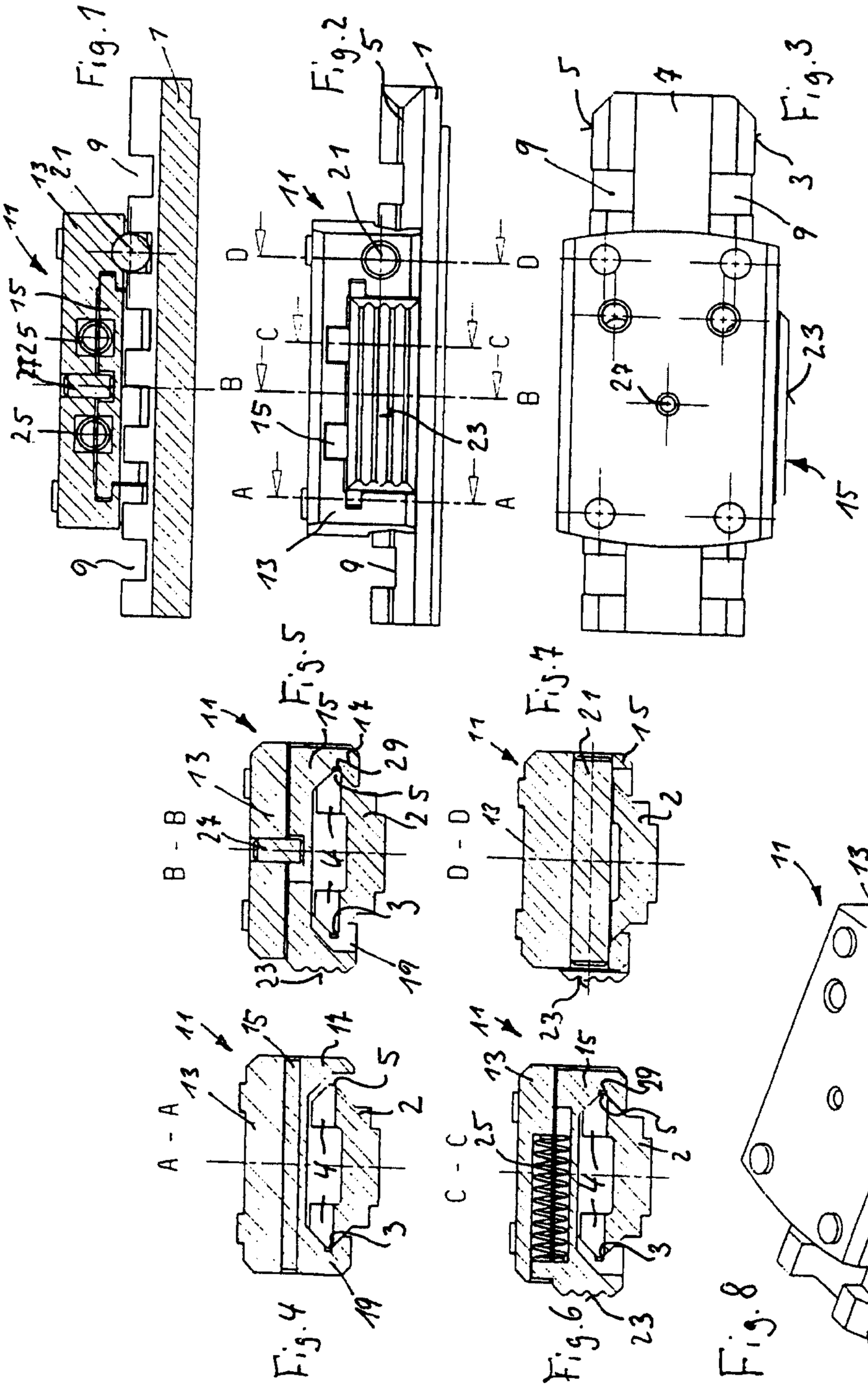
Fig.1
Fig.2
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Fig.5
Fig.6
Fig.7
Fig.8
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B - B
C - C
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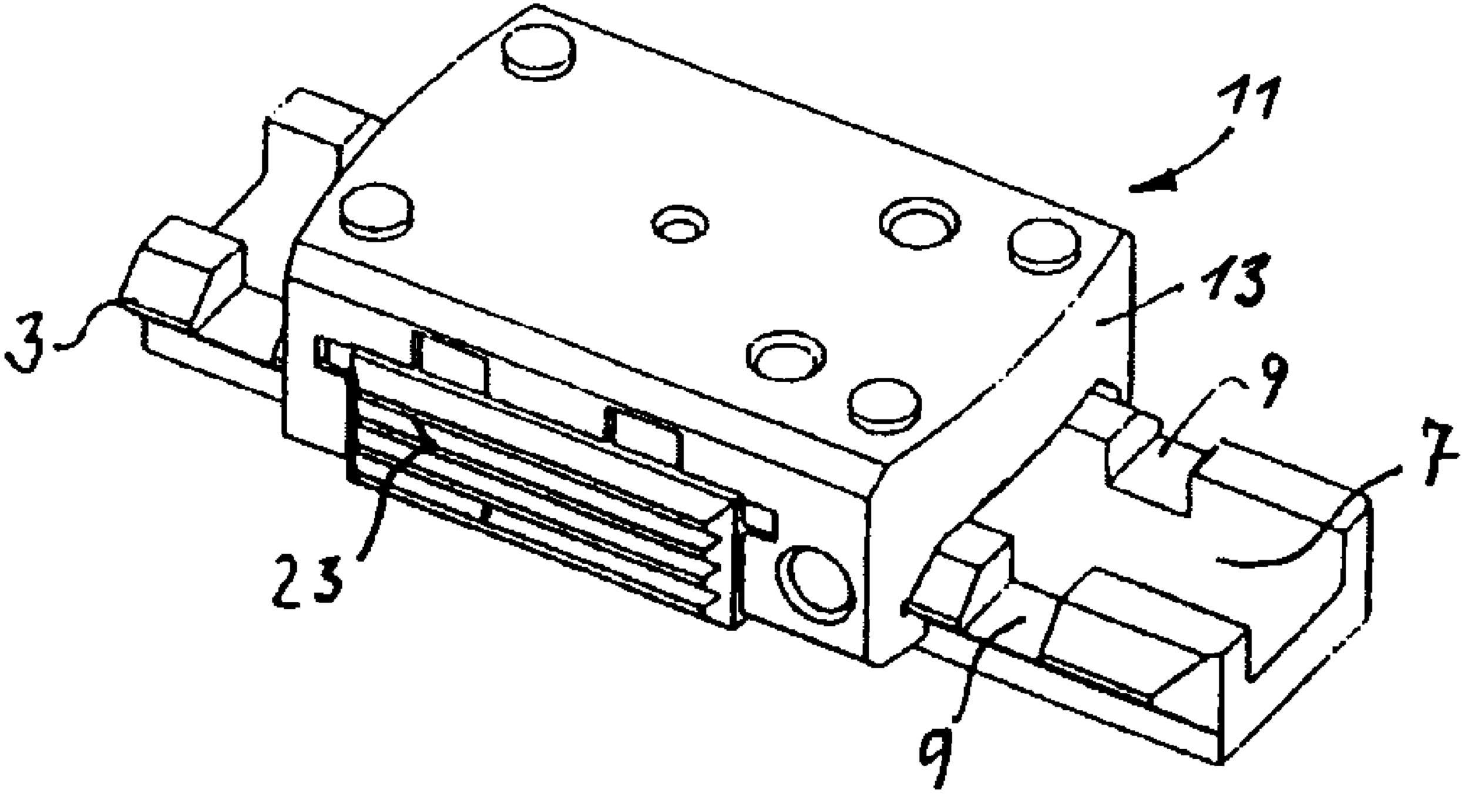
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