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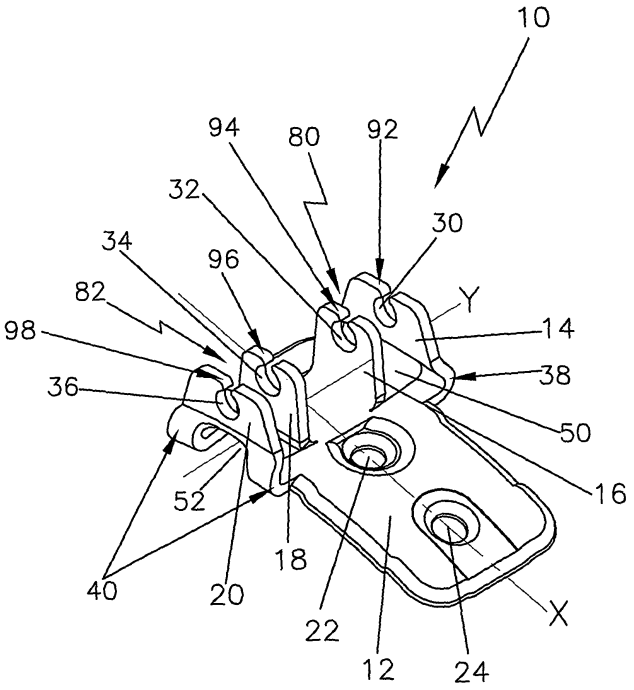
(54) Supporting base for a lever arm of a clamping device, particularly for sports shoes and method for making the same

(57) Supporting base (10) for the lever arm of a clamping device, in particular for a sports shoe, comprising a plate (12) and at least three tabs (14, 20, 16, 18) substantially perpendicular to said plate (12) and provided with respective through-bores (30, 36, 32, 34) lying coaxial with each other, wherein each one of said tabs (14, 20, 16, 18) protrudes from at least a respective border of said plate (12); and method for providing said supporting base (10) for a lever arm from a sheet-metal plate (100), in which there is cut-in a contour of the development of the supporting base (10) for a lever arm, which comprises at least a cut-in profile for forming the plate (12) and cut-in profiles for forming two respective tabs (14, 20), and inside said contour there is cut-in at least a cut-in profile for forming at least one further inner tab (16, 18), said cut-in profiles for forming the respective tabs (14, 16, 18, 20) being bent to form respective tabs (14, 16, 18, 20) and respective borders of the plate (12).

FIG. 2



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Description

Field of the Invention

[0001] The present invention refers to a supporting base for a lever arm of a clamping device, particularly adapted for application to sports shoes such as for instance ski or snowboard boots or shoes, ice skates, roller skates, mountaineering boots, cycling shoes, motorcycling boots, and the like, as well as a method for making said supporting base for a lever arm.

Background of the Invention

[0002] Sports shoes of the above-cited kinds are largely known to usually comprise flaps that are capable of opening out, so as to facilitate the introduction of the foot in the shoe, and being then tightened together by means of at least a clamping device.

[0003] The operation of such clamping device is generally based on the principle of a second-class lever, wherein the device comprises a lever arm pivoted about a fulcrum on a supporting base of its own, which is attached on to a first flap of the sports shoe. The coupling of the lever arm to the supporting base thereof is obtained by providing an articulated joint to act as a fulcrum, wherein the lever arm is able to pivot about a fulcrum axis.

[0004] In a resistance-arm axis, comprised between the fulcrum axis and a grip end portion of the lever arm, the lever arm is further pivotally coupled to a connecting rod. This connecting rod is provided with a hook member that is adapted to selectively engage a selection tooth of a rack secured on to a second flap of the sports shoe.

[0005] During a clamping step, a force is imparted to the grip end portion of the lever arm to rotate the lever arm about the fulcrum axis. Such action causes the selection tooth to undergo a tractive force causing the two flaps of the sports shoe to move closer to each other until they eventually are fully tightened together to establish a closed condition of the shoe. Under these conditions, the resistance arm axis is positioned closer to the first flap of the sports shoe than the fulcrum axis, and the articulated fulcrum joint is submitted to a fastening torque.

[0006] The above-described clamping step is followed by a release step of the two flaps of the sports shoe from each other, to thereby completing a utilization cycle of the clamping device.

[0007] However, as the clamping device goes repeatedly through such utilization cycles, the articulated fulcrum joint unavoidably undergoes corresponding fatigue stresses, since, especially during the clamping step, considerable shearing and flexural stresses are produced, which affect the same articulated fulcrum joint. This practically sets an upper limit to the number of utilization cycles of the clamping device.

[0008] Some solutions have been proposed in an attempt to increase the strength of such articulated fulcrum joint to said shearing and flexural stresses, as well as to increase its ability to withstand possible impacts and blows of an accidental nature it may be exposed to during the use of the sports shoe.

[0009] EP 1 922 944 discloses a supporting base for a lever arm comprising a plate, which is roughly rectangular in its horizontal plane, and having two peripheral tabs extending almost perpendicularly from the longitudinal peripheral edges of the plate, such peripheral tabs being provided with a respective bore. Each such peripheral tab is provided with a bridge-like member for connecting to and supporting a further tab, which is also provided with a respective bore and having a shape roughly similar to that of the peripheral tab. The bridge-like member is bent into the shape of a U, so that the inner tab is able to fit in approximately parallel to and spaced from the peripheral tab with the respective bores lying coaxial with each other.

[0010] Two accommodating receptacles are thus formed, each one being able to receive a respective appendix provided with a bore and protruding from a fulcrum end portion of a lever arm. The bore in each such appendix lies coaxially relative to the bores in the two tabs forming the accommodating receptacle, so as to allow a hinge-like linking member, such as a rivet, a screw or the like, to be inserted therethrough. Such hinge-like linking member is supported at its end portions by the inner tab and the peripheral tab, respectively, thereby forming a kind of supported beam.

[0011] Disadvantageously, however, such accommodating receptacle is such as to cause the hinge-like linking member to be exposed to deformations, especially in the case of impacts or blows of an accidental nature against the lever arm, since the inner tab is simply resting on the plate and the bridge-like member for supporting and connecting the inner tab to the peripheral tab is of the cantilever type; in other words, a stress of an accidental nature would almost entirely concentrate at the end portion of the hinge-like linking member that is sustained by the peripheral tab.

[0012] In addition, the articulated fulcrum joint is vulnerable to accidental bumps, blows and impacts in substantially the same manner and to the same extent as an articulated fulcrum joint provided with a conventional supporting base having just two tabs, since the sole peripheral tabs are connected to and supported by the plate and, as a result, are capable of taking up and absorbing such accidental bumps and impacts.

[0013] Furthermore, the above-noted drawback is accompanied by another one basically due to an unbalanced constraint-related reaction of the tabs. In fact, shearing and flexural stresses generated during the clamping step, as well as the fastening torque acting in the closed condition, are mainly compensated by a constraint of the fixed joint type featured by each peripheral tab, rather than by a constraint of the support type featured by each inner tab. As a result, the fatigue strength of the articulated fulcrum joint is comparable to that of a

clamping device comprising a lever-arm supporting base provided with just two tabs.

[0014] Still another drawback derives from the bulkiness of the bridge-like member, which prevents the lever arm from being capable of being fully rotated by 180° during opening.

[0015] Furthermore, again in a disadvantageous manner, a sheet-metal plate to be used in view of cutting out a blank for the production of a lever-arm supporting base provided with four tabs must of course have a larger surface area than a sheet-metal plate to be used in view of cutting out a blank for the production of a lever-arm supporting base provided with just two tabs, since forming the other two tabs obviously requires additional material to be available.

Summary of the Invention

[0016] The object of the present invention is to provide a supporting base for the lever arm of a clamping device, in particular for a sports shoe, which is effective in doing away with the drawbacks of prior-art embodiments.

[0017] Within the above-noted general object, it is a purpose of the present invention to provide a supporting base for the lever arm of a clamping device, in particular for a sports shoe, which ensures greater fatigue strength, along with improved resiliency, of the articulated fulcrum joint as compared with prior-art embodiments, such that the number of utilization cycles is increased.

[0018] A further purpose of the present invention is to provide an accommodating receptacle that is adapted to ensure the same type of support to each one of the end portions of the hinge-like linking member, so that any stress of an accidental nature, as imparted in particular to the lever arm, is able to distribute itself in a substantially equally apportioned manner to the end portions of the hinge-like linking member, to the benefit of a reduction in the risk of deformations.

[0019] Still another purpose of the present invention is to provide a supporting base for a lever arm, wherein each tab is able to perform basically the same restraining reaction.

[0020] Yet a further purpose of the present invention is to provide a supporting base which is effective in enabling the lever arm to be moved through a wide rotational arc of substantially 180°, so that the distance from a first selection tooth of the rack to a last selection tooth of the rack is maximized.

[0021] Yet another purpose of the present invention is to keep using a sheet-metal plate for cutting out a blank for the production of a lever-arm supporting base according to the present invention, which has substantially the same surface area as the sheet-metal plate used in view of cutting out a blank for the production of a conventional lever-arm supporting base provided with just two tabs.

[0022] A further, equally important purpose of the present invention is to provide a supporting base for the lever arm of a clamping device, in particular for a sports shoe, which is capable of being manufactured at competitive costs using generally and readily available tools and machinery.

[0023] According to the present invention, these aims, along with further ones that will be apparent in the following description, are reached in a supporting base for the lever arm of a clamping device, in particular for a sports shoe, incorporating the characteristics as recited in both the main claims and the sub-claims appended hereto.

Description of the Drawings

[0024] Features and advantages of the invention will be more readily understood from the detailed description of a particular, although not sole embodiment thereof, which is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a plan view of a sheet-metal blank for producing a supporting base for the lever arm of a clamping device, in particular for a sports shoe, according to an embodiment of the present invention;
- Figure 2 is a perspective of the supporting base for the lever arm of a clamping device, in particular for a sports shoe, according to the described embodiment of the present invention;
- Figure 3 is a plan view of a sheet-metal blank for producing a supporting base for the lever arm of a clamping device, in particular for a sports shoe, according to a modified embodiment of the present invention;
- Figure 4 is a perspective view of the supporting base for the lever arm of a clamping device, in particular for a sports shoe, according to the modified embodiment of the present invention shown in Figure 3;
- Figure 5 is a plan view of a sheet-metal blank for producing a supporting base for the lever arm of a clamping device, in particular for a sports shoe, according to a further modified embodiment of the present invention;
- Figure 6 is a perspective, exploded view of a clamping device comprising the supporting base for a lever arm shown in Figure 2;
- Figure 7 is a perspective view of the clamping device shown in Figure 6 in a closed condition; and
- Figure 8 is a side view of the clamping device shown in Figure 6 in an open condition.

Detailed Description of a Preferred Embodiment of the Invention

[0025] With reference to Figures 1, 2 and 3, a supporting base 10 for the lever arm of a clamping device, in particular for a sports shoe, according to a preferred embodiment of the present invention comprises a plate 12 and at least three tabs, preferably four tabs 14, 20, 16, 18.

[0026] Such supporting base 10 for a lever arm may be manufactured by means of any viable sheet-metal forming process starting from a sheet-metal plate 100 under formation of scraps 102, such as for instance a continuous sheet-metal forming process of the progressive-die or similar kind.

[0027] Such sheet-metal forming process includes a mechanical cutting operation performed by using any suitable technology known in the art, such as for instance using a shearing machine, a laser cutting machine, a water-jet cutting machine, a plasma cutting machine, or the like, and a mechanical bending operation capable of being performed by using any suitable technology known in the art, as well, such as for instance using a bending machine, a punch-and-matrix forming machine, or the like.

[0028] Such mechanical cutting and bending operations may of course be carried out for forming the tabs 14, 20, 16, 18 and the plate 12 in any suitable order, either in a sequence or in parallel to each other.

[0029] During the mechanical cutting step of the process, the sheet-metal plate 100 is cut in so as to reproduce a contoured blank for the supporting base 10 of a lever arm.

[0030] Such blank, according to the present invention, has a contour that includes a cut-in profile for forming the plate 12, a first cut-in profile for forming a first tab 14, and a second cut-in profile for forming a second tab 20; in addition, such contour encloses at least one further cut-in profile for forming at least one respective further inner tab therewithin. Preferably, there are provided a third inner cut-in profile for forming a third inner tab 16 and a fourth inner cut-in profile for forming a fourth inner tab 18.

[0031] Therefore, by cutting the sheet-metal plate 100 along the contour of the blank reproducing the development of the supporting base 10 for a lever arm, and by removing the resulting scrap 102, a polygonal surface may for instance be obtained, whose perimeter is formed by the cut-in profile for forming the plate 12, which may be in any suitable shape whatsoever, as joined to the first cut-in profile for forming the first tab 14 and the second cut-in profile for forming the second tab 20.

[0032] The first cut-in profile for forming the first tab 14 comprises a first through-bore 30, and the second cut-in profile for forming the second tab 20 comprises a second through-bore 36; moreover, such first and second cut-in profiles stretch out symmetrically relative to an axis X that lies longitudinally on the afore-noted polygonal surface.

[0033] Within the development contour of the supporting base 10 for a lever arm and, therefore, on the portion of the sheet-metal plate 100 that coincides with the afore-noted polygonal surface, there are cut-in the third inner cut-in profile for forming the third inner tab 16 and the fourth inner cut-in profile for forming the fourth inner tab 18.

[0034] The third inner cut-in profile for forming the third inner tab 16 includes a third through-bore 32, and the fourth inner cut-in profile for forming the fourth inner tab 18 includes a fourth through-bore 34; furthermore, such third and fourth cut-in profiles are symmetrical relative to the axis X.

[0035] Preferably, the first, second, third and fourth cut-in profiles for forming the first, second, third and fourth tabs 14, 20, 16, 18, respectively, are moreover arranged so that the first, second, third and fourth through-bores 30, 36, 32, 34 of the first, second, third and fourth tabs 14, 20, 16, 18, respectively, are aligned along an axis Y, which is substantially perpendicular to the axis X, and which lies on the afore-noted polygonal surface.

[0036] Further, at least one attachment through-bore, e.g. a first attachment through-bore 22 and a second attachment through-bore 24, may be formed on the afore-mentioned polygonal surface so as to enable the supporting base 10 for a lever arm to be secured on to a first flap of the sports shoe.

[0037] During the mechanical bending step of the process, there may be formed the first tab 14, the second tab 20, the third inner tab 16, the fourth inner tab 18, as well as borders of the plate 12.

[0038] Namely, by bending the first cut-in profile for forming the first tab 14 along a first bending line 2 there are formed the first tab 14 and two first peripheral borders of the plate 12, and - symmetrically relative to the axis X - by bending the second cut-in profile for forming the second tab 20 along a second bending line 2' there are formed the second tab 20 and two second peripheral borders of the plate 12.

[0039] Furthermore, within the contour of the development of the supporting base 10 for a lever arm, by bending the third cut-in profile for forming the third inner tab 16 along a third inner bending line 1 there are formed the third inner tab 16 and a third inner peripheral border of the plate 12, and - symmetrically relative to the axis X - by bending the fourth cut-in profile for forming the fourth tab 18 along a fourth inner bending line 1' there are formed the fourth inner tab 18 and a fourth inner peripheral border of the plate 12.

[0040] Preferably, the first bending line 2, the second bending line 2', the third inner bending line 1 and the fourth inner bending line 1' are separated from each other and substantially parallel to the axis X; however, this is by no means a constraint to the purposes of the present invention.

[0041] Once completed the mechanical bending operation on the first, second, third and fourth cut-in profiles for forming the first, second, third and fourth tabs 14, 20, 16, 18, respectively, also the plate 12 itself may then be

formed, the perimeter of which therefore includes the two first peripheral borders defined by the first bending line 2, the two second peripheral borders defined by the second bending line 2', the third inner peripheral border defined by the third inner bending line 1, the fourth inner peripheral border defined by the fourth inner bending line 1', two fifth inner peripheral borders defined by two respective portions of the third inner cut-in profile for forming the third inner tab 16, two sixth inner peripheral borders defined by two respective portions of the fourth inner cut-in profile for forming the fourth inner tab 18, as well as a seventh peripheral border defined by the cut-in profile for forming the plate 12.

[0042] Such perimeter confers the plate 12 a substantially rectangular shape featuring a first recess 50 and a second recess 52 provided along the axis Y and symmetrical to each other relative to the axis X.

[0043] Since the mechanical cutting and bending operations may be carried out in any suitable order whatsoever, i.e. either in a sequence or in parallel to each other, it may of course occur that the plate 12 is not completely formed at the end of the mechanical bending operation performed on the first, second, third and fourth cut-in profiles for forming the first, second, third and fourth tabs 14, 20, 16, 18, respectively, so that some mechanical operation is still needed for such plate to be completed.

[0044] For example, in the afore-mentioned case of a continuous forming process of the progressive-die kind, the mechanical cutting operation for providing the first, second, third and fourth cut-in profiles for forming the first, second, third and fourth tabs 14, 20, 16, 18 with the respective first, second, third and fourth through-bores 30, 36, 32, 34, respectively, is carried out on a shearing machine at the beginning of such continuous forming process. There follows then the mechanical bending operation on said first, second, third and fourth cut-in profiles for providing said first, second, third and fourth tabs 14, 20, 16, 18, respectively. Once said first, second, third and fourth tabs 14, 20, 16, 18 are formed in the above-mentioned manner, the mechanical cutting operation aimed at providing the cut-in profile for forming the plate 12 is carried out and, at the end of such mechanical cutting operation, the plate 12 will then be fully formed.

[0045] The mechanical bending step of the process may further include a substep, in which there are formed a first bulging portion 30 in the first cut-in profile for forming the first tab 14 and a second bulging portion 40 in the second cut-in profile for forming the second tab 20.

[0046] This allows a height of the first and second tabs 14, 20 - as measured from the plate 12 - to be advantageously adjusted so that it may be made equal to a height of the third and fourth inner tabs 16, 18; it further allows the first, second, third and fourth through-holes 30, 36, 32, 34 to be positioned in a mutually coaxial arrangement, further to enabling a distance lying between the first tab 14 and the third inner tab 16 adjacent thereto, as well as a distance lying between the second tab 20 and the fourth inner tab 18 adjacent thereto to be adjusted.

[0047] Furthermore, the plate 12 may be formed so as to show a slight concavity replicating a surface of the first flap of a sports shoe, in view of allowing the supporting base 10 of the lever arm to be conveniently accommodated and securely attached onto the surface of the first flap of the sports shoe in a manner as largely known in the art, such as for instance through the insertion of usual fastening means, e.g. screws, rivets, or the like, in the first and second attachment through-bores 22, 24, as well as in corresponding bores in the first flap of the sports shoe.

[0048] As it may be fully appreciated, a surface area of the sheet-metal plate 100 used to work out the blank corresponding to the development of the supporting base for a lever arm according to the present invention is advantageously kept substantially identical to a surface area of the sheet-metal plate used to work out the blank corresponding to the development of a conventional supporting base for a lever arm provided with just two tabs, since additionally forming the third and fourth inner tabs is done by making use of material of said sheet-metal plate 100, which is contained within the afore-mentioned polygonal surface of the blank forming the supporting base.

[0049] Referring now solely to Figure 2, the first, second, third and fourth tabs 14, 20, 16, 18, which may have been formed in the afore-described manner, are arranged substantially perpendicular to the plate 12, which may have been formed in the afore-described manner, with the respective first, second, third and fourth through-bores 30, 36, 32, 34 positioned in a mutually coaxial arrangement.

[0050] Moreover, the first, second, third and fourth tabs 14, 20, 16, 18 are arranged substantially parallel to each other, since they project from the first, second, third and fourth bending lines 2, 2', 1, 1', respectively, which lie on the sheet-metal plate 100 in a substantially parallel arrangement to the axis X.

[0051] However, in a modified embodiment of the present invention, at least one bending line among the first, second, third and fourth bending lines 2, 2', 1, 1' may be slanting as compared with the other bending lines, so that at least one of the first, second, third and fourth tabs 14, 20, 16, 18 may as a result be slanting as compared with the other tabs.

[0052] By construction, the fourth inner tab 18, which protrudes from the fourth inner peripheral border of the plate 12 defined by the fourth inner bending line 1', and the second tab 20 adjacent thereto, which protrudes from the two second peripheral borders of the plate 12 defined by the second bending line 2', are facing each other with the respective fourth and second through-bores 34, 36 lying in a mutually coaxial arrangement.

[0053] As a result, such pair of tabs, consisting of the fourth inner tab 18 and the second tab 20, may form a first fulcrum accommodation 82 capable of sustaining a first hinge-like linking member 88 (see Figure 7), such

as a rivet, a screw or the like. More exactly, a first end portion of the first hinge-like linking member 88 is sustained by the fourth inner tab 18, whereas a second end portion of the first hinge-like linking member 88 is sustained by the second tab 20 to thereby form a kind of supported beam.

[0054] In addition, owing to the construction of the plate 12, the first fulcrum accommodation 82 advantageously comprises the second recess 52. This second recess 52 lies between the fourth inner tab 18 and the second tab 20 adjacent thereto, along the axis Y.

[0055] Again by construction, the third inner tab 16, which protrudes in the way of a corner from the inner peripheral border of the plate 12 delineated by the third inner bending line 1, and the first tab 14 adjacent thereto, which protrudes from the two first peripheral borders of the plate 12 defined by the first bending line 2, are facing each other with the respective third and first through-bores 32, 30 lying in a mutually coaxial arrangement.

[0056] As a result, such pair of tabs, consisting of the third inner tab 16 and the first tab 14, may form a second fulcrum accommodation 80 capable of sustaining a second hinge-like linking member, such as a rivet, a screw or the like, to thereby form a kind of supported beam.

[0057] In addition, owing to the construction of the plate 12, the second fulcrum accommodation advantageously comprises the first recess 50. This first recess 50 lies between the third inner tab 16 and the first tab 14 adjacent thereto, along the axis Y.

[0058] As it may at this point be fully appreciated, the first, second, third and fourth tabs 14, 20, 16, 18 can advantageously ensure a same constraint-related reaction, since each one of them protrudes from at least a respective peripheral border of the plate 12, thereby offering a constraint of the fixed joint type. As a result, both the first hinge-like linking member and the second hinge-like linking member can rely on a stable and firm backing on which they rest at both end portions thereof, thereby turning out as being exposed to deformations to a markedly lesser extent.

[0059] In this preferred embodiment of the present invention, the first through-bore 30 is provided open in a border 92 of the first tab 14 lying opposite to the plate 12, the second through-bore 36 is provided open in a border 98 of the second tab 20 lying opposite to the plate 12, the third through-bore 32 is provided open in a border 94 of the third inner tab 16 and the fourth through-bore 34 is provided open in a border 96 of the fourth inner tab 18 lying opposite to the plate 12.

[0060] However, in a modified embodiment of the present invention, the first, second, third and fourth through-bores 30, 36, 32, 34 of the first, second, third and fourth tabs 14, 20, 16, 18, respectively, are provided in a closed configuration, as this is shown in Figures 3 and 4.

[0061] In addition, remaining unaltered all pre-requisites and structural constraints which the supporting base 10 of a lever arm is due to comply with, any possible modified embodiments in which the at least one further inner cut-in profile for the formation of at least a further inner tab is formed within the contour of the development of the supporting base 10 for a lever arm according to any pattern or configuration whatsoever, has to be considered as falling within the scope of the present invention.

[0062] As a result, the third and fourth cut-in profiles for forming the third and fourth inner tabs 16, 18, respectively, may be arranged inside the contour of the development of the supporting base 10 for a lever arm in a manner differing from the afore-described one. This implies that, following the mechanical cutting and bending operations, the plate 12 may take a shape differing from the one that has been described and illustrated hereinbefore.

[0063] With reference to Figure 5, for example, following the above-mentioned mechanical cutting and bending operations, the plate 12 may take the shape of an outer rectangle (or other geometrical figure) with at least one inner aperture 120 provided inside said outer rectangle.

[0064] The perimeter of such inner aperture 120 may comprise two inner peripheral borders defined by two respective cut-in profiles extending substantially parallel to the axis Y, and two inner peripheral borders defined by two respective inner bending lines 1,1'.

[0065] In this further modified embodiment of the present invention, the first and second tabs 14, 20 are formed from the first and second cut-in profiles (mechanical cutting operation) and the first and second bending lines 2, 2' (mechanical bending operation), respectively. As a result, the first tab 14 protrudes from the peripheral border of the plate 12 (outer rectangle), which is defined by the first bending line 2, and the second tab 20 protrudes from the peripheral border of the plate 12 (outer rectangle), which is defined by the second bending line 2'.

[0066] The third and fourth inner tabs 16, 18 are formed from the third and fourth cut-in profiles (mechanical cutting operation) and the third and fourth bending lines 1,1' (mechanical bending operation), respectively. As a result, the third inner tab 16 protrudes from the inner peripheral border of the inner aperture 120, which is defined by the third inner bending line 1, and the fourth tab 18 protrudes from the inner peripheral border of the inner aperture 120, which is defined by the fourth inner bending line 1'.

[0067] Furthermore, the first, second, third and fourth bending lines 2, 2', 1, 1' are preferably separated from and substantially parallel to each other.

[0068] With reference to Figure 6 a clamping device, in particular for a sports shoe, according to the present invention comprises the supporting base 10 for a lever arm, a lever arm 60, a connecting rod 72 and a pin 70.

[0069] The lever arm 60 comprises a grip end portion 87 and a first fulcrum appendix 64, a second fulcrum appendix 62, a first insertion through-bore 74 and a second, preferably blind bore 76. Advantageously, the first

and second fulcrum appendices 64, 62 are given a hooked shape, although this shall not be regarded as a limitation to the purposes of the present invention, and both of them are arranged in a position lying opposite to the grip end portion 87.

[0070] The connecting rod 72 is in turn provided with a through-bore 75 and a hook member arranged so as to be able to selectively engage a selection tooth of a rack attached on to a second flap of the sports shoe (not shown).

[0071] The coupling of the lever arm 60 with the related supporting base 10 is done by means of an articulated fulcrum joint. This articulated fulcrum joint is formed by pivotally connecting the first fulcrum appendix 64 with the first fulcrum accommodation 82 and the second fulcrum appendix 62 with the second fulcrum accommodation 80. This is practically done by inserting the first hinge-like linking member 88 in the second through-bore 36, the hooked portion of the first fulcrum appendix 64 and the fourth through-bore 34, and inserting the second hinge-like linking member in the first through-bore 30, the hooked portion of the second fulcrum appendix 62 and the third through-bore 32, respectively.

[0072] Therefore, the lever arm 60 is hinged on to the supporting base 10 and, as a result, is able to pivot about a same (coaxial) axis of the first, second, third and fourth through-bores 30, 36, 32, 34, which shall be hereinafter referred to as the fulcrum axis.

[0073] Furthermore, the lever arm 60 is pivotally coupled to the connecting rod 72 by inserting the pin 70 in the first insertion through-bore 74 of the lever arm, in the through-bore 75 of the connecting rod and in the second blind bore 76 of the lever arm.

[0074] The pin 70 is interchangeable and may not need being clinched by heading, hammering or the like. Preferably, the pin 70 is fixed to the lever arm 60 by having it screwed thereto, although any other suitable fixing solution may be used. The pin 70 might in fact be knurled on its outer surface and be fixed to the lever arm 60 by force-fit kind of attachment.

[0075] Advantageously, the pin 70 does not extend fully through the lever arm 60, but remains rather locked in position inside the second blind bore 76 of the lever arm. Therefore, a side of the lever arm 60 comprising the second blind bore 76 may be formed to show a smaller thickness than a side of the lever arm 60 comprising the first insertion through-bore 74. Furthermore, the pin 70 may be solely visible from the side of the lever arm 60 that comprises the first insertion through-bore 74.

[0076] Shown in Figure 7 is the clamping device in a closed condition thereof, so as to better illustrate some further advantages of the preferred embodiment of the present invention.

[0077] The articulated fulcrum joint comprises the supporting base 10, in which the first, second, third and fourth tabs 14, 20, 16, 18 are formed so as to have a reduced height as measured from the plate 12. In fact, from the first, second, third and fourth tabs 14, 20, 16, 18, and namely from the borders thereof lying opposite to the plate 12, some material has been removed in order to open up the respective bores 30, 36, 32, 34, without however affecting the proper functionality of any of such bores.

[0078] Furthermore, in a closed condition, the first and second fulcrum appendices 64, 62, which are made in a crooked shape, orientate a first and a second open portion 86, 84 thereof in a direction facing away from the plate 12, so that they do not extend beyond the edges of the reduced-height first, second, third and fourth tabs 14, 20, 16, 18.

[0079] As a result, when in the closed condition, the clamping device turns is rather low in its profile, extending very close to the surface of the sports shoe where it is attached to. This makes such clamping device particularly suited to its use in competitive sports applications, in that it reduces the risk of accidental impacts or bumps against ground asperities or, in the case of ski races, gate poles, which might in fact cause the clamping device to become loose or break down.

[0080] In addition, the second and first recesses 52, 50 allow the first and second appendices 64, 62, respectively, to move much closer to the first flap of the sports shoe than this would be possible in the case of a plate 12 that is on the contrary solid in the corresponding points. This may well be appreciated to be effective in further contributing to a low, flat profile of the clamping device in the closed condition.

[0081] Figure 8 shows the clamping device in a released condition so as to better illustrate the advantage deriving from the wide turning arc, substantially 180°, along which the lever arm can be rotated, since this practically allows to obtain a very large distance from a first selection tooth to a last selection tooth of the rack.

[0082] Fully apparent from the above description is therefore the ability of the supporting base 10 for the lever arm of a clamping device, in particular for a sports shoe, according to the present invention to effectively reach the afore-cited aims and advantages.

[0083] Provided is in fact a supporting base 10 for the lever arm of a clamping device, in particular for a sports shoe, which is effective in ensuring a greater fatigue strength and a greater resilience of the articulated fulcrum joint as compared to the teachings of the prior art, so that the number of utilization cycles of the clamping device is increased.

[0084] Furthermore, both the first fulcrum accommodation 82 and the second fulcrum accommodation 80 of the supporting base 10 for a lever arm are such as to ensure a same kind and extent of support to each of the end portions of the respective hinge-like linking member, since such fulcrum accommodations 82, 80 is formed by two respective tabs protruding from respective peripheral borders of the plate 12, thereby providing a respective constraint of the fixed joint type.

[0085] In addition, each tab of the first fulcrum accommodation 82 and each tab of the second fulcrum accom-

modation 80 are capable of ensuring the same constraint-related reaction, for instance through properly sizing the length of the peripheral edge wherefrom the tab protrudes.

[0086] Moreover, the supporting base 10 for a lever arm allows the lever arm 60 to be rotated along a wide turning arc, substantially 180°, since the supporting base 10 is free of any obstacle along a trajectory of the lever arm 60.

[0087] In addition, the surface area of the sheet-metal plate 100 used to obtain a blank for forming the supporting base 10 for a lever arm is kept substantially unchanged as compared with the surface area of the sheet-metal plate used to obtain a blank for forming a conventional supporting base for a lever arm provided with just two tabs, so that there is no increase in the cost of the material involved for manufacturing the supporting base 10 for a lever arm according to the present invention.

[0088] It shall be appreciated that the present invention as described above may of course be the subject of a number of applications, modifications and further embodiments without departing from the scope defined in the appended claims. Furthermore, all such applications, modifications and further embodiments mentioned in this specification, including the ones that may be inferred therefrom, can be combined with each other.

Claims

1. Supporting base for the lever arm of a clamping device, in particular for a sports shoe, comprising a plate (12) adapted to be secured to a first flap of said sports shoe, and at least three tabs (14, 20, 16, 18), each one of said at least three tabs (14, 20, 16, 18) being substantially perpendicular to said plate (12) and provided with a respective through-bore (30, 36, 32, 34), said through-bores (30, 36, 32, 34) of the respective said at least three tabs (14, 20, 16, 18) being coaxial with each other, **characterized in that** each one of said at least three tabs (14, 20, 16, 18) protrudes from at least a respective border of said plate (12), each one of said tabs (14, 20, 16, 18) being firmly connected to said respective border of said plate (12).

2. Supporting base for a lever arm according to claim 1, wherein the borders of the plate (12) include peripheral borders of said plate (12).

3. Supporting base for a lever arm according to claim 1, wherein the borders of the plate (12) include peripheral borders of said plate (12) and peripheral borders of an aperture (120) provided within said peripheral borders of said plate (12).

4. Supporting base for a lever arm according to at least one of the preceding claims, comprising a first tab (14), a second tab (20), a third inner tab (16) and a fourth inner tab (18), said first tab (14) and said second tab (20) protruding from respective peripheral borders of the plate (12), said third inner tab (16) and said fourth inner tab (18) protruding from said plate (12) and being comprised between said first tab (14) and said second tab (20).

5. Supporting base for a lever arm according to at least one of the preceding claims, wherein the first tab (14) and the second tab (20) protrude from the plate (12) respectively along a first bending line (2) and a second bending line (2') lying on the perimeter of said plate (12), wherein the third inner tab (16) and the fourth inner tab (18) protrude from the plate (12) respectively along a third inner bending line (1) and a fourth inner bending line (1') lying between said first bending line (2) and said second bending line (2'), said first bending line (2), said second bending line (2'), said third inner bending line (1) and said fourth inner bending line (1') being separated from and substantially parallel to each other.

6. Supporting base for a lever arm according to at least one of the preceding claims, wherein a first recessed portion (50) of the plate (12) is formed between the third inner tab (16) and the first tab (14) adjacent thereto along a direction (Y) substantially parallel to a coaxial direction of the through-bores (30, 36, 32, 34), and a second recessed portion (52) of the plate (12) is formed along said direction (Y) between the fourth inner tab (18) and the second tab (20) adjacent thereto.

7. Supporting base for a lever arm according to at least one of the preceding claims, wherein the first tab (14) comprises a first bulging portion (38) and the second tab (20) comprises a second bulging portion (40), said first bulging portion (38) and said second bulging portion (40) being adapted to adjust a mutually coaxial arrangement of the through-bores (30, 32, 34, 36) and/or adjust the distance between the third inner tab (16) and said first tab (14) adjacent thereto and the distance between the fourth inner tab (18) and said second tab (20) adjacent thereto.

8. Supporting base for a lever arm according to at least one of the preceding claims, wherein the fourth inner tab (18) and the second tab (20) adjacent thereto form a first fulcrum accommodation (82) adapted to sustain a first hinge-like linking member (88), and the third inner tab (16) and the first tab (14) adjacent thereto form a second fulcrum accommodation (80) adapted to sustain a second hinge-like linking member.

9. Method for making a supporting base for the lever arm of a clamping device, in particular for a sports

shoe, comprising the steps of:

a) cutting a sheet-metal plate (100) for obtaining a blank reproducing the development of the supporting base (10) for a lever arm, said blank comprising a cut-in profile for forming a plate (12) and at least three cut-in profiles for forming respective tabs (14, 16, 18, 20) provided with respective through-bores (30, 32, 34, 36);
b) bending said cut-in profiles for forming the respective tabs (14, 16, 18, 20) so as to arrange them substantially perpendicular to a portion of the sheet-metal plate (100), and with the respective through-bores (30, 32, 34, 36) in a mutually coaxial arrangement,

characterized in that a contour of said blank reproducing the development of the supporting base (10) for a lever arm comprises the cut-in profile for forming the plate (12) and the cut-in profiles for forming two respective tabs (14, 20), said contour enclosing at least one inner cut-in profile for forming at least one further inner tab (16, 18) therewithin.

10. Method for making a supporting base for the lever arm of a clamping device according to claim 9, wherein bending the cut-in profiles for forming the respective tabs (14, 16, 18, 20) causes respective borders of the plate (12) to be formed.

11. Method for making a supporting base for the lever arm of a clamping device according to any of the claims 9 or 10, wherein bending the cut-in profile for forming the tab (14, 20) causes a bulging portion (38, 40) of said tab (14, 20) to be formed.

12. Method for making a supporting base for the lever arm of a clamping device according to any of the claims 9 to 11, wherein the contour of said blank reproducing the development of the supporting base (10) for a lever arm encloses two inner cut-in profiles for forming two respective inner tabs (16, 18) therewithin.

13. Clamping device for fastening flaps, in particular of a sports shoe, comprising a lever arm (60) and a supporting base (10) for a lever arm, said lever arm (60) being hinged on to said supporting base (10) for a lever arm, **characterized in that** said supporting base (10) is defined according to at least one of the claims 1 to 8.

14. Clamping device according to claim 13, comprising a pin (70) and a connecting rod (72), said connecting rod (72) being provided with a through-bore (75) and a hook member adapted to engage a tooth of a rack attached to a second flap of the sports shoe, wherein said pin (70) is inserted in a first through-bore (74) of said lever arm (60), in the through-bore (75) of said connecting rod (72) and in a second bore (76) of said lever arm (60), said second bore (76) being a blind bore.

15. Shoe, particularly a sports shoe, comprising a first flap, a second flap and at least a clamping device, said clamping device being associated to said flaps and adapted to fasten them together, **characterized in that** said clamping device is defined according to at least one of the claims 13 and 14.

FIG. 1

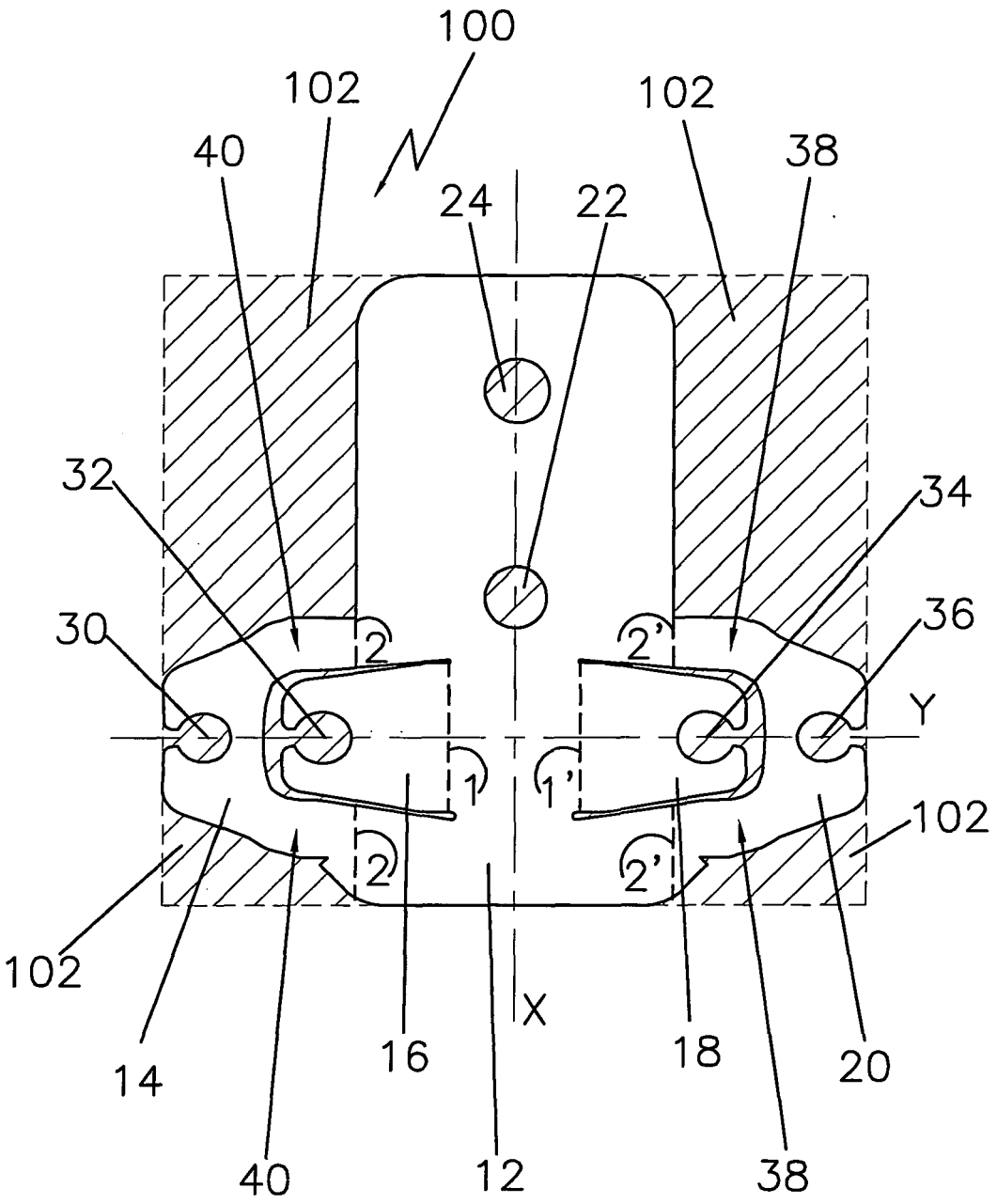
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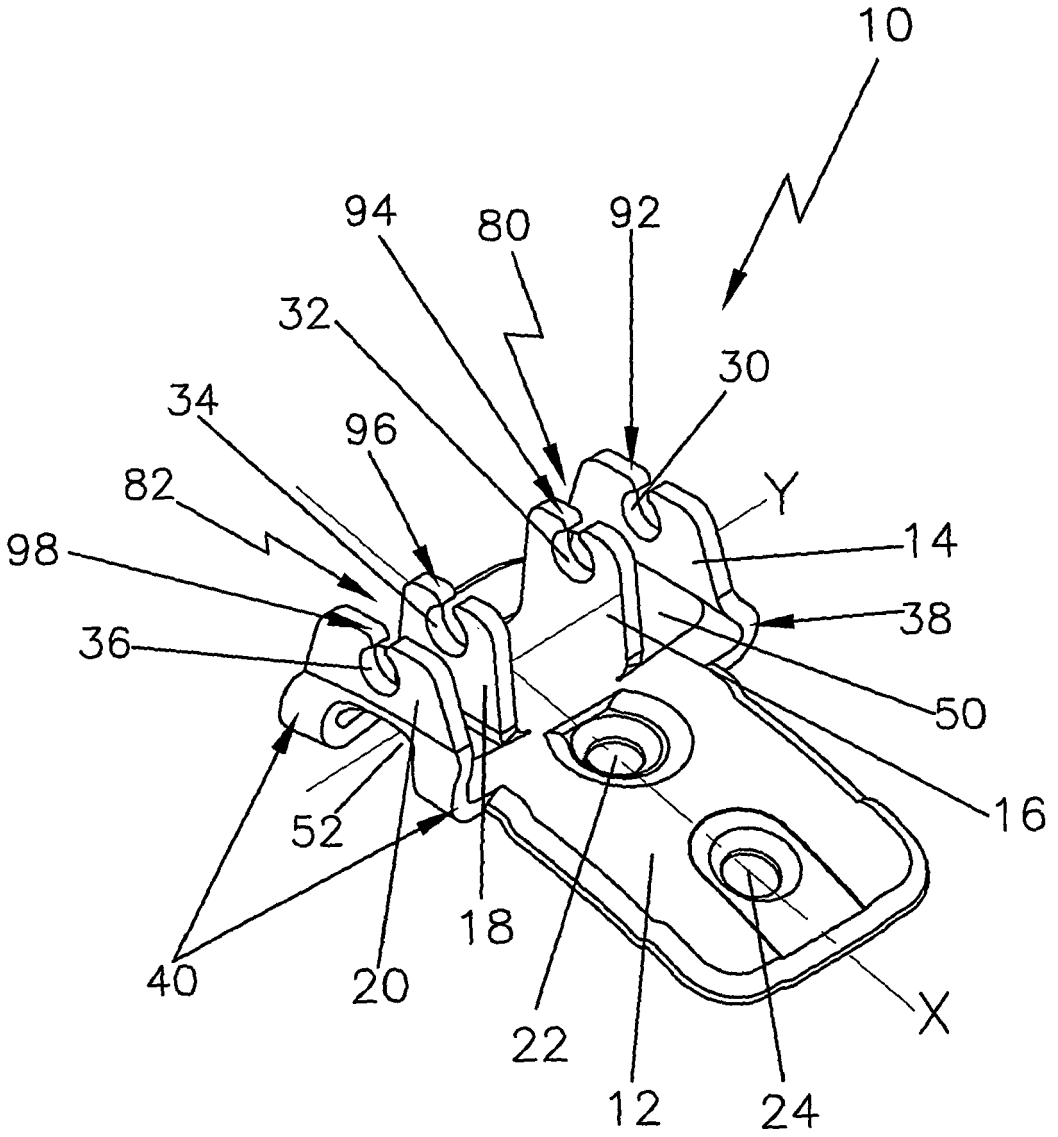
FIG. 2



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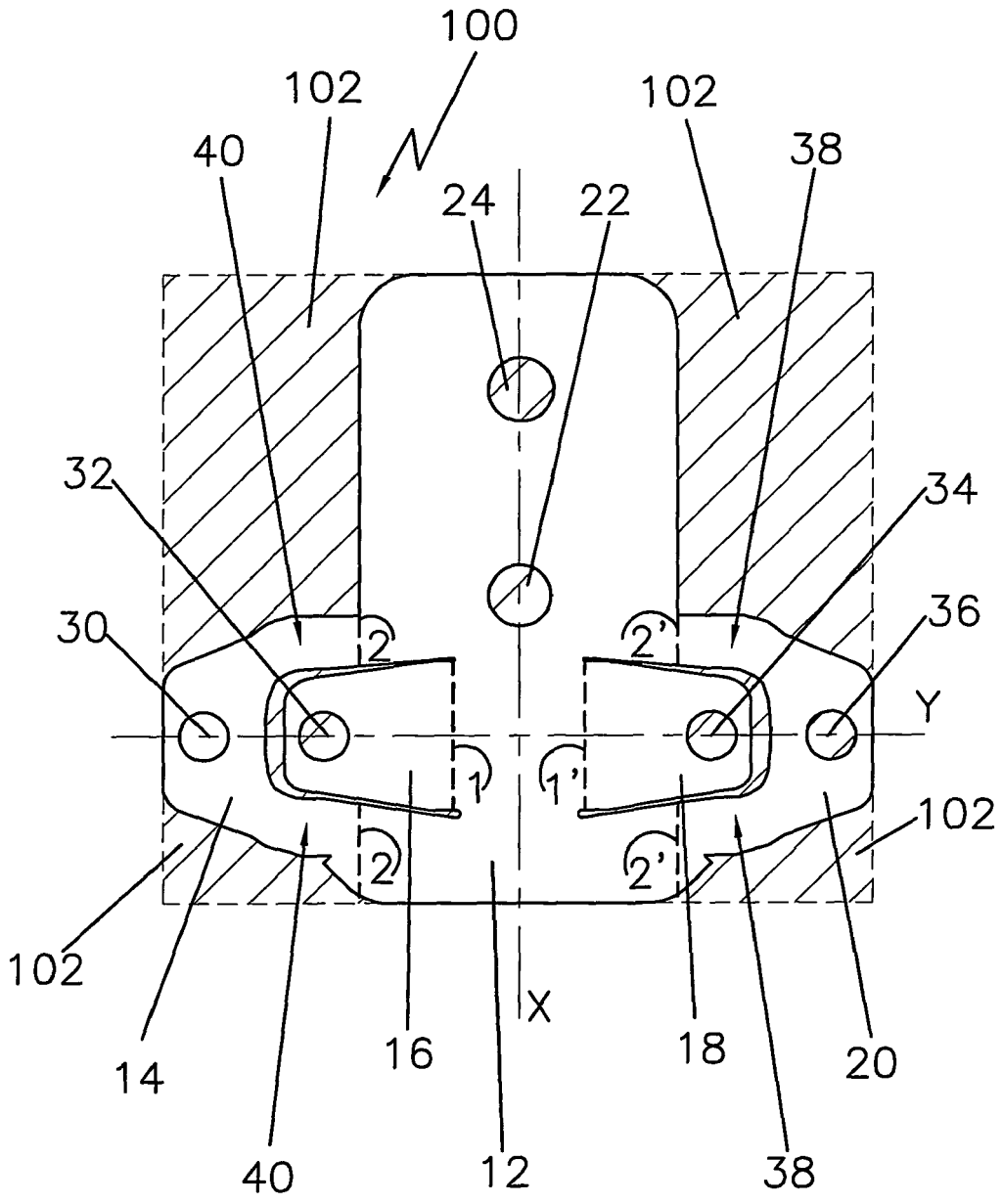
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FIG. 4

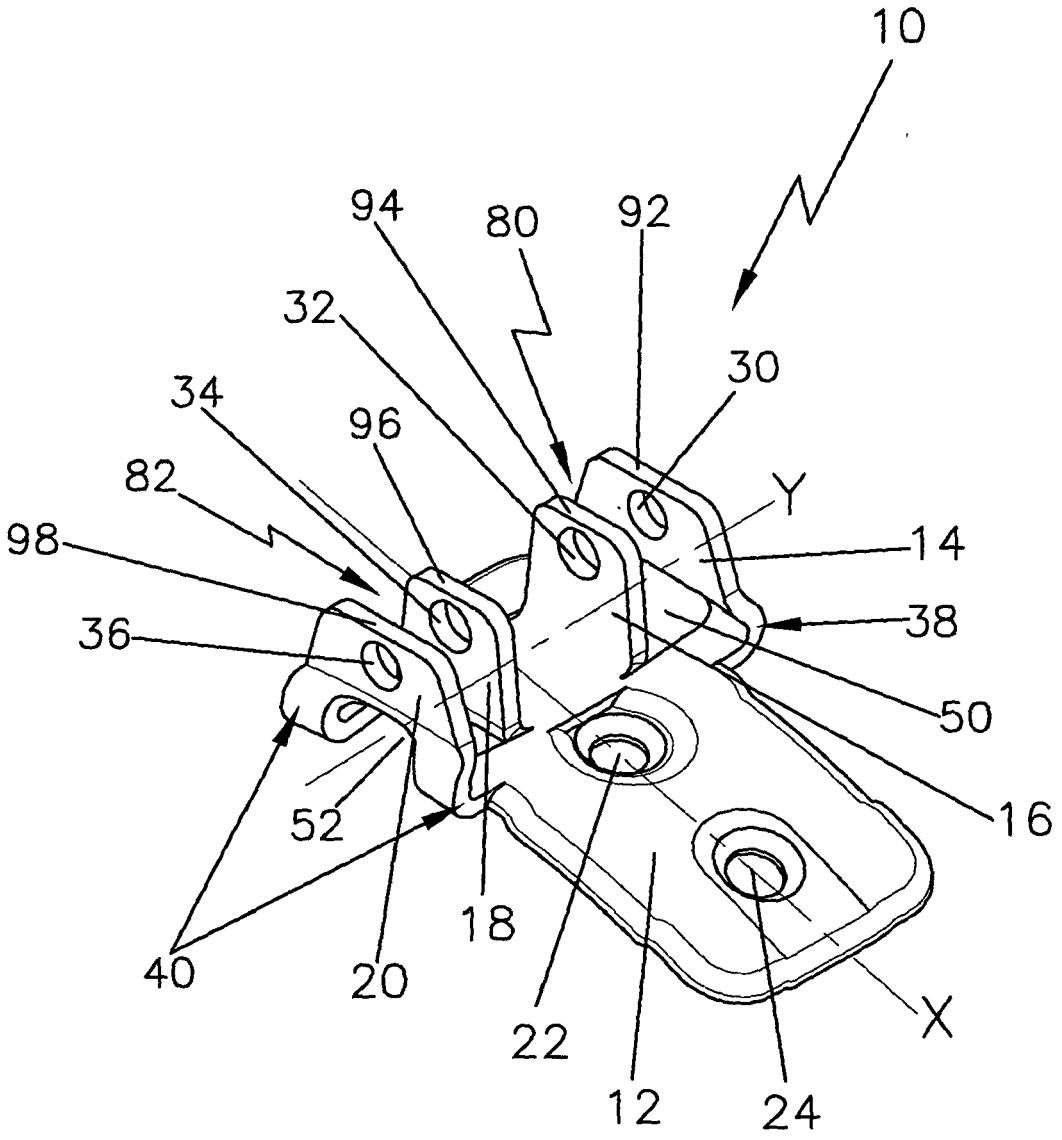

FIG. 5

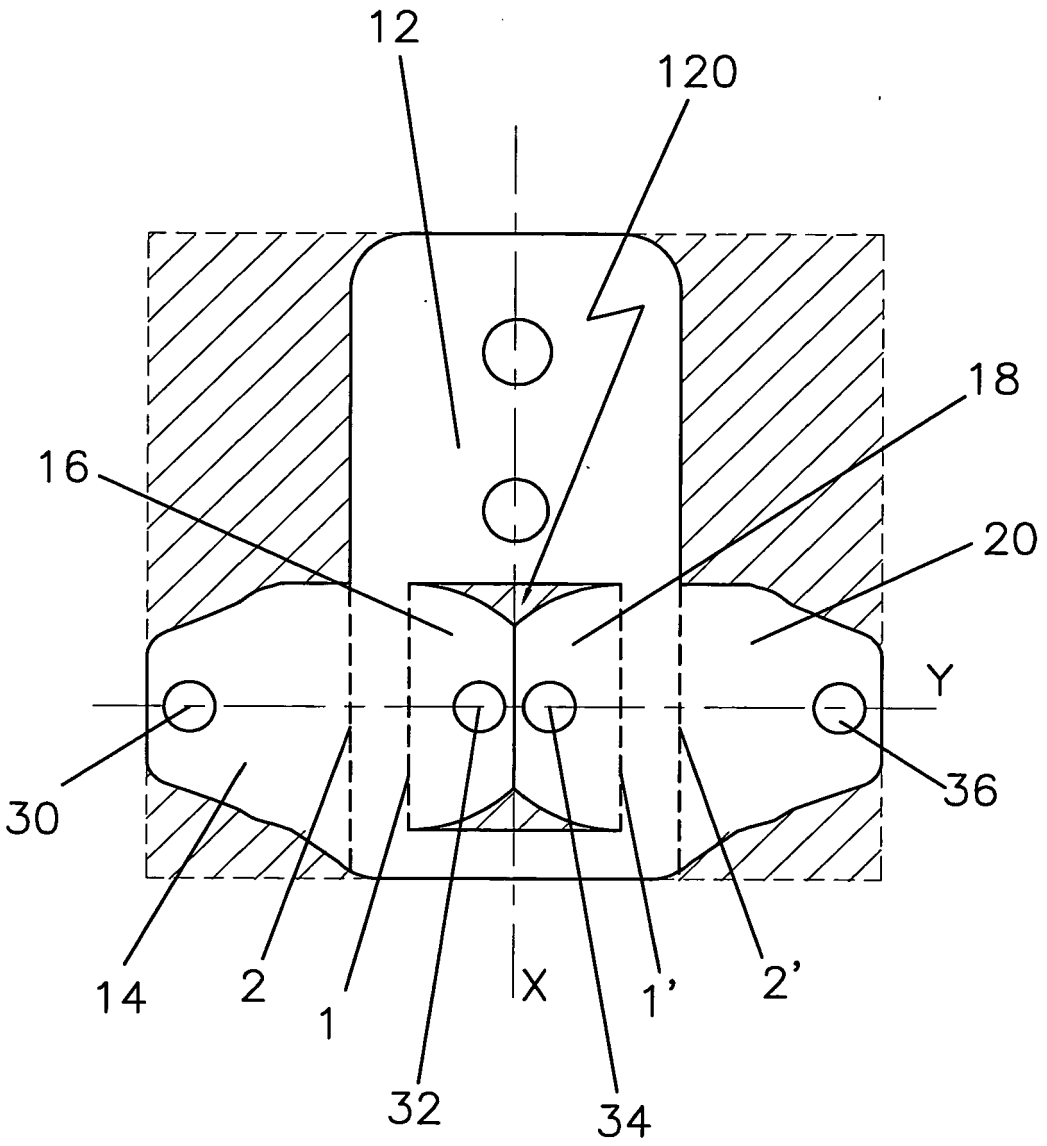

FIG. 6

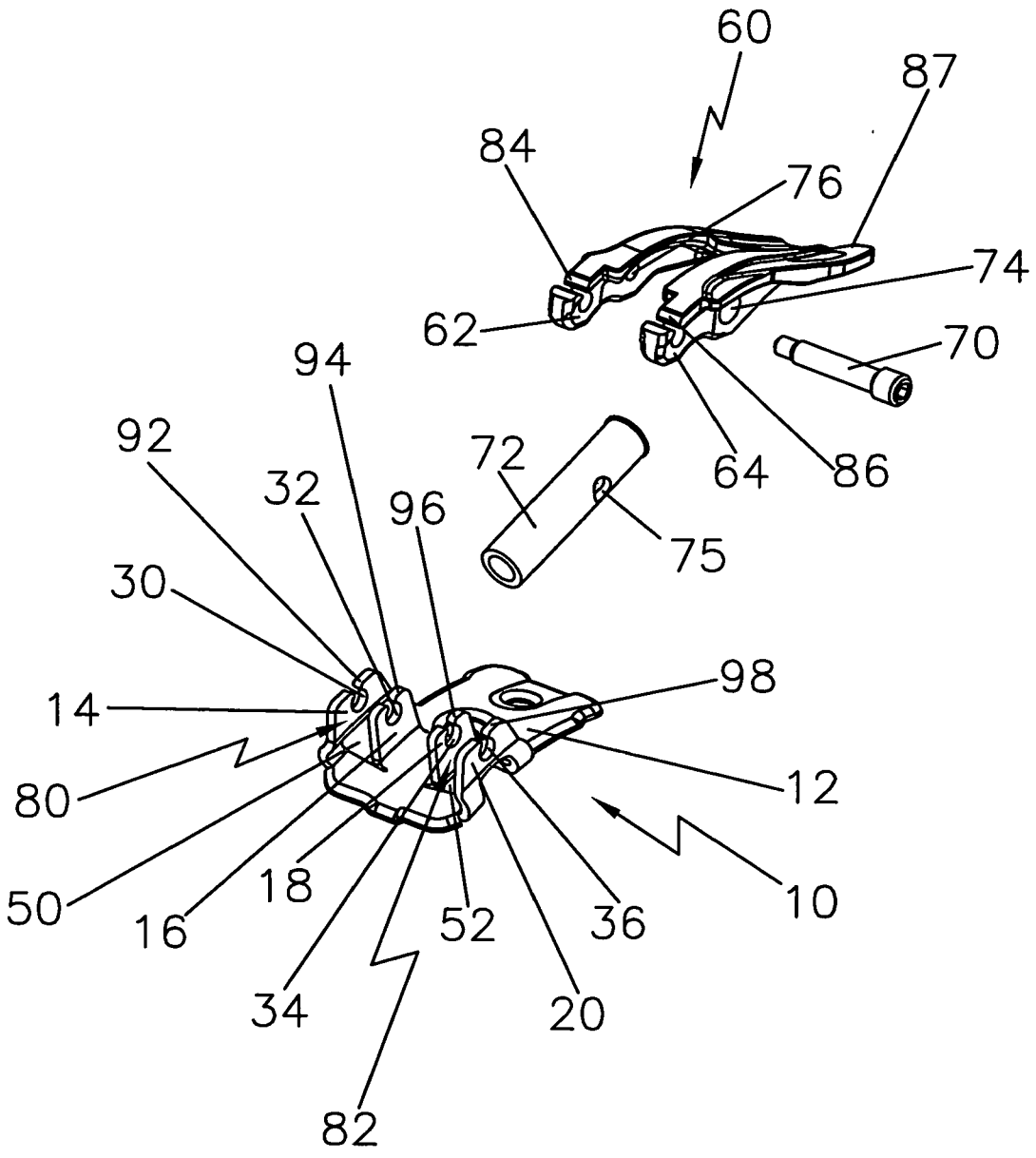
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FIG. 7

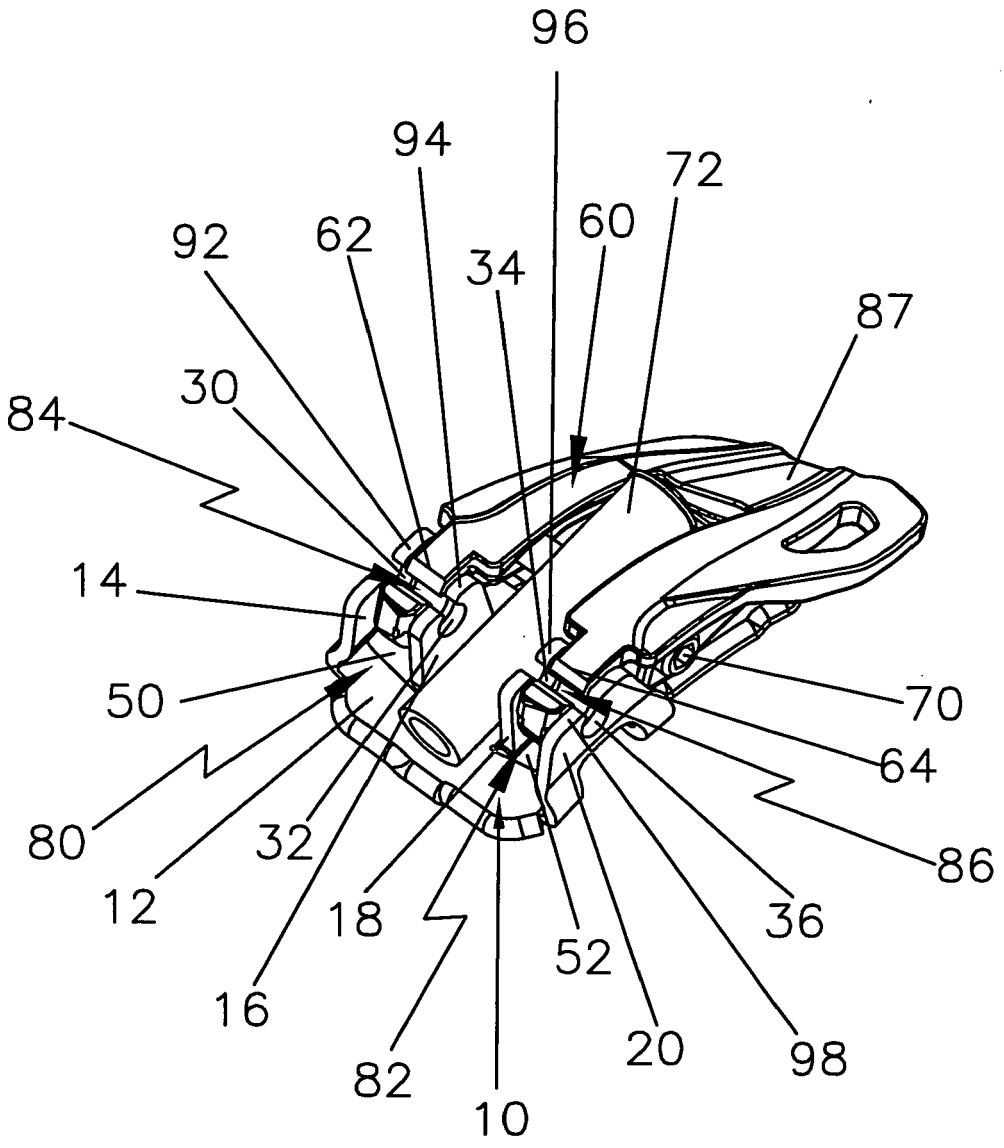
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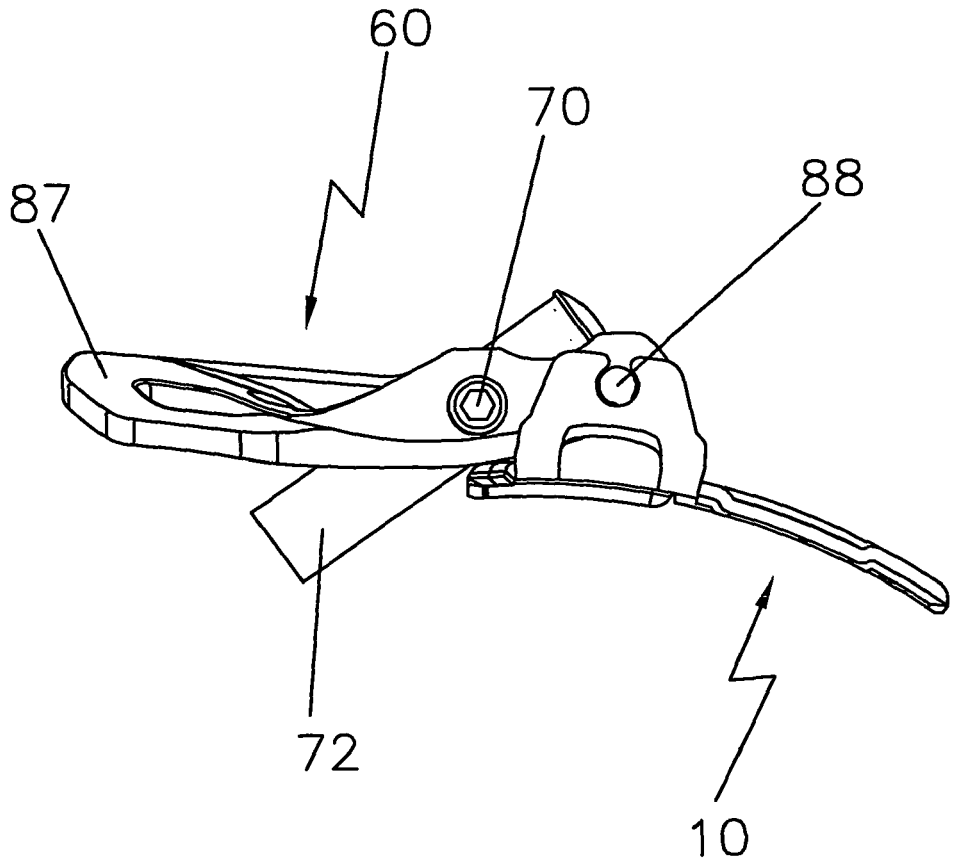
FIG. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5621

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 February 2009	Cianci, Sabino

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