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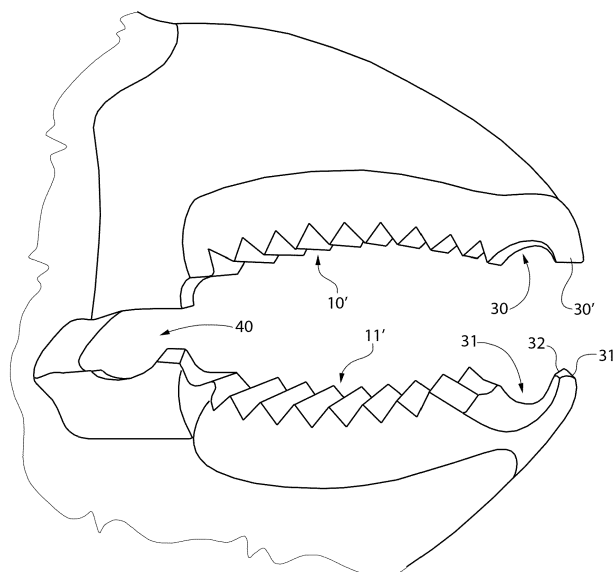
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(54) **SELF-LOCKING PLIERS FOR WHEEL BALANCING**

(57) The present invention relates to self-locking pliers comprising a first clamp (10) and a second clamp (11) each one having a grasping surface (10', 11') and hinged to each other in such a way that the two grasping surfaces (10', 11') face each other and in such a way as to be able to rotate said two clamps between an opened position by spacing the two grasping surfaces apart, and a closed position in which the grasping surfaces are in

contact or close to each other, the pliers being of the self-locking type in such a way as to enable to lock the selected splay of the clamps at the desired value, characterized by the fact that in correspondence with or in proximity of the end of at least one of said two clamps pliers comprise a cusp (32) which protrudes from the corresponding grasping surface.

FIG.6



Description

Scope of the invention

[0001] The present invention relates to the technical field of production of pliers.

[0002] In particular, the invention relates to particular pliers for applying/removing counterweights for wheel balancing.

Brief outline of prior art

[0003] As well known, cars and motor vehicles in use need regular maintenance and special maintenance in particular cases.

[0004] Changing tires is maintenance that is performed regularly. This change is carried out when the tires are worn or in the event of season change. In this case, winter tires can be replaced with summer tires and vice versa.

[0005] As well known, tires do not have a perfect curving and therefore the weight is not uniformly balanced.

[0006] Rims (said also wheel rims) have slight defects as well.

[0007] For a good functioning of the vehicle, performing the operation called balancing is important for harmonizing the distribution of the weights between tire and rim.

[0008] The balancing operation is important for guaranteeing comfortable driving of the vehicle and preservation of the inner mechanical components like wheel bearings or shock absorbers of said vehicle from possible stresses.

[0009] In fact, unbalanced tires cause vibrations to the steering wheel, to the pedals and to the cabin.

[0010] Moreover, a badly balanced wheel does not allow to maintain a perfectly linear trajectory and this causes an abnormal wear of the tire with a consequent loss of grip, in addition to be dangerous to driving.

[0011] A good practice is to perform wheel balancing also in the event when the wheels are stressed for example because they hit a wall.

[0012] To perform this operation, the mechanic or tire specialist uses a balancer which indicates where the tire is unbalanced and the necessary weight to counterbalance it.

[0013] As well known, it is constituted by a rotatable axis connected to a computerized system which indicates any imbalance by indicating the application points of the balancing counterweights.

[0014] The objects applied for balancing the wheel are named indeed balancing counterweights.

[0015] Said counterweights can be of adhesive type or clip ones (also named spring ones) and have various and predefined weights.

[0016] These counterweights are applied onto the rim wheels in both cases.

[0017] The clip counterweights are widely used because they enable their reuse.

[0018] To apply said counterweights, the mechanic or tire specialist uses a hammer. Pliers are required to remove these counterweights.

[0019] As per schematization of the prior art, shown in figures 2 and 3, a clip counterweight is formed by a central body 100 constituting the actual weight, in the form of a bar 100, with a curving profile conforming to the curving of the rim to which it is applied and by a U-folded foil which forms the hook 101 inserted into the rim.

[0020] Pliers produced according to the prior art, shown in figure 1, are commonly used to apply and remove said counterweights.

[0021] It is a tool commonly used in shops of tire specialists or mechanics, as well as by individuals who perform DIY wheel balancing in domestic field.

[0022] Said pliers comprise two elements of substantially elongated shape which end with a curving of approximately 90°. This curved part forms the two beak-shaped end portions held together with a pin 5 (generally constituted by a rivet).

[0023] More specifically, these pliers are made up by handles (6, 7) (or arms or whatever) through which, as well known, it is possible to use them. The two handles are hinged scissor-like through a pin 5 in such a way as to be able to rotate around the pin (or fulcrum or whatever).

[0024] The handles end with this folded portion which forms the grasping part of the pliers.

[0025] This portion (indicated in figure with number 2 and 3) has a shape of beak and therefore it constitutes the gripping clamps (2, 3).

[0026] As well known, by acting on the handle with a reciprocal moving-away or approach motion of the handles through their rotation around the fulcrum 5 (scissor-like opening and closure), the opening or closure of the beak is caused for releasing or grasping an object.

[0027] According to the prior art, the object to be handled, in particular the balancing weight, is inserted between the two clamps (2, 3) and grasped by tightening the handles (6, 7) which rotate around the pin 5.

[0028] Then the object is handled depending of the aim of the application which can be removing, folding, etc. by prying through handles.

[0029] It is common practice to cover the handles with insulating and non-slip material to improve grip.

[0030] The user of said pliers who wants to remove a counterweight fixed to a wheel rim grasps the counterweight between the clamps (2, 3) and grasps the counterweight by tightening (namely moving close to each other) the handles. In particular, a clamp is placed in contact with the hook 101 of the counterweight and the other clamp is placed in contact with the hook 101 thereby locking the counterweight between the two clamps.

[0031] By prying said counterweight through the handles (6, 7) of the pliers, the user removes it from said wheel rim.

[0032] Moreover, said pliers are also equipped with a protrusion 1 of cylindrical shape which has the purpose

of hammer.

[0033] Said hammer is used to fix a counterweight to a rim.

[0034] Moreover, said pliers have an incision 8 in the inner part of a handle 7, in which said incision in use forms a space together with the other handle 6, said space is suitable for receiving a counterweight to be able to reshape it after use.

[0035] In fact, after use, a hook 101 of a counterweight can be deformed and by inserting said counterweight on the receiving space formed by the incision 8 of the handle 7 and the other handle 6, it is possible to reshape said counterweight by tightening the handles (6, 7) and applying force onto said hook 101. In this way, said counterweight can be reused.

[0036] The use of pliers of prior art for applying and removing counterweights has remarkable technical problems.

[0037] The clamps of said pliers are elements of substantially elongated shape forming flat and smooth surfaces. Therefore, the inner surface facing the opposite clamp is substantially flat.

[0038] In particular, the surface 2' relative to the clamp 2 is a substantially flat surface and therefore it is not suitable for wedging in the space between the counterweight to be removed and the rim to which it is applied.

[0039] The clamp 3 has at its free end a curving 4 facing the other clamp, in the form of hook with a flat surface 4'.

[0040] Actually, there are two flat surfaces 4' and 2' facing each other.

[0041] To be able to remove a counterweight from a rim, the clamps of said pliers are applied to said counterweight.

[0042] As mentioned above, the contact surfaces of said clamps are flat. Therefore, this means that a great force must be exerted onto the handles to tighten the counterweight between the clamps as much as possible so that it does not slip and to remove said counterweight.

[0043] Moreover, this kind of pliers is not self-locking, that is it does not have the mechanism which fixes a selected splayed position.

[0044] Substantially, the operator must constantly exert a grasping force to lock the counterweight between the clamps and remove it.

[0045] Therefore, the action performed for this operation requires an immediate remarkable effort by the user/operator.

[0046] Said action may cause important stresses on the involved joints, said stresses can consequently cause carpal tunnel syndrome, dysarthrosis, etc. above all when this action is repeated a hundred times each day all days.

[0047] Another problem arises to reshape a counterweight after use.

[0048] As mentioned above, to be able to reshape a counterweight after use, said counterweight is inserted into the space formed by the incision 8, present in the handle 7, and the handle 6.

[0049] The insertion of said counterweight in the space formed in this way has many inconveniences because the counterweight slips and exits from said space.

[0050] Moreover, great force must be applied on the handles, once the counterweight has been grasped, to be able to reshape the hook 101.

Summary of the invention

[0051] Therefore, an aim of the present invention is to provide a new type of pliers for wheel balancing in general, which resolves said technical problems.

[0052] In particular, the aim of the present invention is to provide particular pliers for applying and/or removing balancing counterweights from a rim and these pliers are shaped in such a way as to require less force for removing the counterweight and ensuring precision at the same time.

[0053] These and other aims are achieved with the pliers according to claim 1.

[0054] These pliers, according to the invention, comprise a first clamp (10) and a second clamp (11) each one having a grasping surface (10', 11') and hinged in such a way that the two grasping surfaces (10', 11') face each other and in such a way as to be able to rotate said two clamps between an opened position by spacing the two grasping surfaces apart, and a closed position.

[0055] For example, in said closed position the grasping surfaces can be in contact with each other or close to each other at a certain distance (therefore not in contact).

[0056] Moreover, this type of pliers comprises a locking system which allows to adjust the splay of clamps from each other thus maintaining the selected splay.

[0057] According to the invention, the pliers comprise a cusp (32) in correspondence or in proximity of an end of at least one of said two clamps.

[0058] Therefore, the cusp protrudes from the corresponding grasping surface like a sort of tip emerging from it.

[0059] This solution allows to solve all said technical disadvantages.

[0060] In particular, thanks to this cusp, the end of the clamp can be penetrated between the hook 101 and the edge of tire thus causing the cusp in use to be positioned under the edge 101' of the hook 101.

[0061] Thanks to the fact that the pliers are self-locking, the user can select and lock the suitable splay beforehand.

[0062] At this point, the muscular effort is no longer required for grasping and closing the pliers given that the cusp positioned under the edge 101' acts as a pushing point with the user who simply pries up with the pliers thanks to the fact that they are self-locking and remain locked in a selected splayed position. In fact, actually, the two handles must no longer be held to be tightened and the operator can act by holding the pliers by only one of the two handles by simply prying action given that the

selected splayed position remains fixed by the locking system of the self-locking pliers themselves.

[0063] More specifically, the subject of the present invention are self-locking pliers comprising a first clamp (10) and a second clamp (11) each one having a grasping surface (10', 11') and hinged to each other in such a way that the two grasping surfaces (10', 11') face each other and in such a way as to be able to rotate said two clamps between an opened position by spacing the two grasping surfaces apart, and a closed position, in which the two grasping surfaces are in contact with each other or close to each other at a certain distance, the pliers being of self-locking type in such a way as to allow to lock the selected splay of the clamps at the desired value.

[0064] According to the invention, in correspondence with or in proximity of the end of the grasping surface (10', 11') of at least one of the two clamps (10, 11) a tooth (31') equipped with a cusp (32) is provided.

[0065] Advantageously, said tooth is generated by a curved recess (31) hollowed out in said grasping surface (11').

[0066] Advantageously, the opposite grasping surface comprises a tooth (30') having a flat surface (30'') which is opposite to said cusp.

[0067] Advantageously, said tooth (30') is generated by a curved recess (30) hollowed out in the grasping surface (10').

[0068] Advantageously, the pliers have a surface (9) forming a strike hammer, for example obtained by welding a metallic cylindrical body at a point of the pliers.

[0069] Advantageously, at least one of the two clamps can be connected in a removable way to the body of the pliers, for example through magnetic systems.

[0070] In this way, it can be easily replaced, for example in the event of breakages.

[0071] Advantageously, in the event or replaceability, it is precisely the clamp equipped with tooth forming the cusp that is connected to the body of the pliers in a removable way, for example through said magnetic means.

[0072] Advantageously, said cusp is preferably arranged exactly in correspondence of the end of the grasping surface.

[0073] Advantageously, said cusp is preferably arranged on one of the two grasping surfaces only.

[0074] The use of pliers according to one or more of the previous features for removing counterweights (100) from the tires is also described here.

[0075] Also described here is a modifying method for self-locking pliers, the method comprising a processing by removing material of at least one of the two grasping surfaces (10', 11') in such a way as to modify the shape of said at least one of the two grasping surfaces in correspondence with or in proximity of its end by generating the formation of a tooth (31') equipped with a cusp (32).

[0076] Advantageously, said tooth is generated by a curved recess (31) hollowed out in said grasping surface (11').

[0077] Advantageously, the opposite grasping surface

can comprise a tooth (30') having a flat surface (30'') which is opposite to said cusp.

[0078] Advantageously, said tooth (30') can be generated by a curved recess (30) hollowed out in the grasping surface (10').

Brief description of the drawings

[0079] The invention, in one or more of the embodiments thereof, will be described below according to the following drawings:

- Figure 1 shows pliers produced according to prior art;
- Figure 2 shows a clip counterweight, used for wheel balancing;
- Figure 3 shows an axonometric view of a clip counterweight;
- Figure 4 and figure 4A show the subject of the invention with its components;
- Figure 5 shows an assembly of pliers according to the invention;
- Figure 6 shows an enlarged detail of clamps modified according to the invention;
- Figure 7 shows a step of use;
- Figure 8 shows a comparison between the original pliers and the pliers after modification.

Detailed description of the invention

[0080] The subject of the present invention are pliers already known and sold per se but modified according to the description below.

[0081] Anyway, many elements already known are described for clarity purposes notwithstanding the new modified elements will be described in detail.

[0082] As explained below, this does not obviously exclude the full production of pliers even of types different from the described ones to which are applied at least the innovative elements subject of the invention.

ELEMENTS RELATIVE TO THE PRE-EXISTING PLIERS:

[0083] The pliers described in figure 4 and figure 4A are pliers, as mentioned, already marketed and well known. They are self-locking pliers sold and marketed for a long time with the name of "Bgs 505" for example sold online on the following website:

<https://www.amazon.it/Bgs-505-Pinza-autobloccante-extracorta/dp/B001ILH13Y>

[0084] First of all, for clarity purposes, the pliers of the prior art are described hereunder:

[0085] Said pliers, as schematized in figure 4 and in figure 4A, comprises two handles 13 and 14 and a portion formed by two clamps 10 and 11 which can obviously be activated into opening and/or closure always by acting through the handles 13 and 14.

[0086] At the top end of the handle 13 there is the clamp

10 connected thereto.

[0087] Said clamp 10 has a toothed surface 10' (saw-tooth-like) in the side facing the other clamp 11 and therefore on the suitable side to be grasped.

[0088] The clamp 11 is connected to the handle 14 through a first pin 16 around which it is free to rotate.

[0089] The clamp 11 has a serrated surface 11' similar or equal to the surface 10' and which faces the serration 10'.

[0090] The clamp 11 can rotate freely around the first pin 16.

[0091] Said clamp 11 is in turn connected to the handle 13 through a second pin 15 which is at a certain axial distance (d) from the first pin 16.

[0092] A rod 19 whose end 19' is slidable in a seat of the handle 13 is interposed transversely between the handle 14 and the handle 13 with said seat which runs longitudinally along the handle 13. The other end is hinged in a third hinging 20 of the handle 14.

[0093] Therefore, the articulated system produced for this type of pliers known per se is clear.

[0094] In particular, the third hinging 20 is at a certain distance (d') from the end 19' of the rod 19 (see figure 5). In this way, when the lever 14 is moved close to the lever 13, the end 19' of the rod 19 abuts thus locking through obstruction against a fixed adjustable pin 18. This causes a transmission of a force along the rod 19 which is transferred to the lever 14 which, consequently, roto-translates with rotation around the fulcrum 20 and the fulcrum 16 thereby generating a pushing force onto the clamp 11 (a sort of kinematic motion like articulated pantograph).

[0095] The clamp 11, hinged in turn to the fulcrum 15, receives a pushing force from the rod 14 and therefore rotates moving close to the clamp 10 when the lever 14 is moved towards the lever 13 and moving away from the clamp 10 when the lever counterrotates thus moving away from the lever 13.

[0096] Therefore, the threaded cylinder 18 is positioned abutting against the end 19' of the lever 19.

[0097] In particular, by rotating the knob 17, the threaded cylinder 18 moves towards a direction or the other direction depending on the rotation direction of the knob 17, said cylinder thus going to fit more inside the handle 13 or protruding from said handle 13.

[0098] Therefore, the end 19' of the lever 19 is slidingly positioned in the handle 13 and is positioned abutting against the threaded cylinder 18 inside the handle 13.

[0099] Depending on the penetration degree of the handle 18 into its channel inside the handle 13, the end 19' of the lever 19 moves translating along the handle 13 and thereby modifying as a whole the geometries of the articulated system determined by the fulcrums 20 and 16.

[0100] This determines the possibility to adjust the maximum opening and/or closure of the clamps between each other.

[0101] Therefore, by acting on the knob 17, the opening/closure of the handles (13, 14) and consequently also

the opening/closure between the clamps (10, 11) can be adjusted thus modifying the space between the pliers.

[0102] The space suitable for receiving the object to be handled, in particular a counterweight, is formed between the two clamps (10, 11).

[0103] By moving the two clamps (10, 11) close to each other by acting on the handles (13, 14), the space narrows to be able to grasp the object to be handled.

[0104] Said space can be adjusted through the knob 17, as mentioned.

[0105] When the distance between the handles (13, 14) reaches the end stroke, the pliers are locked and remain locked thus maintaining the fixed distance between the clamps, given that the handles touch each other in closed position.

[0106] Thanks to the adjustment with the knob 17 and threaded rod 18, the end stroke of the two handles (the position in which they are closed) is such as to move the two clamps to a certain corresponding position, this position of the clamps may indicate a splayed position of the clamps or a position in which they touch each other, depending on the occurred adjustment.

[0107] Substantially, a splayed or closed position (depending on the adjustment) of the clamps can correspond to closed handles close to each other.

[0108] Moreover, this configuration is maintained locked.

[0109] For this reason, this type of pliers is called self-locking or more commonly these pliers are known as snap-like pliers.

[0110] Therefore, the described and known mechanism for these pliers allows to lock and maintain the pliers in a predetermined opening position without the need of maintaining this position through a grip action of the user.

[0111] For unlocking said pliers, it is enough to act on the handles themselves by splaying them, or by rotating the lever 21 against the lever 13.

[0112] In fact, when the handle 13 is close to the handle 14, the lever 21 is interposed between them and a rotation of the lever 21 entails a thrust on the handle 13.

[0113] The description above is prior art.

NEW MODIFIED PART IN THE PRE-EXISTING PLIERS

[0114] It has surprisingly been found that the use of suitably modified self-locking pliers, therefore of the pliers maintaining the selected position (position means the opening width of the clamps) suitably modified, fits very well the needs of removing the counterweight in the field of wheel balancing.

[0115] Therefore, the descriptive example below refers to a modification on the same pliers, model "Bgs 505", introduced above, even if the same modifications could be made to other brands/types of self-locking pliers.

[0116] According to a first aspect of the invention, as schematized in figure 5, a cylindrical protuberance 9 which extends outwardly from the handle 13 in the shape

of hammer 9 is located between the clamp 10 and the handle 13. Therefore, it is positioned above the clamp 10.

[0117] Said hammer 9 has precisely the purpose of allowing to apply a counterweight to a rim, by hitting with said hammer 9 onto the hook 101.

[0118] In this sense, therefore, a first modification has provided for the introduction, for example by welding, of this hammer 9 in the shape of a cylindrical protuberance.

[0119] The further modification, essential in the present patent application, concerns instead a working of the grasping surfaces relative to the two clamps, as better shown in the enlarged view of figure 6.

[0120] In particular, as shown in figure 6, there are the two grasping surfaces 10' and 11' relative to the clamps 10 and 11 and which have a knurled surface, for example sawtooth-like, as per prior art.

[0121] According to the invention, the modification has brought to a working in the end area thus producing a sort of curved inlet (30, 31), in particular a sort of recess (30, 31), preferably with curved profile.

[0122] Said recess 30 in correspondence of the clamp 10 has formed a single tooth 30' in the end part of the corresponding grasping surface 10'.

[0123] The recess 31 has equally formed a single tooth 31' in the end part of the relative grasping surface 11'.

[0124] Structurally, the tooth 31' has been further worked in such a way as to form a pointed cusp 32.

[0125] Therefore, on one side the surface 30' constituting said tooth 30' has been maintained substantially flat whereas the tooth 31' has been worked to form a cusp thus forming a tip (even round).

[0126] Thanks to this cusp 32, the removal of the counterweight is much more simplified.

[0127] In fact, as schematized in figure 7, the working of the part 31' is such as to penetrate the space comprised between the edge 200 of the rim to which the counterweight and the tire 100 are fastened.

[0128] In fact, as shown in the image of figure 7, the modification allows the tip of the part 31' to penetrate until being positioned below the edge 101' relative to the hook 101 (see figure 3) so that it can allow to apply a quick and efficient lifting lever.

[0129] In particular, the seat 31 creates a sufficient penetration space which enables the tooth 31' and relative cusp to be positioned below the edge 101' of the hook when it is fixed to the rim.

[0130] In fact, whereas the traditional pliers of prior art are not capable of bringing an end of their clamp under the end 101', the occurred modification allows this result with an advantageous effect of removal by prying.

[0131] Moreover, the invention works well because the type of selected pliers are pliers which maintain the selected fixed distance between the clamps, given that they are self-locking indeed.

[0132] In this way, differently from prior art, the generation of the cusp together with the fact that the pliers are self-locking allows an immediate removal without the need of a muscular effort of the hand or wrist tendons.

[0133] Therefore, to be able to remove a counterweight from a rim, an opening between the clamps is adjusted and fixed that can obviously remain unvaried for the various types of tires on which to act or can be modified depending on needs.

[0134] In any case, the operation is performed with the clamps fixed in position.

[0135] First the cusp is inserted into the space between the tire and rim on which the counterweight is mounted, taking care that the cusp is positioned under the edge 101' of the arch 101 (figure 3) and it is slightly pried. The penetration of the cusp of the tooth under the edge is facilitated by the presence of the seat 31 (that is the recess) which determined the formation of the same tooth 31' equipped with cusp 32. For generating the lever, pushing on the handles (13, 14) which are fixed to the selected position is sufficient thereby rotating the whole pliers to the direction which lifts and unhooks the counterweight.

[0136] Unhooking is immediate (actually the counterweight jumps away) and the fact of having pliers locked in the selected splayed position allows to reduce to the minimum the effort of removal differently from prior art in which the counterweight must be crimped very well.

[0137] With the proposed solution the counterweight must no longer be grasped with the other clamp given that the lever with the cusp is even sufficient.

[0138] In the event that this operation must be repeated for counterweights having the same sizes, the pliers can be adjusted to have the same grip, that is the same opening of the clamps (10, 11).

[0139] By using this type of pliers modified in this way, it is not necessary to grasp tightly a counterweight to be removed from a rim to which said counterweight is applied, as is the case with pliers for balancing produced according to the prior art.

[0140] Therefore, the operation of tightening between the clamps is no longer necessary.

[0141] Obviously, the description above and said modifications can be achieved on any pliers but with a working of an end of the clamp such that it is inserted in use under the edge 101' to lift by acting directly on the edge 101'.

[0142] With the purpose of greater clarity, figure 8 shows a comparison between the original part of the pliers and the working thereof to better highlight the production of the cusp which has the seat 31 upstream.

[0143] Therefore, the pliers of prior art not modified are highlighted on the left whereas the same pliers with the modification are shown on the right, therefore the generation of two opposite teeth formed through the production of recesses (30, 31).

[0144] The above occurs obviously by removing material, such as through machine tools.

[0145] Therefore, the cusp 32 is highlighted which faces the other tooth which maintains the flat surface.

[0146] The seat 31 allows the cusp to be positioned in use under the edge 101'.

[0147] The person skilled in the art will be able to as-

sess the optimal sizes of this working depending on his needs.

[0148] Therefore, it is evident that the working caused a substantially flat surface of the original pliers in their end part to obtain a shape of the two seats or recesses or whatever (30, 31), from which the tooth with its cusp 32 and the surface 30' on the opposite clamp are developed.

[0149] According to the invention, although a preferred configuration provides for the production of pliers as a modification of the pre-existing pliers, however the full production, instead of the modification, of new pliers with the above-described features is not excluded.

[0150] Notwithstanding the description above, in the event of production of new pliers instead of a modification of pre-existing ones, pliers could be produced by producing the clamp 10 or both clamps (therefore, only one of them or both) of interchangeable type.

[0151] For example, a clamp as accessory which is inserted and locked into position by a pin and which can be removed and replaced with a different one would be possible.

[0152] Given that the occurring lever forces are not high, and in view of the use to which the pliers are intended, not all teeth could be present and the clamp/s could be made interchangeable with connection to the structure even of magnetic type or with other locks such as pins or the like.

[0153] In addition, also the ends of the clamps could be magnetized to better maintain the grip with the counterweight to be removed.

[0154] Finally, notwithstanding the description above, as described in figure 6, a further modification could provide an additional removal of material in order to create the further curved seat 40 delimited in front by a further tooth 41 and this seat facilitates compression of the counterweight in order to bring it to its initial configuration for a new installation once it has been removed.

[0155] In particular, by inserting the counterweight into the provided seat, the clip part 101 is pressed to bring it to its original position, given that the removal operation tends to broaden it.

Claims

1. Self-locking pliers comprising a first clamp (10) and a second clamp (11) each one having a grasping surface (10', 11') and hinged to each other in such a way that the two grasping surfaces (10', 11') face each other and in such a way as to be able to rotate said two clamps between an opened position by spacing the two grasping surfaces apart, and a closed position, the pliers being of the self-locking type in such a way as to enable to lock the selected splay of the clamps at a desired value, **characterized by the fact that** in correspondence with or in proximity of the end of the grasping surface (10', 11')

of at least one of the two clamps (10, 11) a tooth (31') equipped with a cusp (32) is provided.

2. The pliers, according to claim 1, wherein said tooth is generated by a curved recess (31) hollowed out in said grasping surface (11').

3. The pliers, according to claim 1 or 2, wherein the opposite grasping surface comprises a tooth (30') having a flat surface (30') which is opposite to said cusp.

4. The pliers, according to claim 3, wherein said tooth (30') is generated by a curved recess (30) hollowed out in the grasping surface (10').

5. The pliers, according to one or more of the previous claims, having a surface (9) forming a strike hammer.

6. The pliers, according one or more of the previous claims, wherein at least one of the two clamps is connected in a removable way to the body of the pliers, preferably through magnetic systems.

7. The pliers, according to claim 6, wherein the clamp equipped with tooth forming the cusp is connected to the body of the pliers through said magnetic means.

8. The pliers, according to any one of the previous claims, wherein the first clamp (10) is connected to a first handle (13) and the second clamp (11) is connected to a second handle (14).

9. The pliers, according to claim 8, wherein the clamps are movable through said handles.

10. The use of pliers according to one or more of the previous claims for removing counterweights (100) from the tires.

11. A modifying method for self-locking pliers, the method comprising a processing by removing material of at least one of the two grasping surfaces (10', 11') in such a way as to modify the shape of said at least one of the two grasping surfaces in correspondence with or in proximity of its end by generating the formation of a tooth (31') equipped with a cusp (32).

12. The method, according to claim 11, wherein said tooth is generated by a curved recess (31) hollowed out in said grasping surface (11') and wherein the opposite grasping surface comprises a tooth (30') having a flat surface (30') which is opposite to said cusp and wherein said tooth (30') is generated by a curved recess (30) hollowed out in the grasping surface (10')

13. A method for removing a counterweight (100) from a rim (200) of the tire (P) on which it is mounted, the method comprising the following steps:

- Providing self-locking pliers, according to one or more of the previous claims from 1 to 9; 5
- Fixing of the two clamps at a selected splay;
- Inserting the cusp (31') into the space between the tire and rim on which the counterweight (100) is mounted, taking care that the cusp is positioned under the edge (101') of the arch (101) belonging to said counterweight (100); 10
- Generating the lever, pushing on the handles (13, 14) of the pliers thereby rotating the whole pliers to the direction which lifts and unhooks the counterweight. 15

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FIG.1
(Known art)

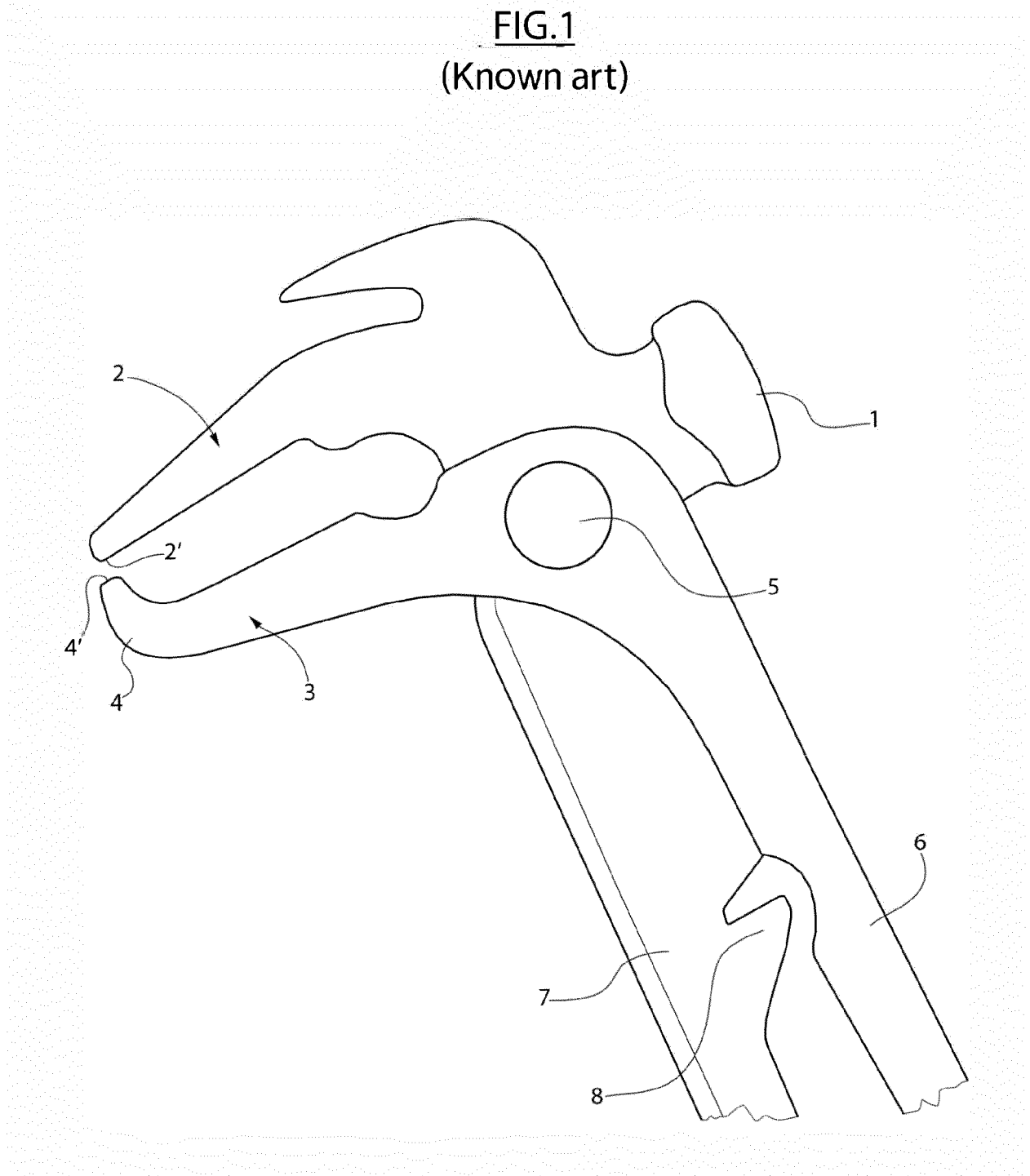


FIG.2

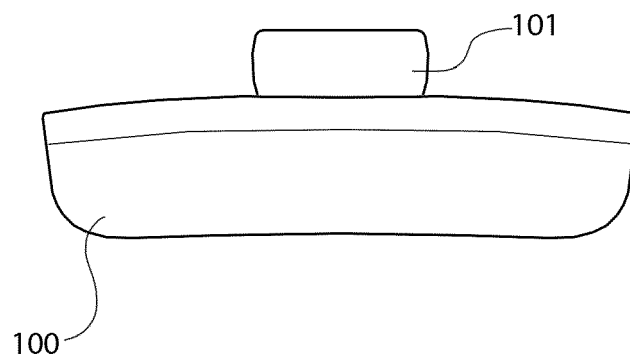


FIG.3

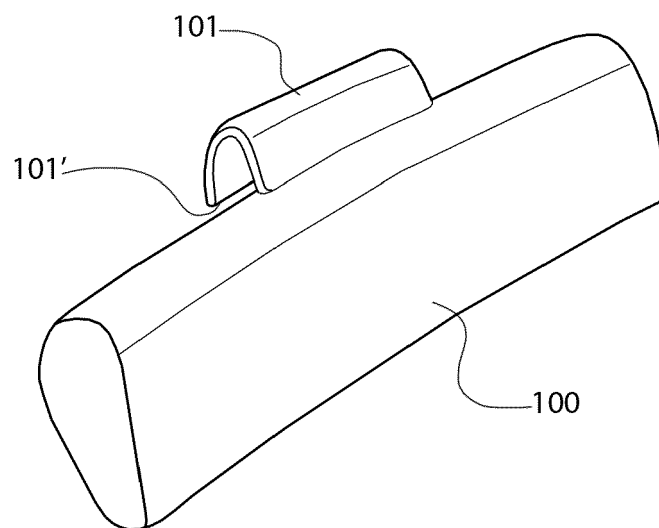


FIG.4

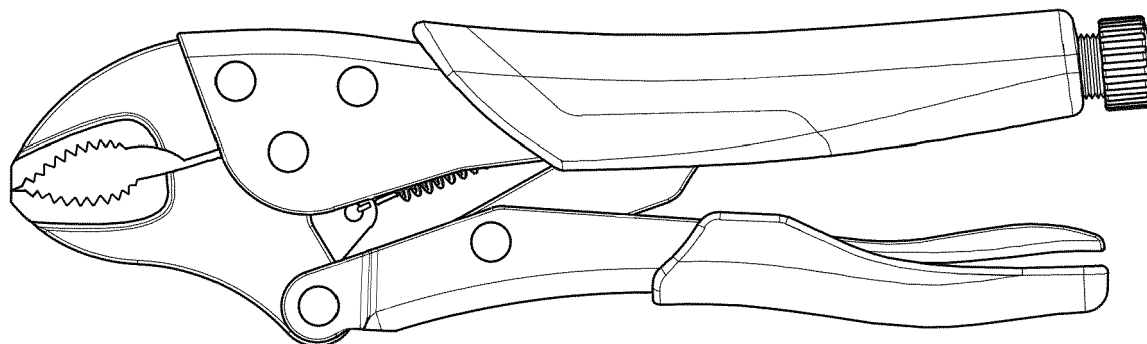


FIG.4A

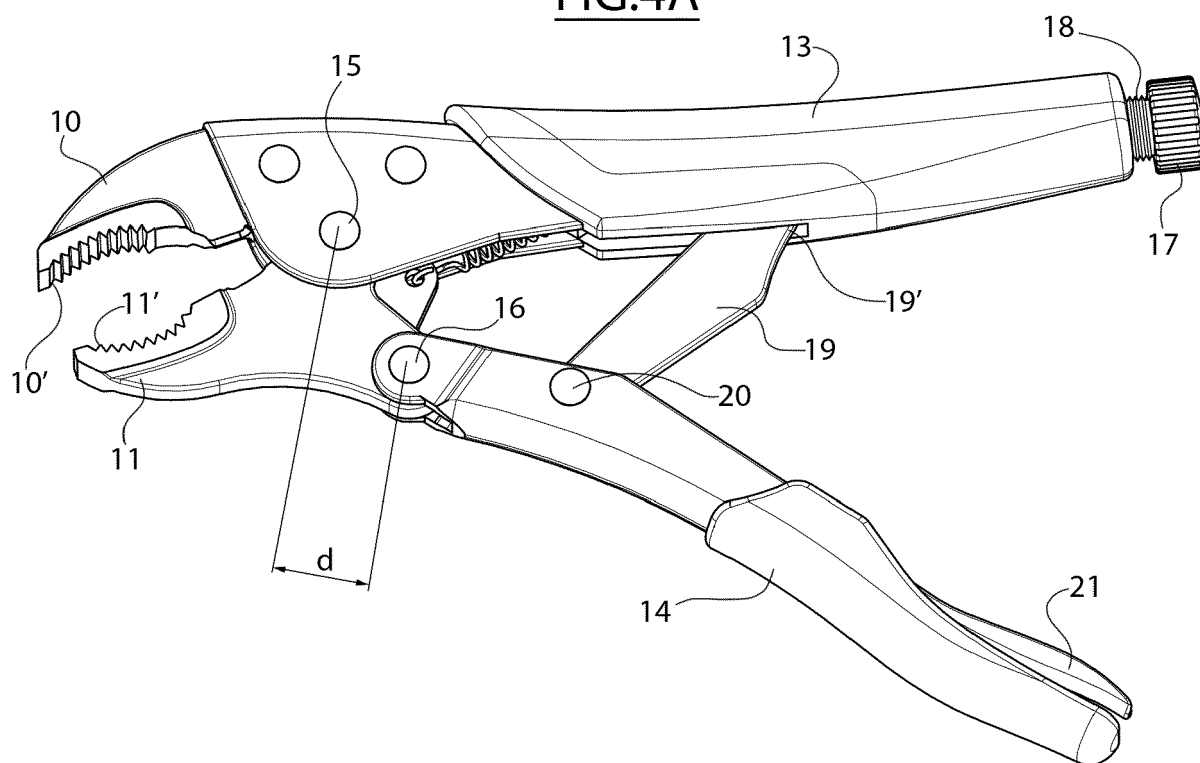


FIG.5

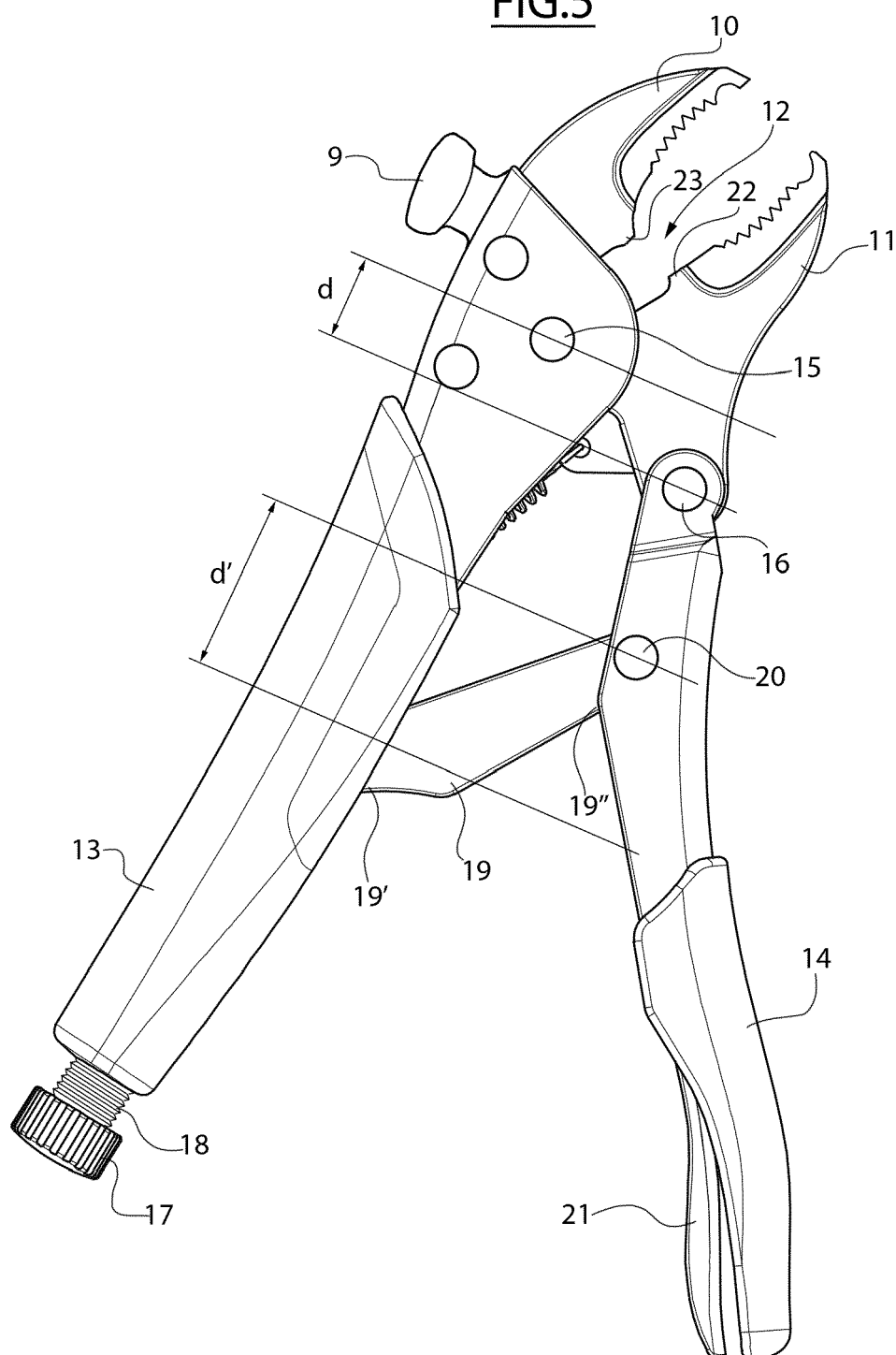


FIG.6

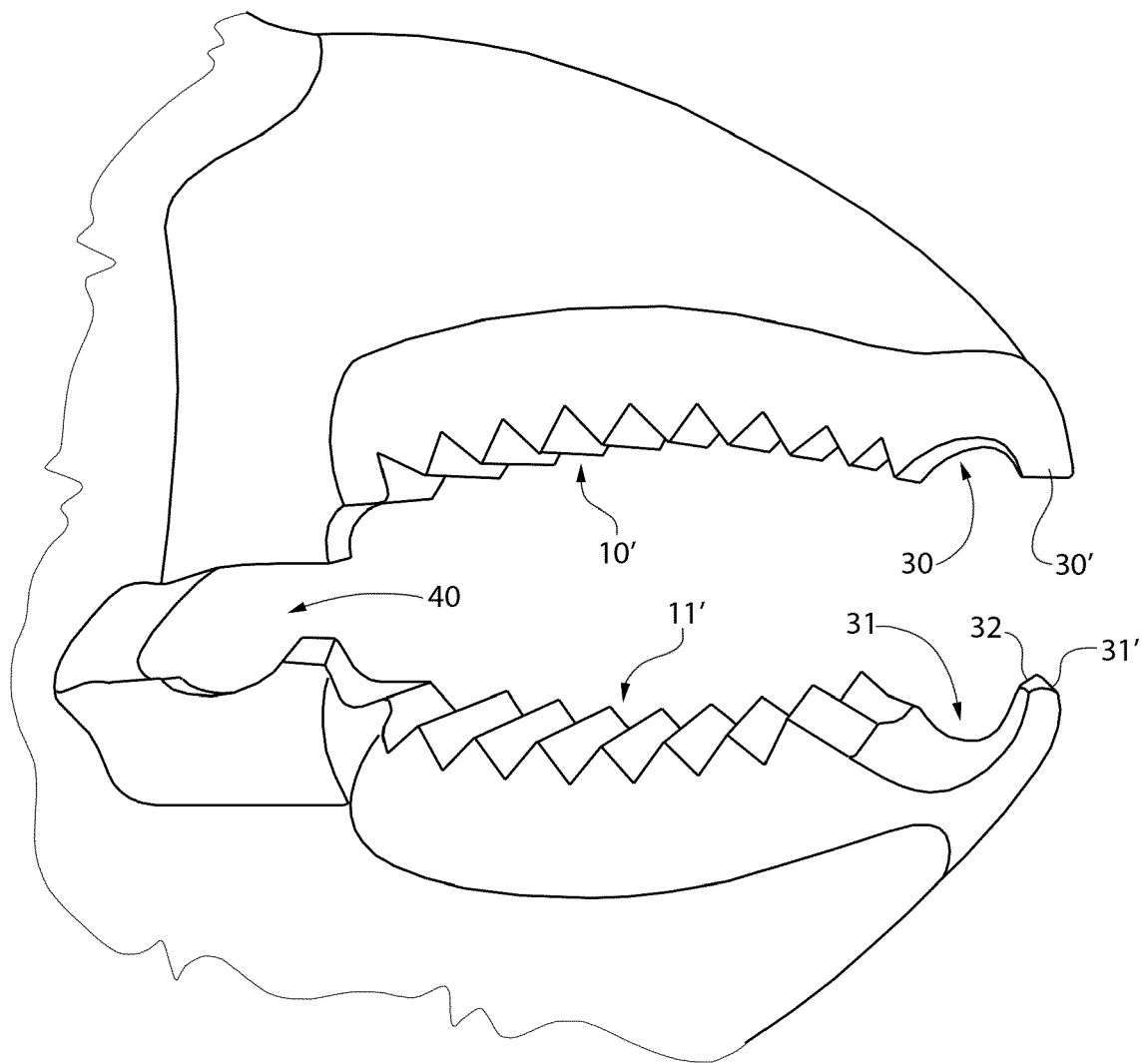


FIG.7

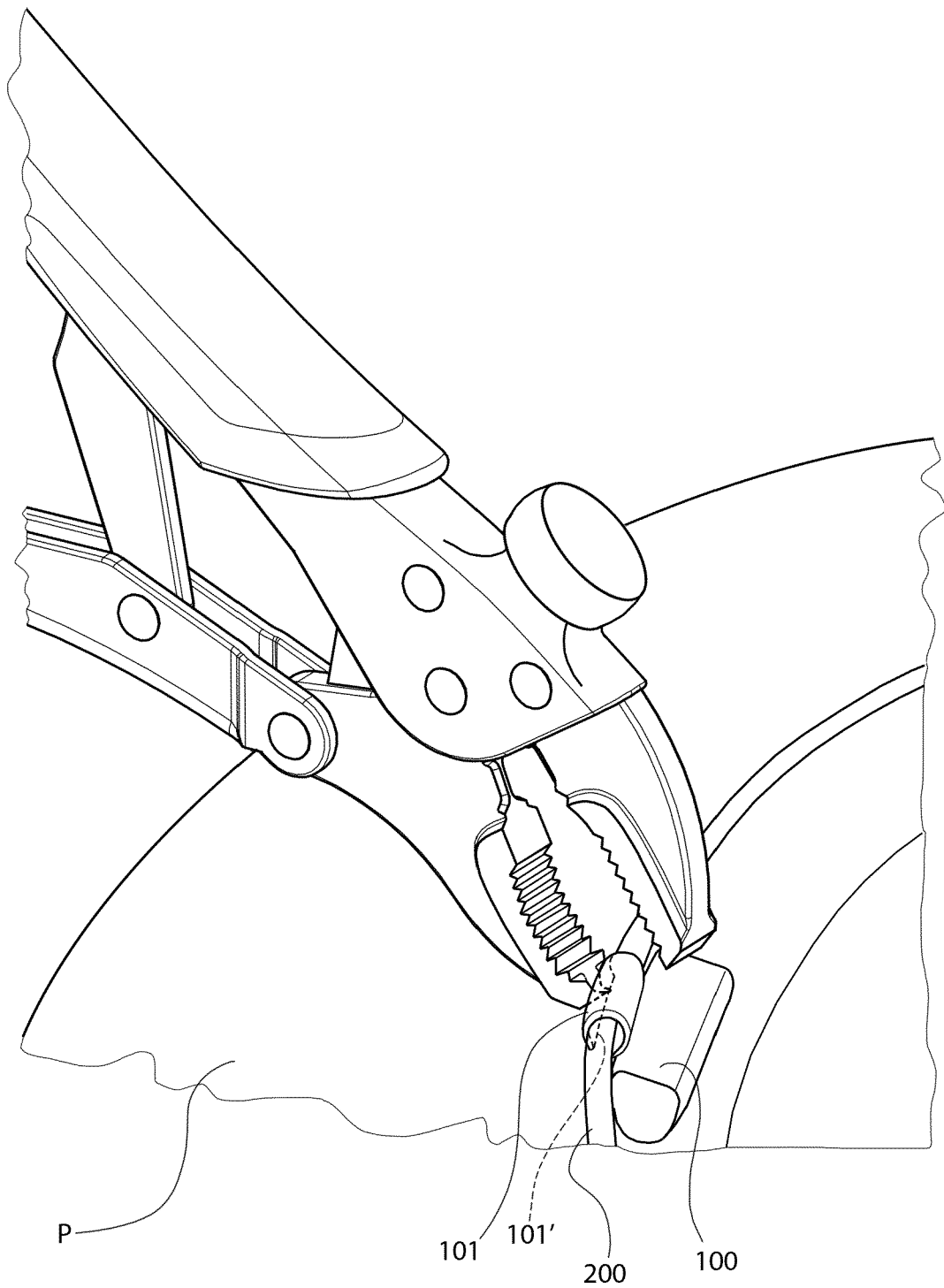
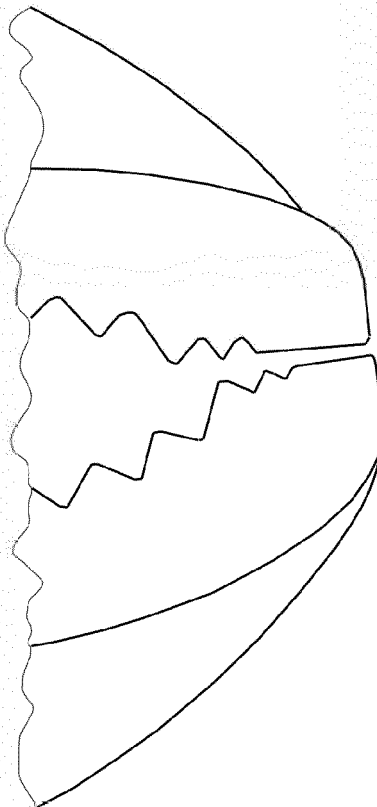
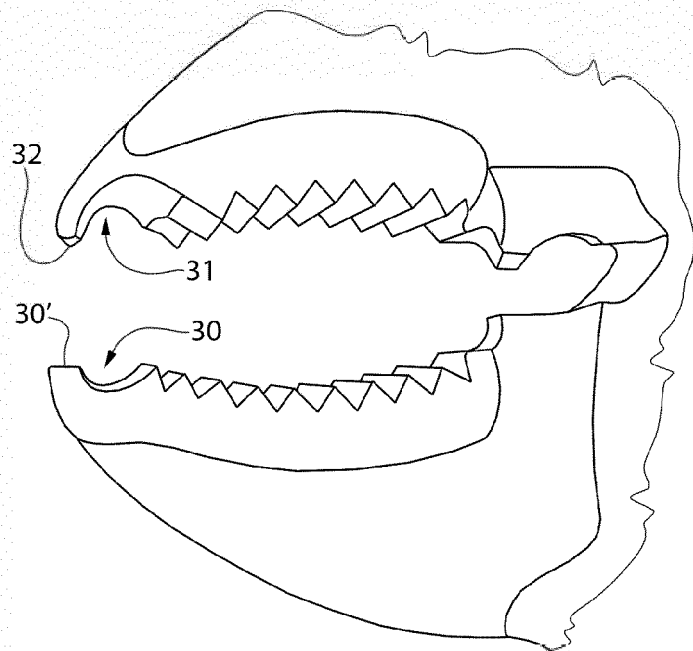


FIG.8

Pliers of known art



Modified pliers





EUROPEAN SEARCH REPORT

Application Number

EP 23 18 4947

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EPO FORM 1503 03.82 (P04C01)

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Y	* paragraph [0033] - paragraph [0043]; figure 7 *	5-7, 10, 13	B25B7/12 B25B27/00

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			B25B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 November 2023	Examiner Joosting, Thetmar
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17-11-2023

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82