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(54) **Title:** BLADE SHARPENING FIXTURE SYSTEM

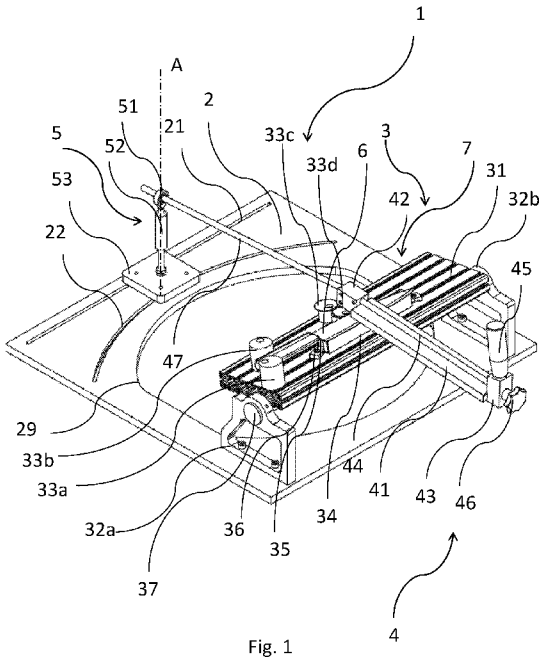


Fig. 1

(57) **Abstract:** Provided is a blade sharpening fixture system (1) for fixating a blade (6) to be sharpened, the blade sharpening fixture system (1) comprising a jig (3) for fixation of the blade (6). The jig (3) comprises a table (31) onto which a blade is to be fixedly arranged, fixating equipment (7) for fixating the blade (6) to said table (31), a grinding arrangement (4) for grinding of the blade (6), and a height adjustment arrangement (5) which is coupled to the grinding arrangement via an arm (47). The arm (47) being arranged in a receiving portion (51) of the height adjustment arrangement (5) which is arranged to freely support the arm (47) and, the receiving portion is arranged allow the grinding arrangement (4) to be movable in a grinding motion relative to the blade (6), wherein the grinding arrangement (4) comprises a grinding block (41) which is arranged to grind the blade edge (61), wherein the grinding block (41) is arranged to the arm via a first connector (421) or a second connector (422) wherein arrangement via the first connector provides an angle between the grinding block (41) and the arm (47) that when moving the grinding block (41) relative to the blade, the blade edge (61) assumes a convex edge.

BLADE SHARPENING FIXTURE SYSTEM

Technical field

The present invention relates to a blade sharpening fixation system for fixating a blade to be sharpened, and in particular to an adjustable blade sharpening fixation system.

Background

The art of sharpening knives, scissors, tools and other blades has been available for hundreds of years. Sharpening methods are many, and so are the types of blades to be sharpened. A common goal for any sharpening method is to ensure a sharp blade suitable for the cause, either if the blade is on a kitchen knife, scissors, a tool or an axe. When sharpening a knife, one goal is to ensure that the grinding angle is optimum for the blade in question. This way, a sharp edge that will last longer may be pursued. One way to solve this is by using a rotation grinding stone. The grinding stone rotates while a person holds the blade at an angle while grinding. A problem with a rotation grinding stone is however that the grinding is imprecise, since the orientation of the blade depends solely on the person holding the blade. A way to solve this is to fasten the blade in a jig and move a whetter across the blade at a given angle. A problem with this is however that a fixed jig may not provide adaptability to produce a grinding angle that suits blades of different shapes. Also, the grinding stone will erode and may not provide the same quality over time.

Therefore, there is a need for an improved solution in blade sharpening.

Summary

It is an object of the present invention to provide an improved solution that alleviates the mentioned drawbacks with present devices. Furthermore, it is an object to provide a versatile blade sharpening fixture system for a precise and repeatable grinding result.

This is achieved by a blade sharpening fixture system for fixating a blade to be sharpened. The blade sharpening fixture system comprises a jig for fixation of the blade. The jig comprises a table onto which a blade is to be fixedly arranged. The fixture system further comprises fixating equipment for fixating the blade to the table, a grinding arrangement for grinding of the blade, and a height adjustment arrangement which is coupled to the grinding arrangement via an arm. The arm is arranged in a receiving portion of the height adjustment arrangement which is arranged to freely support the arm and thereby allow the grinding arrangement to be movable in a grinding motion relative to the blade. The grinding arrangement comprises a grinding block which is arranged to grind the blade edge. The grinding block is arranged to the arm via a first connector or a second connector wherein the first connector provides an angle between the grinding block and the arm such that when moving the grinding block relative to the blade, the blade edge assumes a convex edge.

This is an advantage since the system provides a versatile solution. The number of adjustment solutions allows a single person to achieve a fine result every time. One goal for the fixture system of the invention, is to provide stability to the blade, and achieve a grinding motion that is predictable and possible to repeat. The possibility to repeat a grinding motion at a variety of grades without losing the angle throughout the whole process may thus be highly desirable. By predictability a number of uncertain factors may be almost eliminated. The blade edge may achieve a very precise and finely ground edge. Preferably, the grinding block should touch the blade such that their normal vectors are aligned. This may be achieved with a solution that allows the grinding block to move predictably along the edge. When discussing the angle relative to the grinding block, the angle is shown in a plane perpendicular to the table. Or in other words, the angle makes the grinding block face downwards towards the blade. The angle causes the grinding block to move at a radius on the blade edge when the arm is moved along the receiving portion. This is a great advantage, since a convex edge may be difficult to achieve when using other types of jigs. Many knives have a

convex profiled edge of different grades, so the need is big in the business of grinding. The angle at which the grinding block is arranged relative to the arm may be varied, and hence the convexity may be varied.

While grinding, it may also be desirable that the height difference between the object to be ground and the linkage head may be as small as possible to minimize changes in the grinding angle when processing the material in a pendulum motion from the centre to the edges of the grinding block. Therefore it may be valuable that the height and the angle can be changed via both the table and the linkage head to combine these two settings to achieve optimal results and that the pendulum movement obtains an as small height difference as possible.

According to an embodiment, the fixating equipment may comprise at least one magnet of which the magnetic force attracts the blade for fixating of the blade. This is an advantage since the magnetic force attracts the blade towards the magnet. Therefore, other fixating arrangements may not be necessary. Also, if using for instance a clamp of some sort, the clamp may cause damage to the blade. Also a clamp may be in the way for the grinding arrangement and hence obstruct the path for the grinding block, especially at low angels and when the whole blade needs to be profiled. Since the fixation may be provided by using magnets, a blade which is magnetic may preferably be used. Any other type of blade, such as ceramic may be fixated by using other fixating means. When using a magnet, it may be importance that the grinding arrangement is not affected by magnetism. The grinding arrangement may thus include a non-magnetic material.

According to an embodiment, the fixture system further comprises a base onto which the jig and the height adjustment arrangement are adjustably arranged. This is an advantage since the height adjustment arrangement and the jig may be arranged relative each other at a distance which can be varied depending on which blade is supposed to be ground. For instance, the grinding angle of the blade may be different depending on the distance between the height adjustment arrangement and the jig. The adjustable distance to each other may enable provision of an adjustable angle for the

blade relative to the height adjustment arrangement and hence an adjustable grinding angle. Thus grinding may be performed with a predetermined repetitive motion. In the base, the area between the height adjustment arrangement and the fixating arrangement may be hollow. In that way, the fixture system may be reasonably light. Further, by providing a hollow base, the tool or object to be sharpened may extend towards the ground on which the base is placed. This may be an advantage, since an object, for instance a chisel, may be quite long and may need a large grinding angle. This leads to the handle extending far down through the hollow area.

According to an embodiment, the table may be tiltable such that the blade edge may be adjustably arranged at an angle relative to the base. This is an advantage since the edge of one blade may be different from another. For instance, an axe has a thick blade and a steep angle, while a kitchen knife may be very thin. The table may be tiltable 0-90 degrees, in order to provide any grinding angle. Therefore, adjusting the angle may provide a better position for grinding. The grinding angle of a knife may be difficult to calculate. Normally, there is more than one factor that determines the angle, since the blade has an angle of its own. One can simply not only trust to the distance between the linkage head and the edge. The knife has its own angle if it is thicker in the neck and tapers towards the edge. Therefore, the angle may be obtained by a digital inclinometer, first by calibrating it on the table, then measuring the blade's own angle. After that, measuring the angle of the grinding block when it rests on the knife's blade. With compensation for the blade's own angle, the desired angle may be set by means of tilting the table and/or change the linkage head height. Measuring the convex radius may be done when the grinding block is resting on the blade and are in its two outer positions. In that way, the difference in angle when the grinding block is pushed forward and pulled back may be obtained. In this way, the angle may be determined by a tenth to a hundredth of degree accuracy, depending on the inclinometer used.

According to an embodiment, the table may constitute a standard profile, such as a T-Slotted aluminium profile to provide versatile arrangement

of the fixating equipment . This may be an advantage since all knives differ. Different knives may require different measures as to fixate them. By providing a standardised table, the fixating equipment may be fastened along any slot at any place without the need of providing fixating holes for each solution. This makes the table versatile and can be used for virtually any knife. Also, the table may be inexpensive to make, and can be made at any size required.

According to another embodiment, the magnet may be provided within an exchangeable tube. The tube may be a rectangular tube, to provide support to the blade. Since the tube may be supporting the blade, different sizes can be used depending on the size of the blade. Therefore, by arranging a magnet within a tube, it may be possible to exchange the tube for any size needed. Also, in this way the magnet or magnets used may be the same. The tube may be magnetic or non-magnetic. The tube may be an aluminium tube. Preferably, there may be a number of magnets which may be arranged throughout the tube in order to spread the magnetic force. Preferably, the exchangeable tube may support the entire length and width of the blade, without the edge coming in contact with it. Preferably, the blade may be arranged so that the edge stays clear off any external part in order to prevent the grinding block from colliding with anything other than the blade.

According to an embodiment, the exchangeable tube may support the blade at two support points, extending along at least a part of the length of the blade, to provide stability to the blade.

This may be an advantage, since the blade may be irregular in shape, such as convex, a flat surface may not provide proper support to a blade with a shape other than flat. So, by allowing the tube to be slightly recessed towards the middle, the blade may be supported.

According to another embodiment, the magnet may be a permanent magnet chosen from the group comprising neodymium magnets. For keeping a knife in place during grinding, a very strong magnet may be needed. A type of magnet like a neodymium magnet may be suitable since it is strong and likely to keep a knife in place. However, any other type of magnet can be

used having similar properties as a neodymium magnet.

According to another embodiment, the height adjustment arrangement may comprise a height adjustment piece which may provide adjustable height to the linkage head. Further, the receiving portion may be a pivotable linkage head in which the arm may be arranged to provide pivotable adjustable position to the grinding arrangement.

This is an advantage, since the height and the angle of the grinding block may be adjusted by changing the height of the receiving portion which supports the arm. Since the receiving portion may be a pivotable linkage head, the receiving portion may not only provide freely movable arm linearly, it may also provide a rotational centre for the grinding arrangement. Thereby, by moving the arm in a circular movement around the height adjustment arrangement, the grinding movement may be circular. Therefore, the grinding arrangement may be suitable for roundly shaped edges. Further, a pivotable linkage head provides the possibility of a non-linearly movement by attaching the arm with an angle to the inner holder of the grinding block. Therefore, the grinding arrangement may be suitable both for convex shaped edges and straight edges. The angle can also be altered by adjusting the height of the linkage head. By moving the rod end horizontally, it is possible to avoid obstructing parts of the knife, for instance the handle, and allow the grinding block to move freely at the same angle.

In another embodiment, the grinding block may be arranged between an inner block holder and an outer block holder. The first connector may be arranged in the inner block holder. The first connector may be arranged at an angle relative to the normal of the inner grinder.

The grinding block may be the device that does the actual grinding. This may be a whet stone or the like. The grinding block may be exchangeable such that it may be changed and replaced depending on the kind of grinding to be done. For instance, when sharpening a very blunt axe, firstly a coarse grinding block may be used. Further it may be changed for other blocks with medium coarse and others with finer and finer piece.

In one embodiment, the grinding block comprises exchangeable

abrasive paper. This may be an advantage since abrasive paper is readily available. By using exchangeable abrasive paper, there is no need to keep many different grinding blocks having different coarseness. Further, there are no limits in finding the preferable kinds for any purpose. The abrasive papers and the leather may be arranged to the grinding block using an adhesive tape. In this way, the abrasive papers may be exchanged, without losing the angle throughout the whole process. After having ground the edge surface, leather may be used until the blade is sharp and polished.

Further, it may be an advantage to allow the grinding block to comprise a block and abrasive paper since a grinding block having an incorporated grinding surface, such as a grinding stone, may erode with time and will affect the angle and reduce the quality of the grind. The block may be of any shape suitable. For instance it may be rectangular for a normal straight or v-shaped edge. It may also be round or elliptical. This type may be suitable if a serrated edge is to be sharpened. The grinding block may thus be exchanged for any shape or size needed.

In another embodiment, the inner block holder may further comprise a second connector arranged in line with the normal of the inner block holder. By having a straight connector, a v-shaped edge may be obtained.

According to yet another embodiment, the inner and outer block holders may comprise an inner and an outer supporting lip respectively. The grinding block may be arranged to rest upon the inner and outer supporting lips. This is an advantage since the supporting lips may provide a determined placement for the grinding block, no matter how thick the abrasive paper is. This may ensure that the grinding block surface is placed at the same height relative to the blade every time, and with each one of the blocks with different thickness of abrasive paper. Thus there may be no differences in height if for instance the abrasive paper needs to be changed in the middle of a grind, given that the set height and the table angle is the same. It thus maintains the calibrated heights and angles. Further, with the use of abrasive papers, the surface of the abrasive paper may be positioned at the same height every time and with every single block since they rest upon the lips. In this way,

there is no need to change the settings of the height adjustment arrangement while changing abrasive paper.

According to another embodiment, the inner and outer block holders may be connected via a grinder rod. Along the grinder rod, the distance between the inner and outer block holders may be adjustable. This is an advantage since the grinder rod holds the grinding arrangement together. Further, it may be easy to exchange grinding blocks and the holders for other grinding devices of different shapes or sizes.

According to yet another embodiment, the base may be provided with at least one position rail along which, one at a time, the height adjustment arrangement may be adjustably attached. A position rail may provide a steady and predictable and repeatable attachment. Once the height adjustment arrangement has been fixed at a height, the platform with the linkage head can be moved along one of the rails for horizontal movement, but with the set height and angle to be substantially the same. This is an advantage since some blades or knives may be provided with awkward shapes or handles which may be difficult to reach using a conventional jig. In conventional grinding machines, such shapes may be taken care of by hand, which in turn provides unpredictable results.

In one embodiment, one of the at least one position rail may be a circular position rail that may extend radially at a path at least partially around the jig. Since only the position of the height adjustment arrangement, the already set angle of the grinding block may not be lost.. Another one of the at least one position rails may extend linearly at a path at least partially along the jig. By providing the base with position rails it is possible for the grinding block to reach awkward positions on the blade, for instance angles on curved blades or due to handles, which normally would not be reached with a completely fixed linkage head.

In another embodiment, the fixating equipment further may comprise support elements for supporting the blade and the neck of a blade from accidental slide relative to the table. This is an advantage as the goal is to achieve a jig and grinder which allows grinding without the use of manual

manipulation. By manual manipulation it is meant the manual handling that may cause unpredictable results, such as holding the handle by hand, and using free hand grinding. Therefore, support elements that may be versatile for use on many types of knives may be an advantage. Preferably, the support elements may be arranged at three points around the knife. Possibly two points at the handle side and one point by the neck. The support elements may be of different types, depending on which part of the blade, handle or neck to be supported. One may have a collar that allows that if the knife or scissors are narrower than the tube, it can be pushed over the tube against the blade neck. Another support element may have a shelf on which the blade neck may rest on when the blade is larger than the tube, and placed slightly outside the tube. The advantage with this type, may be that this allows processing of the whole of the knife blade as the support elements does not reach above the knife's blade, and thus not collide with the grinding block. And due to this, the problem when trying to fasten the knife with a bracket or clamp, the risk for collision may be overcome. Also, by clamping it may limit the possibility of achieving low grinding angles. Preferably, the supports for the neck should match the thickness of the blade and need to be below it, if the whole blade has to be processed. It is an advantage if the height is kept as low as possible in order to avoid them to obstruct the grinding block.

According to another embodiment, the support elements may comprise at least one eccentric support block which by turning the eccentric support block provide adjustable support to said blade. By using an eccentric support block, the support element may be arranged in a slot of the table, but can still be flexible to reach different distances. An eccentric support block may be formed as a cylindrical block. The cylindrical block may be provided with a screw or the like, eccentrically arranged relative to the centre of the cylinder. Thus, when turning the cylinder, the support block may move eccentrically.

Brief description of drawings

The invention will in the following be described in more detail with

reference to the enclosed drawings, wherein:

Fig 1 is a perspective view of a blade sharpening fixture system according to an embodiment of the invention,

Fig. 2 is a side view of a blade sharpening fixture system according to an embodiment of the invention,

Fig. 3 is a detailed view of a table of a blade sharpening fixture system according to an embodiment of the invention,

Figs. 4-6 are side views of the blade sharpening fixture system according to an embodiment in different grinding positions,

Fig. 7 is a top view of a blade sharpening fixture system according to an embodiment of the invention,

Fig. 8 is a perspective view of the inner and outer block holder according to an embodiment of the invention,

Fig. 9 is a section side view of the inner block holder according to an embodiment of the invention,

Fig. 10 is a schematic view of a magnet in a magnet tube according to an embodiment of the invention, and

Fig. 11 is a schematic view of a magnet tube according to an embodiment of the invention.

Description of Embodiments

The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, like numbers refer to like elements.

In Fig. 1 there is shown a perspective view of a blade sharpening fixture system 1. From here on called fixture system or blade sharpener which refer to the same. The fixture system 1 is arranged to be set on a work top, the ground or the like and comprises a base 2. The base is generally stable

and is arranged to hold a jig 3 and a grinding arrangement 4. The jig 3 is arranged at one end of the base 2 and is arranged to keep a blade 6, which may be a knife, scissors, pruning shears, shovel, axe or any other blade or tool that need sharpening in position while grinding the edge 61 of the blade. In the base 2, the area between the height adjustment arrangement and the fixating arrangement may be provided with a hollow area 29. In that way, the fixture system may be reasonably light. Further, by providing a hollow base, the tool or object to be sharpened may extend towards the ground on which the base is placed. This may be an advantage, since an object, for instance a chisel, may be quite long and may need a large grinding angle. This leads to the handle extending far down through the hollow area 29.

The grinding is done by a grinding arrangement 4. The grinding arrangement 4 comprises a grinding block 41 or a whetter, which is arranged to be moved over the blade edge 61 in order to produce a desirable edge. The grinding arrangement comprises a handle 45, which is operated manually. The grinding block is connected by the inner block holder 42 to an arm 47. The arm 47 is connected to the grinding block 41 in one end, and connected to a height adjustment arrangement 5 in the other end. The height adjustment arrangement 5 is configured to adjust the height of the arm 47 in order to provide a steady and set angle of the grinding block 41 relative to the blade edge 61. The height adjustment arrangement comprises a height adjustment piece 52, a linkage head 51 and a foot plate 53. The foot plate 53 is arranged to be detachably attached to the base 2. The height adjustment piece 52 is the piece which may be adjustable, such that when manipulated, the height of the linkage head 51 is adjusted. The linkage head may be adjusted so that a desirable angle relative to the edge of the blade may be obtained. . The height adjustment piece may be a turnbuckle type adjustment. The linkage head 51 is configured to receive the arm 47. Further, the linkage head 51 is provided with a pivotable head. In this way, the arm 47, may be pivotally moved when arranged in the linkage head 51. In turn, the grinding block 41 may be pivotally moved relative to the blade edge 61, while the linkage head 51 is static.

The base 2 comprises a linear position rail 21 and a circular position rail 22. The circular position rail extends radially around the jig 3. Either of the position rails (21, 22) is configured to attach to the foot plate 53. In that way, it is optional to arrange the foot plate 53 in either of the linear position rail 21 or the circular position rail 22.

As can be further seen in Fig. 1, the grinding block 41 is arranged between an inner block holder 42 and an outer block holder 43. The block holders are arranged to clamp the grinding block 41.

The jig 3 comprises a table 31. The table 31 is supported by a first and second side piece (32a-b). The table 31 may be tiltable via a tilt adjustable axle 37 in order to provide an angle to the blade edge 61 relative to the base.

On top of the table 31, the blade is arranged. The goal is to provide a steady support for the blade so that a user does not need to hold the blade while grinding. The blade 6 is stabilised by means of a magnet 35. The magnet is arranged such that its magnetic force keeps the blade vertically stable. Preferably, the magnet is provided within a tube 34, such as a rectangular aluminium tube or the like. In this way, the size of the tube can be varied to support any size of blade. Further, the tube may prevent grinding dust to pile up in the centre of the magnets which could be the case using round magnets. The magnet should preferably be a permanent magnet. The magnet may be a strong magnet, a so called super magnet, such as neodymium magnet.

Further in Fig. 1, support elements 33a-d are shown. The support elements are arranged so as to restrict the blade's (6) movement in the horizontal plane. In the case where the blade has a shaft, for instance if there is a knife or an axe, the support elements 33 may provide stability. The support elements shown are cylindrical eccentric adjustable support elements. This means that the turning centre of the support elements 33 a-d is adjustable eccentrically on the table 31 to support the handle or the neck, thus making it possible for the support elements to be finely adjusted. The eccentric support elements 33 a-d may be round or elliptic or any other

suitable shape.

Fig. 2 shows a side view of the fixture system 1. Fig. 3 shows a more detailed view of the connector between the arm and the grinding block 41. In Figs. 2 and 3 there is illustrated that the grinding block 41 and the arm 47 are arranged relative to each other at an angle. Referring to Fig. 9, this angle is achieved by the connection of the arm 47 to the inner block holder 42. The inner block holder 42 is provided with a first connector 421 and a second connector 422. Either of the connectors can receive the arm 47. The first connector is, however, arranged at an angle α relative to the normal N of the inner block holder 42. By placing the arm in the first connector 421, it is possible to move the grinding block 41 so that a radius-like movement is provided over the blade edge 61. This exact phenomenon is illustrated in Figs. 4-6. The arm 47 is there shown in different positions, or in other words, the arm 47 is extended at different lengths relative to the linkage head 51 as the grinding movement is done. The arm 47 is freely movable in the linkage head 51 in any direction in the linear direction of the arm. The angle α causes the grinding block 41 to move at a radius-like curve, while the arm 47 is moved longitudinally in the linkage head 51. This will provide a blade 6 with a convex edge. Alternatively, the arm 47 can be arranged in the second connector 422, which is at zero angle relative to the normal N. This will instead provide a straight ground edge, a so called V-edge.

In Figs. 2-6 it is also clear that the table 31 comprises slots 311. The table 31 may be of a T-slotted profile, which allows the fixating equipment 7 to be freely arranged in any of the slots 311 provided. The fixating equipment 7 may thus be fastened by t-slot nuts. Further, a standardized profile may be readily available and may also be dimensioned to suit any size. Of course, the table may be of any type and can also be a table with positioning holes arranged at predetermined places. It may also be of another slotted type of profile.

Fig. 7 illustrates a top view of a blade sharpening fixture system 1. Looking from above it is clear that the grinding block 41 is movable across the blade 6. The arm 47, and thus the grinding block 41 is movable radially

relative to the linkage head 51. The grinding block 41 is also movable linearly through the linkage head 51. Also, since the height adjustment arrangement 5 may be adjustable horizontally along one of the position rails 21, 22, allowing the grinding block to achieve several positions. In Fig. 7 it is also shown that the magnet tube 34 is kept in place by at least one magnet keeper 36. The grinding block 41 is held between the inner and an outer block holder 42, 43. The clamping force is adjustable using the adjustment device 46 at the outer end of the outer block holder 43. Since the grinding block 41 is removable, it can be exchanged for different sizes and shapes, depending on the blade to be sharpened. For instance, a rectangular grinding block may be suitable for kitchen knives. A round or rounded grinding block may be suitable for sharpening knives with serrated edges or recurved blades. Also, the grinding block may be provided with exchangeable abrasive paper 48, depending on if a coarse or a fine grind is required, or the grinding blocks could be made of completely other abrasive materials in different shapes.

Referring now to Fig. 8, in which the inner 42 and outer 43 block holders are illustrated. The block holders 42, 43 are provided with supporting lips 423, 433, onto which the grinding block is arranged. Therefore the grinding block may be fixated at the same level, no matter what the thickness of the abrasive paper might be. The supporting lips 423, 433 ensure that whatever grinding block is used it is always placed at the same level every time. This is regardless of the abrasive paper used, as the abrasive paper will assume the same height resting on the supporting lips 423, 433.

Fig. 9 shows in more detail how the first and second connectors 421, 422 of the inner block holder may be arranged. It is shown that the first connector 421 is arranged at an angle relative to the normal N.

Fig. 10 is a schematic view of a magnet tube 34 and a magnet 35 placed therein. As explained, the magnet tube 34 may be of any size, shape or material. Preferably, the magnet tube is made from aluminium. It may be a standard hollow aluminium profile.

In Fig. 11, it is shown a side view if a magnet tube 34. It is shown that the magnet tube 34 may support the blade 6 at two support points 341, 342.

The support points may be such that they extend along at least a part of the length of the blade 6, to provide stability to the blade.

In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation, the scope of the invention being set forth in the following claims.

P A T E N T C L A I M S

1. A blade sharpening fixture system (1) for fixating a blade (6) to be sharpened, the blade sharpening fixture system (1) comprising

a jig (3) for fixation of the blade (6), the jig (3) comprising

a table (31) onto which a blade is to be fixedly arranged,

fixating equipment (7) for fixating the blade (6) to said table (31),

a grinding arrangement (4) for grinding of the blade (6), and

a height adjustment arrangement (5) which is coupled to the grinding arrangement via an arm (47), the arm (47) being arranged in a receiving portion (51) of the height adjustment arrangement (5) which is arranged to freely support the arm (47), wherein the receiving portion is arranged to allow the grinding arrangement (4) to be movable in a grinding motion relative to the blade (6), wherein

the grinding arrangement (4) comprises a grinding block (41) which is arranged to grind the blade edge (61), wherein the grinding block (41) is arranged to the arm via a first connector (421) or a second connector (422) wherein arrangement via the first connector provides an angle between the grinding block (41) and the arm (47), such that when moving the grinding block (41) relative to the blade, the blade edge (61) assumes a convex edge.

2. Blade sharpening fixture system (1) according to claim 1, further comprising a base onto which the jig (3) and the height adjustment arrangement (5) are adjustably arranged.

3. Blade sharpening fixture system (1) according to claim 1 or 2, wherein said fixating equipment (7) comprises at least one magnet (35) of which magnetic force attracts said blade for fixating the blade.

4. Blade sharpening fixture system (1) according to any of the claims 1-3, wherein the table is tiltable such that the blade edge (61) is adjustable at

an angle (β) relative to the base.

5. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the table constitutes a standard profile, such as T-Slotted aluminium profile to provide versatile arrangement of the fixating equipment (7).

6. Blade sharpening fixture system (1) according to any of the claims 3-5, wherein the magnet is provided within an exchangeable tube (34), to provide support to the blade and to avoid grinding dust to attach to said magnet (35).

7. Blade sharpening fixture system (1) according to claim 6, wherein the exchangeable tube (34) supports the blade at two support points, extending along at least a part of the length of the blade, to provide stability.

8. Blade sharpening fixture system (1) according to any of the claims 3-7, wherein the magnet is a permanent magnet chosen from the group comprising neodymium magnets.

9. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the height adjustment arrangement (5) comprises a height adjustment piece (52) to provide adjustable height to the receiving portion (51), and wherein the receiving portion (51) is a pivotable linkage head in which the arm (47) is arranged to provide pivotable adjustability to the grinding arrangement (4).

10. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the grinding block is arranged between an inner block holder (42) and an outer block holder (43), and wherein the first connector (421) is comprised in the inner block holder (42) and wherein the first

connector (421) is arranged at an angle (α) relative to the normal (N) of the inner grinder.

11. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the grinding block comprises exchangeable abrasive paper (48).

12. Blade sharpening fixture system (1) according to claim 10, wherein the inner block holder (42) further comprises a second connector (422) arranged in line with the normal (N) of the inner block holder (42).

13. Blade sharpening fixture system (1) according to any of the preceding claims , wherein the inner and outer block holders (42, 43) comprise an inner and a outer supporting lip (423, 433) respectively, on which the grinding block (41) is arranged to, rest upon said inner and outer lips (423, 433).

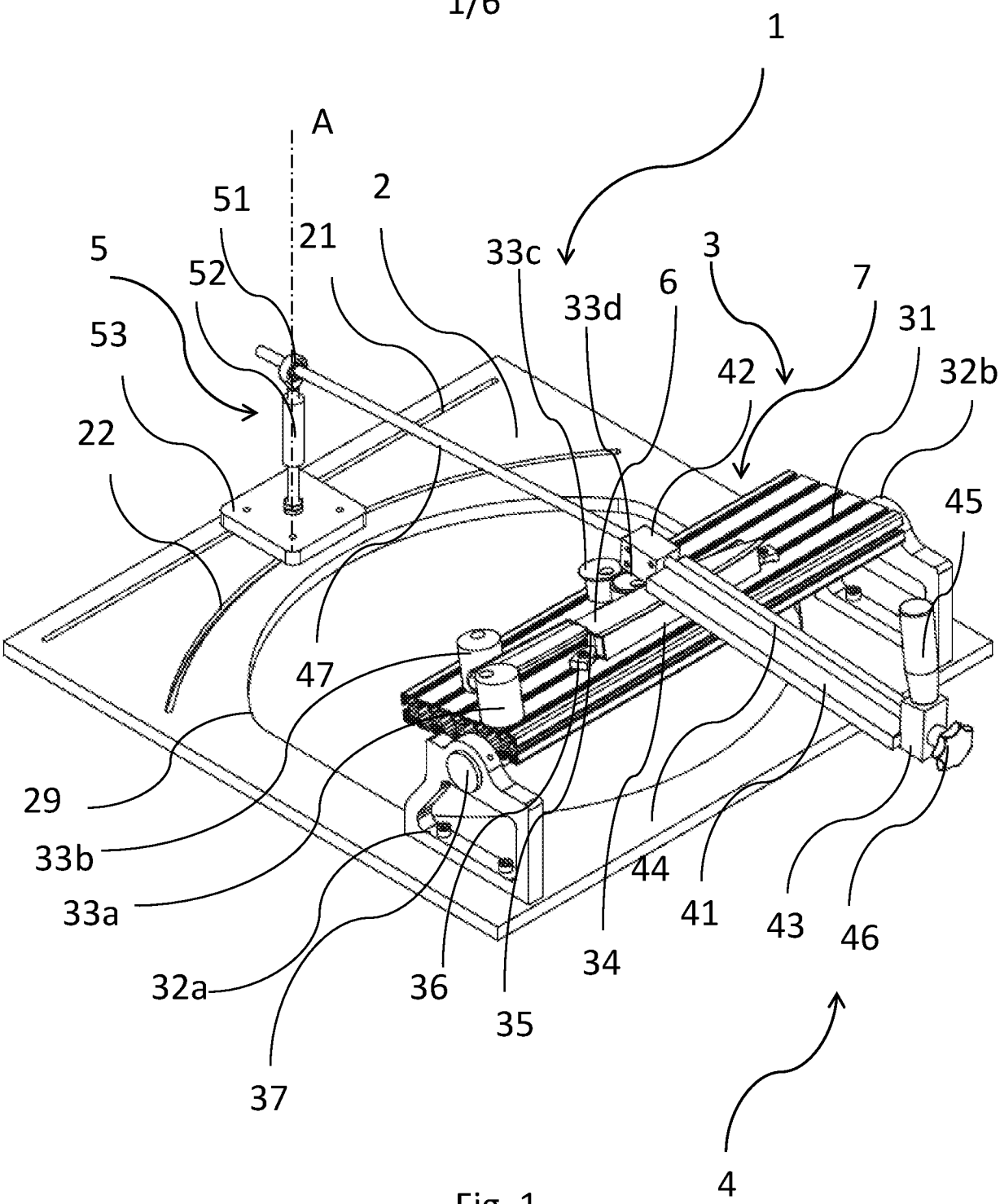
14. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the inner and outer block holders (42, 43) are connected via a grinder rod (44) along which the distance between the inner and outer block holders (42, 43) is adjustable.

15. Blade sharpening fixture system (1) according to any of the claims 2-14, wherein the base (2) is provided with at least one position rail (21, 22) along which, one at a time, the height adjustment arrangement (5) is adjustably fixable.

16. Blade sharpening fixture system (1) according to claim 15, wherein one of the at least one position rail (21, 22) is a circular position rail (22) that extends radially at a path at least partially around the jig (3), and another one of the at least one position rails (21) extends linearly at a path at least partially along the jig (3).

17. Blade sharpening fixture system (1) according to any of the preceding claims, wherein the fixating equipment (7) further comprises support elements (33) for supporting said blade and the neck of a blade holder from accidental movements relative to the table.

18. Blade sharpening fixture system (1) according to claim 17, wherein said support elements (33) comprise at least one eccentric support block (33a-d) which by turning the eccentric support block provide adjustable support to said blade.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A
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2
21
5
52
33c
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33d
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32b
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Fig. 1

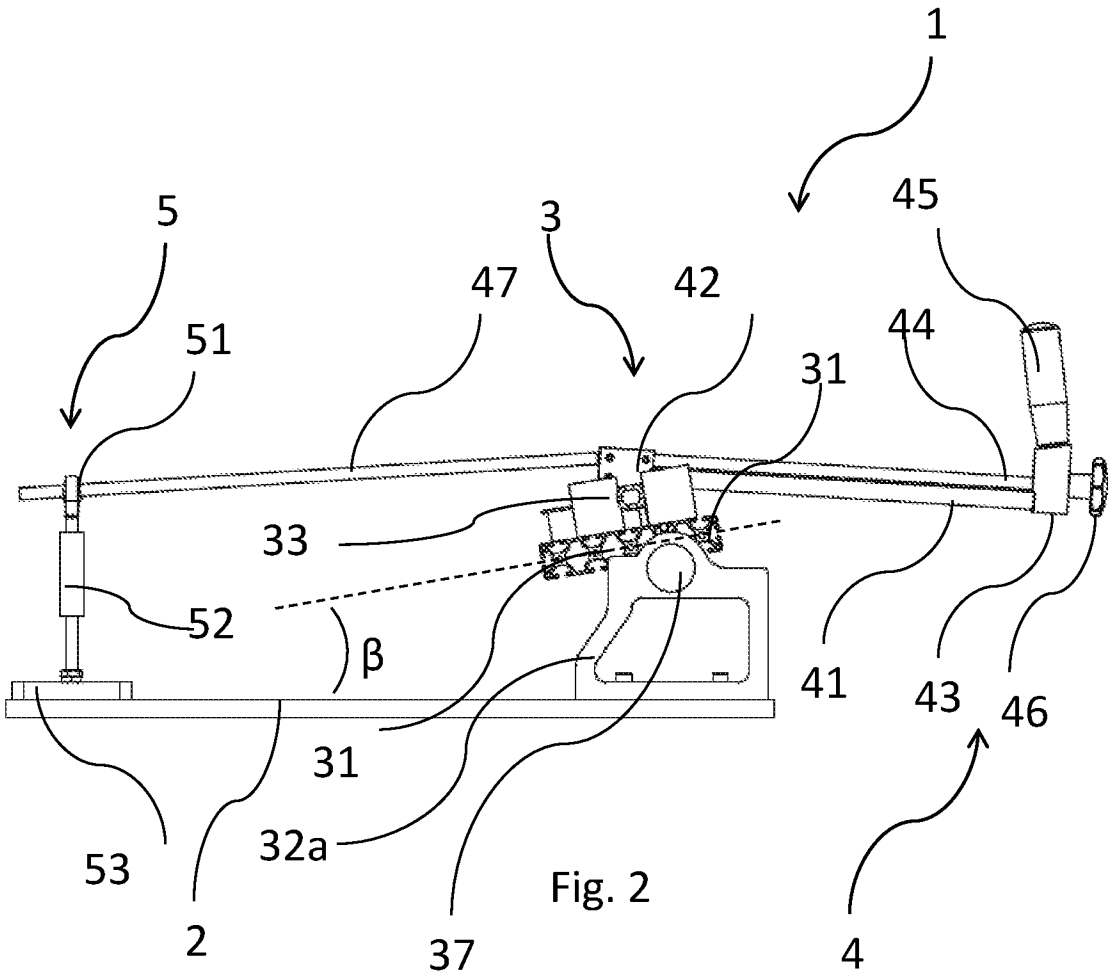

Fig. 2

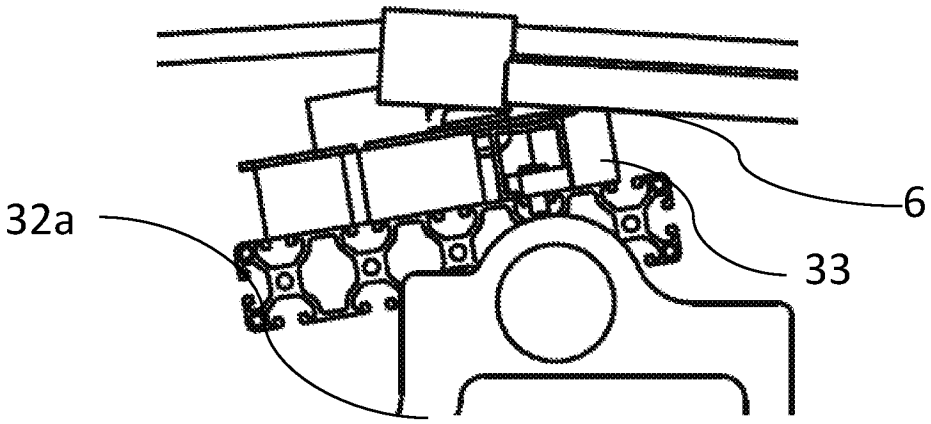

Fig. 3

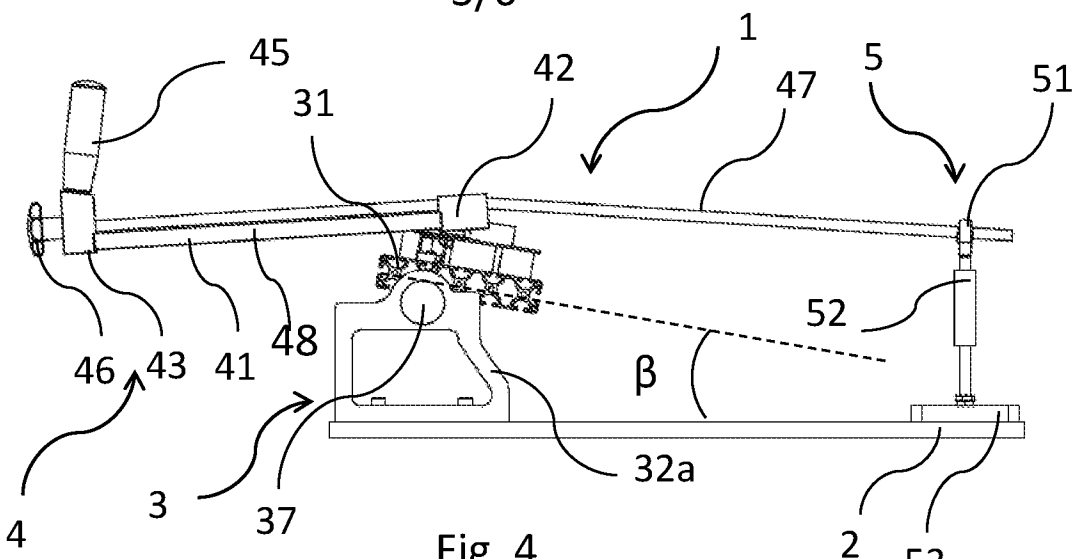

Fig. 4

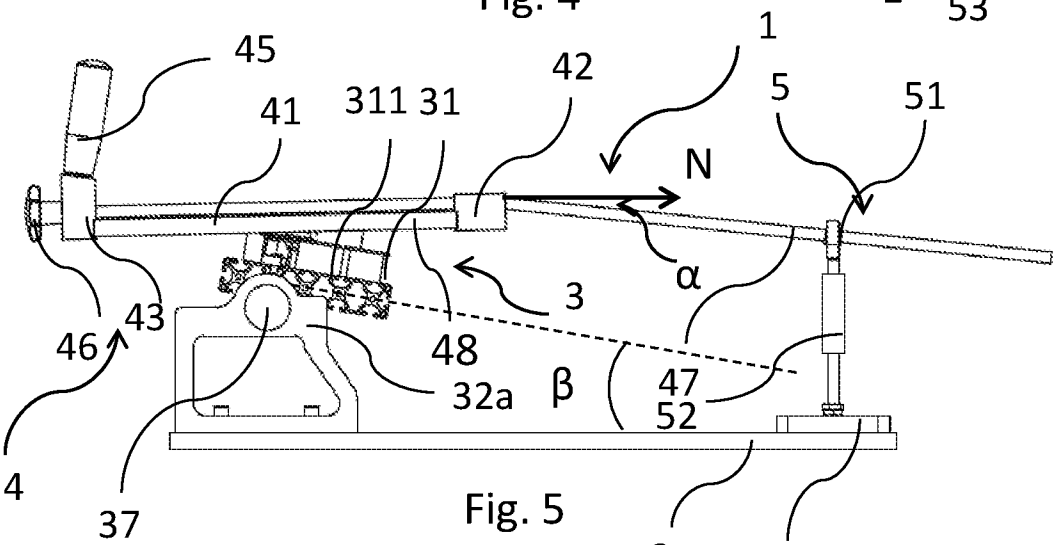

Fig. 5

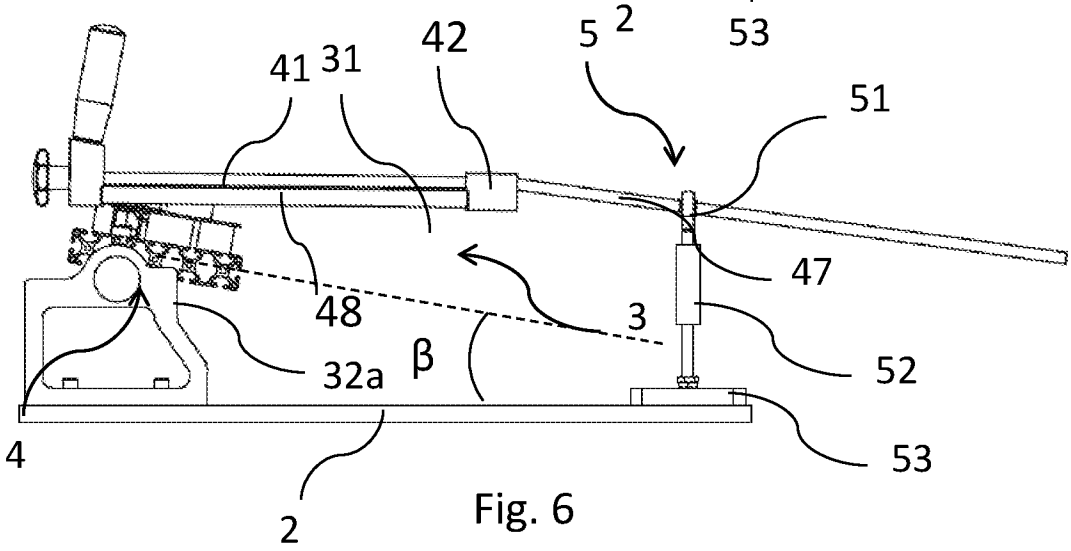

Fig. 6

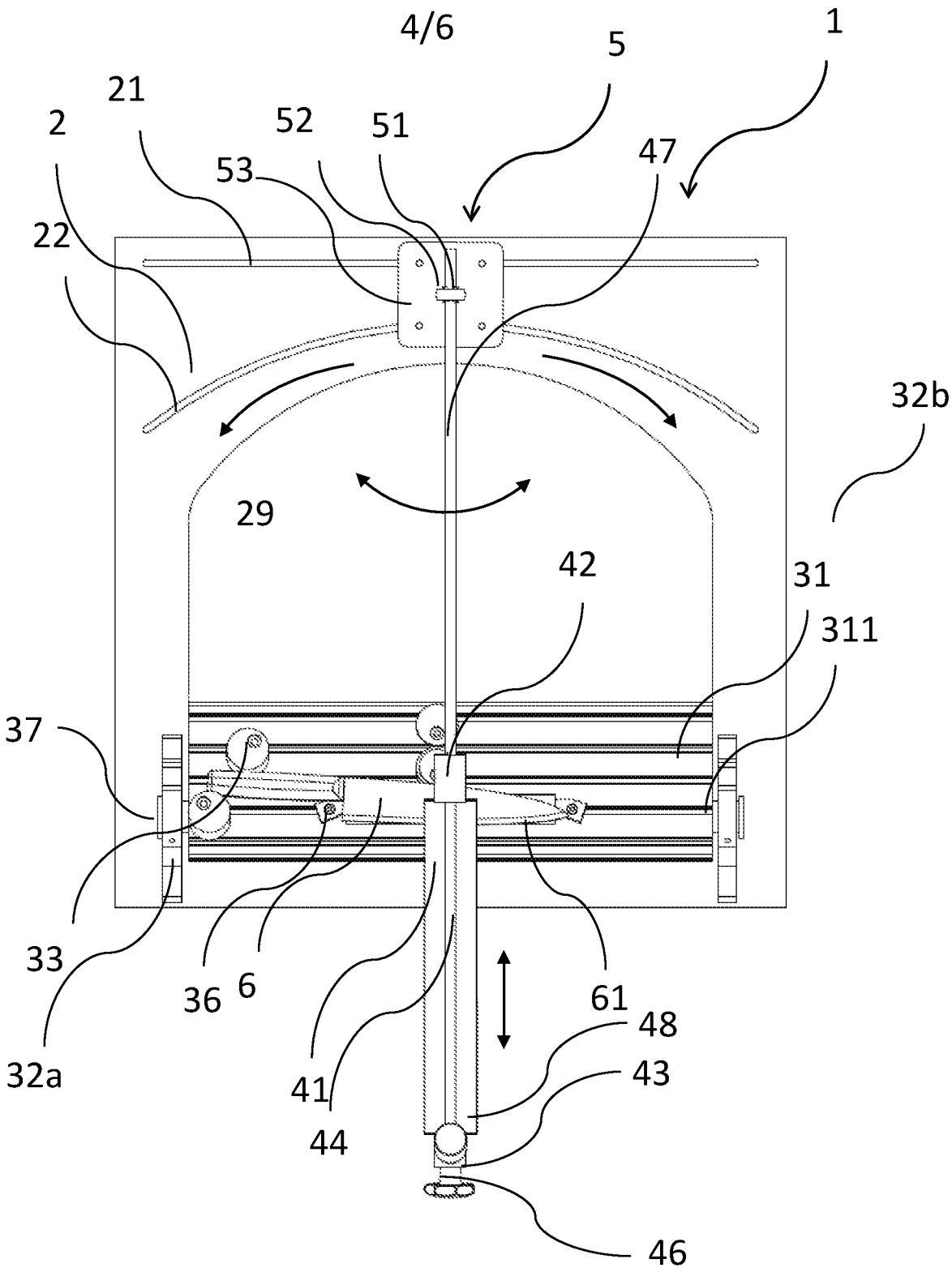

Fig. 7

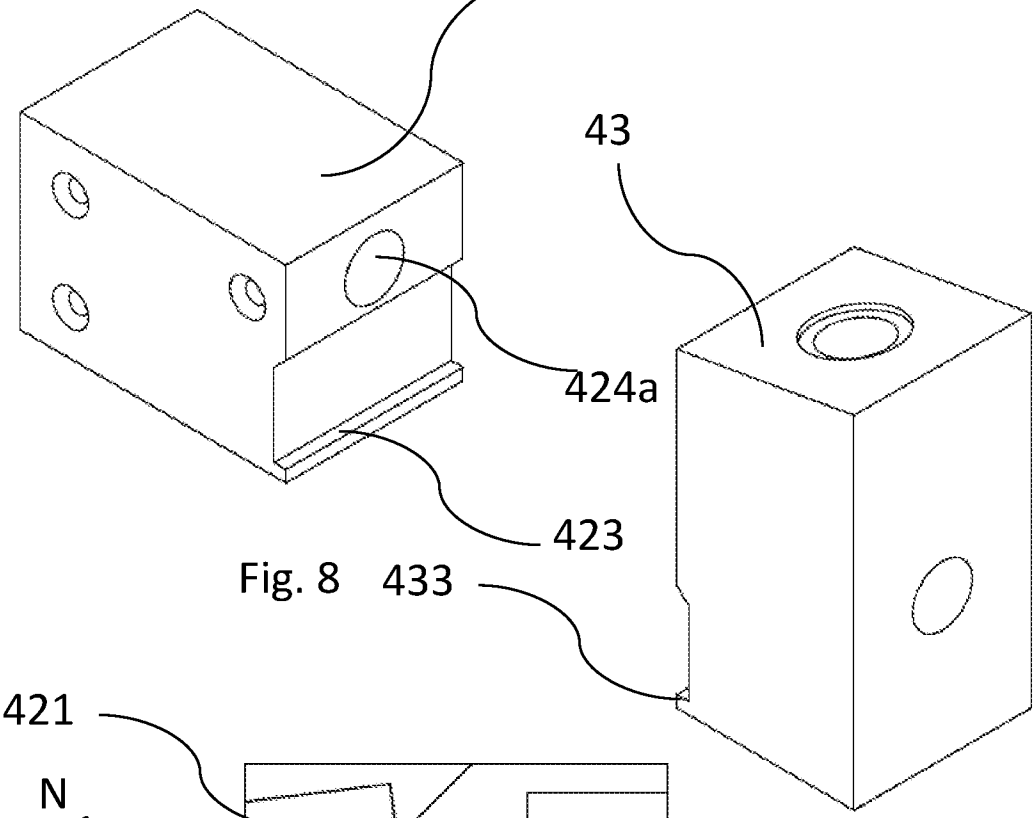

Fig. 8

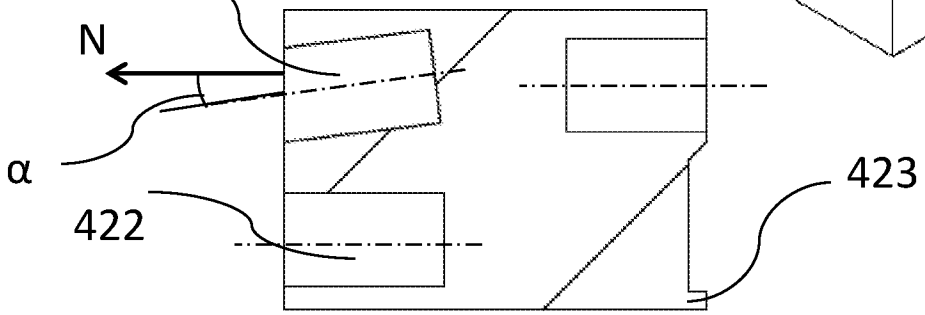

Fig. 9

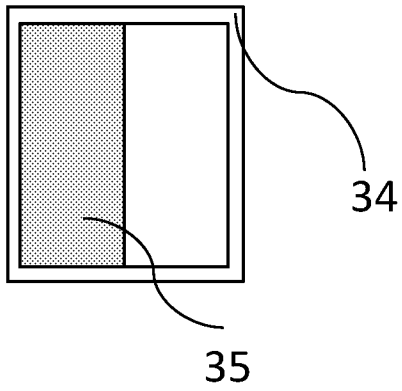

Fig. 10

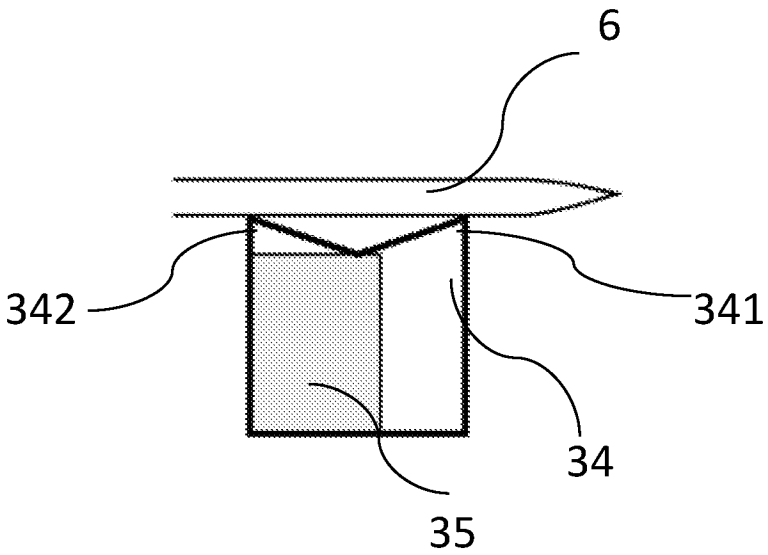

Fig. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2016/050440

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B24B, B24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 20110159791 A1 (HENG WU; TAYLOR BRANDS LLC), 30 June 1989 (1989-06-30); whole document; abstract; figures	1-2, 4-5, 8-9, 15, 17-18
Y		3
A		6-7, 10-14, 16
	--	
Y	DE 202014003739 U1 (HENSCHKE MARTIN), 17 July 2014 (2014-07-17); whole document; abstract; page 1, column 1, line 17, paragraph [0001] - page 1, column 1, line 18, paragraph [0001]; figures	3
A		1-2, 4-18
	--	

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08-02-2017	09-02-2017

Name and mailing address of the ISA/SE	Authorized officer
Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Fredrik Strand Telephone No. + 46 8 782 28 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2016/050440

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 8912529 A1 (MCLEAN PETER CHARLES), 28 December 1989 (1989-12-28); abstract; figures --	1-18
A	US 5185958 A1 (DALE BENTON), 16 February 1993 (1993-02-16); abstract; figures --	1-18
A	WO 2004037488 A1 (LOEFVENMARK THOMAS), 6 May 2004 (2004-05-06); abstract; figures --	1-18
A	US 961010 A1 (POITRAS PIERRE J ET AL), 7 June 1910 (1910-06-07); figures -- --------	1-18

International application No.
PCT/SE2016/050440

Continuation of: second sheet

International Patent Classification (IPC)

B24B 3/52 (2006.01)
B24B 3/54 (2006.01)
B24B 3/55 (2006.01)
B24D 15/08 (2006.01)

US	20110159791	A1	30/06/1989	NONE			
DE	202014003739	U1	17/07/2014	NONE			
WO	8912529	A1	28/12/1989	EP	0424408	A1	02/05/1991
				NZ	229623	A	25/02/1992
				US	5195275	A	23/03/1993
US	5185958	A1	16/02/1993	NONE			
WO	2004037488	A1	06/05/2004	AU	2003273124	A1	13/05/2004
				SE	524407	C2	03/08/2004
				SE	0203149	A	24/04/2004
US	961010	A1	07/06/1910	NONE			