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(54) **PADEL TENNIS RACQUET**

(57) The present invention relates to a padel tennis racquet (10), including a handle portion (12) configured to be gripped by a user and a head portion (14) which is connected to the handle portion (12) and defines two striking surfaces (23, 25), each striking surface (23, 25) being configured to strike a padel tennis ball. The handle portion (12) has a first handle portion central plane (HAP1), which extends substantially parallel to at least one striking surface (23, 25). The head portion (14) has a geometry which is asymmetric with respect to the first handle portion central plane (HAP1) .

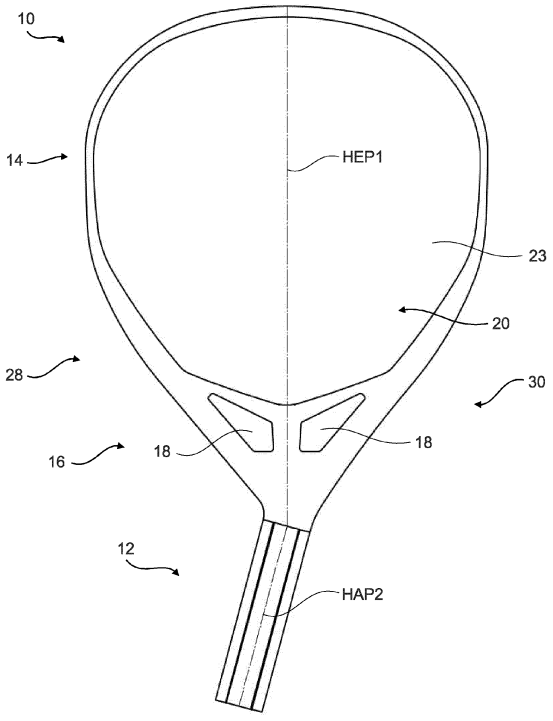

Fig. 1

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Description

[0001] Ball game racquets are available for a variety of different sports and/or leisure activities. The ball game racquets intended to be used for the respective sport and/or leisure activity may be tailored to the respective sport and/or leisure activity, i.e., by specifically designing and/or constructing the ball game racquets for use in the respective sport and/or leisure activity. For instance, the respective ball game racquet(s) may have one or more features which may have one or more particular purposes and/or one or more advantages in the respective sport and/or leisure activity.

[0002] Moreover, many ball game sports have one or more regulations which define one or more requirements and/or mandatory features which the respective ball game racquet must fulfill or have, respectively. Hence, the design and/or construction of a ball game racquet for a specific sport may be at least partially dependent on the respective regulations provided for the respective sport.

[0003] Padel, also known as padel tennis or padel, is a relatively new ball game sport in which ball game racquets are used. Padel tennis is already widespread in some regions of the world, for example in Spain, Italy, Central America and South America. In addition, the popularity of padel tennis is increasing worldwide, for example, in other countries in Europe, such as Sweden. In padel tennis, as in conventional tennis, a game ball is hit alternately over a net into an opponent's field by means of a ball game racquet. In contrast to conventional tennis, a padel tennis court has outer walls against which the game ball may be struck, e.g., in order to play the game ball into the opponent's field, similar to squash.

[0004] Unlike conventional tennis racquets, squash racquets, or other stringed ball game racquets, a padel tennis racquet generally does not have a hitting surface configured as a web of woven strings. Instead, the padel tennis racquet generally has a plate, which is often also referred to as a core. This plate usually defines the hitting surfaces of the respective padel tennis racquet. The plate is often coated or planked with an additional material in order to influence or intentionally alter the stiffness and/or elasticity of the racquet. Furthermore, as discussed above, a set of regulations is also provided for padel tennis which put certain restraints and/or requirements on the design and/or construction of a padel tennis racquet.

[0005] Padel tennis racquets known from the prior art still have disadvantages. On the one hand, this may be due to the relatively short existence of padel tennis as a sport compared to other ball game sports. Moreover, padel tennis has thus far been practiced only as a niche sport and/or at less competitive and/or professional levels in certain regions of the world. Therefore, the development effort of such ball game racquets for padel tennis may have been limited so far. However, due to the increasing popularity of this sport, also in other regions of the world, there is a need to further develop padel tennis racquets and to at least partially improve the disadvantages of the padel tennis racquets known from the prior art.

[0006] It is therefore an object of the present invention to provide an improved padel tennis racquet.

[0007] This object is achieved by a padel tennis racquet as defined by the features of claim 1. Preferred embodiments are defined by the features of the dependent claims.

[0008] The padel tennis racquet, which is sometimes also referred to as a padel bat or padel tennis bat, includes a handle portion configured to be gripped by a user and a head portion connected to the handle portion. The handle portion may have one or more features configured to improve the user's grip on the handle portion and/or to prevent the padel tennis racquet from dislodging from the user's hand(s) and/or arm(s), e.g., due to an external force which may be exerted on the padel tennis racquet and/or an inertia of the padel tennis racquet, e.g., as the padel tennis racquet is accelerated or decelerated during use. For instance, at least a portion of the handle portion may have one or more features which may increase friction between the handle portion and the user's hand(s), e.g., by providing a roughened and/or gnarled surface on the handle portion.

[0009] Moreover, the padel tennis racquet may have a strap, e.g., a wrist strap, which is attached to the handle of the padel tennis racquet and configured to receive the user's hand and/or wrist and/or arm. In fact, the current regulations for padel tennis, i.e., the regulations which are in force on July 26, 2022, prescribe that padel tennis racquets, at least when used during official competition, must have such a strap. The strap may prevent the padel tennis racquet from being dislodged from the user's body. In particular, the risk of an external force being exerted on the padel tennis racquet is higher than in many other ball game sports, e.g., due to the presence of the aforementioned outer walls which bound a portion of the court. When playing the game ball in the vicinity of the wall(s), the user may inadvertently strike the wall with a portion of the padel tennis racquet which may cause the user to lose grip of the handle portion of the padel tennis racquet. The strap may maintain a connection between the padel tennis racquet and the user's hand and/or wrist and/or arm to prevent the padel tennis racquet from dislodging from the user's body, or at least reduce the risk thereof. This may prevent, or at least reduce the risk of injury or damage which may be caused by a padel tennis racquet dislodging from the user's body and, e.g., being flung towards a person and/or object.

[0010] The head portion defines two striking surfaces, each striking surface being configured to strike/contact a padel tennis ball. Preferably, the striking surfaces extend substantially parallel to each other. Each striking surface is preferably planar in at least a section thereof, preferably across the entire striking surface(s). The striking surfaces preferably extend substantially parallel to each other. A first striking surface of the two striking sur-

faces may be arranged on a first striking side of the head portion and a second striking surface of the two striking surfaces may be arranged on a second striking side. The first striking side and the second striking side may be arranged substantially opposite from each other. By altering an orientation of the padel tennis racquet and/or the user's hand, which is gripping the handle portion of the padel tennis racquet, relative to a padel tennis ball during play, e.g., by switching from a backhand strike position to a forehand strike position and/or vice versa, the user of the padel tennis racquet may selectively use either striking side to strike the padel tennis ball.

[0011] The head portion may have a multi-piece, preferably a multi-layered, construction. The head portion may include at least one core element having two striking sides, each configured to strike a padel tennis ball, and one or more striking layers provided on each striking side. Preferably, the outermost striking layer provided on each striking side may at least partially define the respective striking surface. The head portion may include one or more holes defined therein, which preferably extend entirely through the head portion from one striking side, e.g., a first striking side, to the other striking side, e.g., a second striking side, and optionally also through the one or more striking layers. This may reduce the weight and/or the aerodynamic resistance of the head portion during use.

[0012] The handle portion has a first handle portion central plane, which extends substantially parallel to at least one striking surface. A central plane of the handle portion, within the context of the present disclosure, i.e., the first handle portion central plane and/or any further central plane described herein, e.g., a second handle portion central plane, is to be understood in general as a plane which extends through the handle portion and is oriented such that a geometrical centerline of the handle portion extends or lies in the respective central plane. In other words, the respective central plane splits, in an imaginary manner, the handle portion along a geometrical centerline of the handle portion lengthwise in a longitudinal direction of the handle portion.

[0013] Hence, the first handle portion central plane may split, in an imaginary manner, the handle portion along a geometrical centerline of the handle portion in a longitudinal direction of the handle portion, thereby extending substantially parallel to at least one striking surface.

[0014] The head portion may have a geometry which is asymmetric with respect to the first handle portion central plane. Thus, a geometry of the head portion on one side of the first handle portion central plane may differ from a geometry of the head portion on the other side of the first handle portion central plane. Providing such an asymmetric geometry with respect to the first handle portion central plane may enable the geometry of the head portion to be adapted more individually and/or precisely to one or more aspects of padel tennis, such as by enhancing and/or optimizing the performance of the padel tennis racquet with respect to one or more particular types of strikes. Moreover, this may allow the geometry of the head portion to be altered relative to the padel tennis ball during play according to the current playing situation, e.g., by rotating the padel tennis racquet about the longitudinal axis of the handle portion, e.g., by 180°, relative to the padel tennis ball, e.g., to provide a more suitable geometry of the head portion for a particular situation, e.g., a particular type of strike, during play. Such a rotation of the padel tennis racquet may be performed by rotating the handle portion within the user's hand, i.e., relative to the user's hand, or altering an orientation of the user's hand, which is gripping the handle portion of the padel tennis racquet, relative to the padel tennis ball in play, e.g., by switching from a forehand striking position to a backhand striking position and/or vice versa. This may allow a geometry of the head portion relative to the padel tennis ball, e.g., an oncoming padel tennis ball, to be altered between strikes. This may be advantageous, e.g., by tailoring at least one geometry, preferably a plurality of geometries, of the head portion relative to the padel tennis ball to one or more particular playing situations, e.g., one or more particular strikes. For instance, this may allow the configuration of the padel tennis ball to be adapted to provide one or more properties, e.g., one or more playing characteristics and/or one or more physical parameters of the padel tennis racquet, which may be advantageous for one or more types of strikes, e.g., a backhand strike and/or a forehand strike

[0015] Due to a padel court being relatively small, compared with tennis, for instance, and each team generally comprising two players playing simultaneously on opposite sides of a net on the padel court, a player of a team may pass up playing a backhand shot in order to allow the other player of the same team to play a forehand shot since forehand shots may generally be played with more power and/or control than backhand shots. Hence, in general, the head portion may be configured such that the asymmetric geometry of the head portion may be particularly advantageous for forehand strikes or backhand strikes, while optionally accepting that such a configuration may be less advantageous for the other of backhand strikes and forehand strikes. This may be suited for padel tennis, since forehand strikes are generally played more frequently than backhand strikes, as described above.

[0016] Moreover, as discussed above, a strap is generally provided on padel tennis racquets, which is mandatory in sanctioned padel tennis matches. The strap may maintain an orientation of the padel tennis racquet relative to the user's hand and/or wrist and/or arm and/or may at least limit the user's ability to change the orientation of the padel tennis racquet relative to the user's hand and/or wrist and/or arm. As a result, the strap may ensure that the head portion is in, and remains in, the intended orientation during use/play. In tennis or squash, for instance, no such strap is generally provided. Hence, providing a head portion with an asymmetric geometry

may be more challenging and/or disadvantageous for ball game racquets for such sports since the user may, intentionally, unintentionally, or unconsciously, change the orientation of the respective ball game racquet relative to the user's hand. This may cause the respective ball game racquet to be oriented incorrectly, or at least not as intended by the manufacturer, which may decrease the performance of the respective racquet.

[0017] Moreover, configuring the head portion to have a geometry which is asymmetric with respect to the first handle portion central plane may allow a larger striking area and/or more mass and/or more volume of the head portion to be allocated to regions of the head portion in which it may be advantageous to have a larger striking area and/or more mass and/or more volume. This may increase the amount of force which may be transferred from the head portion to the padel tennis ball and/or may increase the stiffness, at least in certain sections, of the head portion, and/or may increase a degree of ball control which may be achieved by the head portion, at least in certain sections of the head portion.

[0018] Moreover, the amount of material used in regions of the head portion, in which a smaller striking area and/or less mass and/or less volume of the head portion may be required and/or desired, may be reduced, compared with the regions in which a larger striking area and/or more mass and/or more volume of the head portion may be advantageous. This may allow the geometry of the head portion to be constructed more efficiently, which may allow the total amount of material used for the head portion to be reduced which may decrease the weight of the padel tennis racquet and/or enhance the aerodynamic properties of the padel tennis racquet during play/use and/or reduce the manufacturing costs of the padel tennis racquet.

[0019] Although the embodiments described herein are generally directed towards padel tennis racquets, the configurations described herein may be applied to any ball game racquet, e.g., tennis racquets, squash racquets, pickleball racquets, etc.

[0020] Preferably, each striking surface has an outer perimeter which defines a front contour of the respective striking surface. Preferably, the respective front contour is defined with respect to a perspective which is substantially perpendicular to the respective striking surface. The front contour defined by one striking surface is shaped differently than the front contour defined by the other striking surface. Configuring the front contours of the striking surfaces to be shaped differently may allow the shape of the striking surfaces to be tailored individually, e.g., to one or more characteristics of one of more particular strikes, e.g., backhand strikes and/or forehand strikes, in order to individually adapt the striking surfaces to the one or more characteristics of the one of more particular strikes. For instance, the contours may be configured individually according to a frequent and/or a predominant point of contact of the padel tennis ball on the respective striking surface for one or more particular strikes. For instance, when performing powerful strikes, e.g., forehand strikes, in particular smashes, the padel tennis ball may frequently or predominantly contact the head portion in a section thereof which is arranged farther from the handle portion, i.e., towards a distal end of the head portion, than for backhand strikes. Hence, the contour of one striking surface may be adapted to such conditions, e.g., by configuring the contour to be wider and/or sturdier in areas of frequent and/or predominant contact on the head portion. The contour of the other striking surface may be configured differently, e.g., to adapt the respective striking surface to other conditions, e.g., to conditions which occur when performing a backhand strike. In general, this may enhance the performance of the padel tennis racquet and/or may adapt the geometry of the padel tennis racquet to a user's playing style and/or playing skills.

[0021] Preferably, each striking surface has an outer perimeter which defines a side contour of the respective striking surface. Preferably, the respective side contour is defined with respect to a perspective which extends substantially along or parallel to the respective striking surface. Preferably, the side contour defined by one striking surface is shaped differently than the side contour defined by the other striking surface. Such a configuration may also allow a shape of the striking surfaces to be tailored individually, e.g., to one or more characteristics of one of more particular strikes, e.g., backhand strikes and/or forehand strikes, in order to individually adapt the striking surfaces to the one or more characteristics of the one of more particular strikes. For instance, the contours may be configured individually according to a frequent and/or a predominant point of contact of the padel tennis ball on the respective striking surface for one or more particular strikes. This may enhance the performance of the padel tennis racquet and/or may adapt the geometry of the padel tennis racquet to a user's playing style and/or playing skills.

[0022] Preferably, one striking surface is distanced farther from the first handle portion central plane than the other striking surface. A distance of the respective striking surface to the first handle portion central plane, within the context of the present disclosure, is to be understood as a distance which extends from a striking surface plane, i.e., a plane in which the respective striking surface at least partially, preferably completely, lies, to the first handle portion central plane. Said distance of the respective striking surface to the first handle portion central plane preferably extends in a direction which is perpendicular to the first handle portion central plane and/or to at least one striking surface. Preferably, one entire striking surface is distanced farther from the first handle portion central plane than the other striking surface. Alternatively, only one or more sections of the striking surface, preferably one or more sections of the striking surface which are distanced the farthest from the first handle portion central plane, may be distanced farther from the first handle portion central plane than the other striking surface,

or at least one or more sections of the other striking surface, preferably one or more sections of the other striking surface which are distanced the farthest from the first handle portion central plane. Preferably, at least an extremity of the striking surface i.e., a section of the striking surface which is arranged the farthest from the first handle portion central plane, is distanced farther from the first handle portion central plane than the other striking surface. Configuring one striking surface to be distanced farther from the first handle portion central plane than the other striking surface may allow one or more playing characteristics of the padel tennis racquet to be varied between the two striking surfaces. For instance, a position and/or an orientation of the respective striking surface relative to the padel tennis ball, when striking the padel tennis ball with the respective striking surface, may thereby differ between the striking surfaces. This may optimize a path of the padel tennis ball, after it has been struck by the respective striking surface, and/or optimize a transfer of force(s) from the respective striking surface to the padel tennis ball. This may enhance the performance of the padel tennis racquet and/or may adapt the geometry of the padel tennis racquet to a user's playing style and/or playing skills.

[0023] Preferably, one striking surface is distanced farther from the first handle portion central plane than the other striking surface by 2 mm to 18 mm, more preferably by 4 mm to 16 mm, more preferably by 4 mm to 14 mm, more preferably by 4 mm to 12 mm, most preferably by 4 mm to 10 mm.

[0024] Preferably, one striking surface is distanced from 6 mm to 18 mm, preferably from 8 mm to 18 mm, more preferably from 10 mm to 18 mm, most preferably from 12 mm to 18 mm, from the first handle portion central plane and the other striking surface is preferably distanced from 20 mm to 32 mm, preferably from 20 mm to 30 mm, more preferably from 20 mm to 28 mm, most preferably from 20 mm to 26 mm, from the first handle portion central plane.

[0025] Preferably, a larger proportion of a total mass and/or a total volume of the head portion is arranged on one side of the first handle portion central plane than on the other side of the first handle portion central plane. This may allow a center of mass and/or a center of volume of the padel tennis racquet to be shifted compared with a symmetric configuration, e.g., which may be advantageous for one or more different types of strikes. For instance, this may enable the head portion to be adapted to provide a greater proportion of the mass and/or of the volume of the head portion in a section of the head portion, e.g., a section by which the padel tennis ball is strike frequently and/or predominantly. This may optimize a transfer of force(s) from the respective striking surface to the padel tennis ball, e.g., by transferring force(s) from the respective striking surface to the padel tennis ball at or near the center of volume and/or the center of mass of the head portion, e.g., instead of striking the ball off-center, with respect to a center of volume and/or a center of mass of the head portion, which may be the case for head portions which have a symmetric geometry.

[0026] In may be advantageous to provide a greater mass in certain predetermined sections of the head portion. For instance, it may be advantageous to configure the head portion to have a greater mass at a 3 o'clock position than at a 9 o'clock position, when viewing substantially perpendicularly onto one of the striking surfaces, wherein a 6 o'clock position is arranged at a location at which the handle portion is attached to the head portion, directly or indirectly, e.g., via one or more intermediate portions. Configuring the head portion to have a greater mass at a 3 o'clock position than at a 9 o'clock position may be achieved by configuring the geometry of the head portion to be asymmetric. Additionally, or alternatively, a density of the head portion at the 3 o'clock position may be configured to be greater than a density of the head portion at the 9 o'clock position. This may naturally, i.e., via gravitational forces, effect a moment about the handle portion of the padel tennis racquet to urge the head portion into, or at least towards, one or more orientations and/or positions, as the user grips the handle portion, e.g., during play. Thus, a sort of "self-alignment" of the padel tennis racquet may thereby be effected. The greater density of the head portion at the 3 o'clock position may be achieved by providing a material at said 3 o'clock position which has a higher density than a material at the 9 o'clock position. Alternatively, or additionally, more material may be provided at the 3 o'clock position than at the 9 o'clock position.

[0027] Preferably, the handle portion has a second handle portion central plane which extends substantially perpendicularly to at least one striking surface. The second handle portion central plane may split, in an imaginary manner, the handle portion along a geometrical centerline of the handle portion in a longitudinal direction of the handle portion, thereby extending substantially perpendicularly to at least one striking surface. The head portion may have a geometry which is asymmetric with respect to the first handle portion central plane and/or the second handle portion central plane. A larger proportion of a total mass and/or a total volume of the head portion may be arranged on one side of the second handle portion central plane than on the other side of the second handle portion central plane. Such a configuration may additionally, or alternatively, shift a center of mass and/or a center of volume of the padel tennis racquet compared with a symmetric configuration, as discussed above. This may alter one or more properties of the padel tennis racquet which may be advantageous at least for one or more strikes, as discussed above.

[0028] Preferably, the first handle portion central plane and the second handle portion central plane intersect substantially perpendicularly. Alternatively, the first handle portion central plane and the second handle portion central plane may intersect at various other angles, such as at an angle from 50° to 89°. Preferably, the handle portion is at least partially symmetric with respect to the

first handle portion central plane and/or the second handle portion central plane.

[0029] Preferably, a proportion of a total mass and/or a total volume of the head portion arranged on one side of the first handle portion central plane is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion arranged on the other side of the first handle portion central plane.

[0030] Preferably, a proportion of a total mass and/or a total volume of the head portion arranged on one side of the second handle portion central plane is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion arranged on the other side of the second handle portion central plane.

[0031] Preferably, a first front contour of one striking surface, the first front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a substantially circular shape, and a second front contour of the other striking surface. The second front contour is preferably defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a substantially teardrop shape. As discussed above, a point of contact of the padel tennis ball on the head portion, preferably a region of the head portion which has the most frequent and/or predominant contact with the padel tennis ball when striking the padel tennis ball during play, may vary between different types of strikes, e.g., between backhand strikes and forehand strikes. For instance, when performing powerful strikes, e.g., forehand strikes, in particular smashes, the padel tennis ball may frequently or predominantly contact/strike the head portion in a section thereof which is arranged farther from the handle portion, i.e., towards a distal end of the head portion, than for backhand strikes. Hence, it may be advantageous to configure a distal section of the head portion to be wider, than a section of the head portion which is arranged towards the handle portion, to increase an area of the hitting surface in the region in which the padel tennis ball is frequently and/or predominantly struck for one or more particular types of strikes.

[0032] This may be achieved by configuring the second front contour to have a substantially teardrop shape, i.e., in which a wider portion of the teardrop shape is arranged at or towards a distal section of head portion, i.e., away from the handle portion, and a thinner section of the teardrop shape is arranged at or towards a proximal section of head portion, i.e., towards the handle portion. Providing a relatively large striking area in a section of frequent and/or predominant contact of the padel tennis ball on the head portion may increase a likelihood of the head portion striking the padel tennis ball during play, which may increase the accuracy of the padel tennis racquet. Moreover, this may increase the mass and/or stiffness of the section of the head portion which frequently and/or predominantly makes contact with the padel tennis ball, when striking the padel tennis ball. This may allow higher forces to be transferred from the head portion to the padel tennis ball and/or may enhance the sturdiness of the padel tennis ball and/or may enable a more efficient and/or effective transfer of forces from the head portion to the padel tennis ball. Furthermore, the above-described configuration may increase a degree of ball control which may be achieved by the head portion. Moreover, this may allow the geometry of the head portion to be used more efficiently, which may allow the total amount of material used for the head portion to be reduced which may decrease the weight of the padel tennis racquet and/or enhance the aerodynamic properties of the padel tennis racquet during play/use. Furthermore, for instance, when performing backhand strikes, the padel tennis ball may frequently or predominantly contact the head portion substantially in a center of the head portion, with respect to an area of the respective striking surface of the head portion which strikes the padel tennis ball. Hence, configuring the first front contour to have a substantially circular shape may be advantageous for such strikes. Hence, the contour of the striking surfaces may be adapted to such conditions, e.g., by configuring the contour to be wider in areas of frequent and/or predominant contact on the head portion. In general, this may enhance the performance of the padel tennis racquet and/or may adapt the geometry of the padel tennis racquet to a user's playing style and/or playing skills.

[0033] Preferably, a first front contour of one striking surface, the first front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a shape which has a greater deviation from a circular shape than a second front contour of the other striking surface, the second front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface. A deviation of the respective front contours from a circular shape may be determined by determining an area, e.g., in cm2, between the respective front contour and a corresponding reference circular contour along the respective perimeter of the respective striking surface. In other words, a front contour which has a circular shape would have an area between said front contour and a circular contour of 0 cm2. The front contour which has the greatest area between the respective front contour and the corresponding reference circular contour along the respective perimeter of the respective striking surface may be considered to have a greater deviation from a circular shape than the front contour of the other striking surface.

[0034] Preferably, the head portion has a first head portion central plane which extends substantially perpendicularly to at least one striking surface. Preferably, the second handle portion central plane intersects the first head portion central plane, preferably at an angle between 120° and 179°, more preferably between 130° and 178°,

more preferably between 140° and 175°, most preferably between 150° and 170°. Configuring the padel tennis racquet such that the second handle portion central plane intersects the first head portion central plane, preferably at one of the angular ranges specified above, essentially shifts the head portion towards one side of the second handle portion central plane of the handle portion, compared with a symmetric configuration in which the second handle portion central plane of the handle portion substantially bisects the head portion in equally sized and/or dimensions portions of the head portion. Providing such an intersection of the first head portion central plane and the second handle portion central plane may be achieved by bending the handle portion and/or angling at least a first section of the handle portion relative to at least a second section of the handle portion, e.g., at a distal section thereof, or a section of the padel tennis racquet which is arranged between the handle portion and the head portion, e.g., an intermediate portion of the padel tennis racquet. Alternatively, or additionally, the above-identified configuration, in which the padel tennis racquet is configured such that the second handle portion central plane intersects the first head portion central plane, preferably at one of the angular ranges specified above, may be achieved by shifting a position and/or an orientation of the handle portion relative the head portion compared with a conventional position and/or an orientation of the handle portion relative the head portion. Conventionally, the handle portion of a standard padel tennis racquet, or of at least most standard ball game racquets in general, is connected to the head portion, or an intermediate portion arranged between the head portion and the handle portion, at a 6 o'clock position of the head portion, when viewing the padel tennis racquet substantially perpendicularly to at least one striking surface, preferably both striking surfaces. However, shifting a position of the handle portion towards a 3 o'clock position or a 9 o'clock position may advantageously alter one or more playing characteristics of the padel tennis racquet. This may naturally, i.e., via gravitational forces, effect a moment about the handle portion of the padel tennis racquet to urge the head portion into, or at least towards, one or more orientations and/or positions, as a sort of "self-alignment" of the padel tennis racquet as the user grips the handle portion of the padel tennis racquet, e.g., during play.

[0035] Preferably, the head portion includes at least one core section and at least one striking layer arranged at least partially on the core section, preferably at least on opposite sides of the core section.

[0036] Preferably, the striking layer is at least partially made from one or more layers of a fiber composite material. The fiber composite material preferably includes a plurality of synthetic and/or natural fibers, preferably carbon fibers and/or glass fibers, which are embedded in at least one matrix material, preferably at least one resin.

[0037] The following list of aspects provides alternative and/or further features of the invention:

1. A game ball racquet, preferably a padel tennis racquet, including:

a handle portion configured to be gripped by a user; and
a head portion which is preferably connected to the handle portion and preferably defines two striking surfaces, each striking surface preferably being configured to strike a game ball, preferably a padel tennis ball;
wherein the handle portion has a first handle portion central plane, which extends substantially parallel to at least one striking surface, and a second handle portion central plane, which extends substantially perpendicularly to at least one striking surface; and
wherein the head portion has a geometry which is asymmetric with respect to the first handle portion central plane and/or the second handle portion central plane.

2. The game ball racquet according to aspect 1, wherein each striking surface has an outer perimeter which defines a front contour of the respective striking surface, the respective front contour preferably being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, wherein the front contour defined by one striking surface is shaped differently than the front contour defined by the other striking surface.

3. The game ball racquet according to aspect 1 or 2, wherein each striking surface has an outer perimeter which defines a side contour of the respective striking surface, the respective side contour preferably being defined with respect to a perspective which extends substantially along or parallel to the respective striking surface, wherein the side contour defined by one striking surface is shaped differently than the side contour defined by the other striking surface.

4. The game ball racquet according to any of the preceding aspects, wherein one striking surface is distanced farther from the first handle portion central plane than the other striking surface.

5. The game ball racquet according to any of the preceding aspects, wherein one striking surface is distanced farther from the first handle portion central plane than the other striking surface by 2 mm to 18 mm, more preferably by 4 mm to 16 mm, more preferably by 4 mm to 14 mm, more preferably by 4 mm to 12 mm, most preferably by 4 mm to 10 mm.

6. The game ball racquet according to aspect 5, wherein one striking surface is distanced from 6 mm to 18 mm, preferably from 8 mm to 18 mm, more

preferably from 10 mm to 18 mm, most preferably from 12 mm to 18 mm, from the first handle portion central plane and the other striking surface is distanced from 20 mm to 32 mm, preferably from 20 mm to 30 mm, more preferably from 20 mm to 28 mm, most preferably from 20 mm to 26 mm, from the first handle portion central plane.

7. The game ball racquet according to any of the preceding aspects, wherein a larger proportion of a total mass and/or a total volume of the head portion is arranged on one side of the first handle portion central plane than on the other side of the first handle portion central plane.

8. The game ball racquet according to any of the preceding aspects, wherein a larger proportion of a total mass and/or a total volume of the head portion is arranged on one side of the second handle portion central plane than on the other side of the second handle portion central plane.

9. The game ball racquet according to any of the preceding aspects, wherein a proportion of a total mass and/or a total volume of the head portion arranged on one side of the first handle portion central plane is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion arranged on the other side of the first handle portion central plane.

10. The game ball racquet according to any of the preceding aspects, wherein a proportion of a total mass and/or a total volume of the head portion arranged on one side of the second handle portion central plane is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion arranged on the other side of the second handle portion central plane.

11. The game ball racquet according to any of the preceding aspects, wherein a first front contour of one striking surface, the first front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a substantially circular shape, and a second front contour of the other striking surface, the second front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a substantially teardrop shape.

12. The game ball racquet according to any of the preceding aspects, wherein a first front contour of one striking surface, the first front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface, has a shape which has a greater deviation from a circular shape than a second front contour of the other striking surface, the second front contour being defined with respect to a perspective which is substantially perpendicular to the respective striking surface.

13. The game ball racquet according to any of the preceding aspects, wherein the head portion has a first head portion central plane which extends substantially perpendicularly to at least one striking surface, wherein the second handle portion central plane intersects the first head portion central plane, preferably at an angle between 120° and 179°, more preferably between 130° and 178°, more preferably between 140° and 175°, most preferably between 150° and 170°.

14. The game ball racquet according to any of the preceding aspects, wherein the head portion includes at least one core section and preferably at least one striking layer arranged at least partially on the core section, preferably at least on opposite sides of the core section.

15. The game ball racquet according to aspect 14, wherein the striking layer is at least partially made from one or more layers of a fiber composite material.

[0038] Preferred embodiments of the present invention are further elucidated below with reference to the figures. The described embodiments do not limit the present invention.

Fig. 1 shows, in a front view, a padel tennis racquet according to an embodiment of the invention;

Fig. 2 shows, in a side view, a padel tennis racquet according to a further embodiment of the invention;

Fig. 3 shows, in a front view, a padel tennis racquet according to a further embodiment of the invention;

Fig. 4 shows, in a rear view, the padel tennis racquet shown in Fig. 3,

Fig. 5 shows a comparison of front contours of the padel tennis racquet shown in Figs. 3 and 4.

[0039] Fig. 1 shows, in a front view, a padel tennis racquet 10 according to a first embodiment of the present invention. The padel tennis racquet 10 includes a handle portion 12 configured to be gripped by a user and a head portion 14 connected to the handle portion 12. The padel

tennis racquet 10 further includes an intermediate portion 16 which connects the handle portion 12 and the head portion 14. The intermediate portion 16 includes two openings 18 provided in a section thereof. The intermediate portion 16 is often referred to as the "throat" of the padel tennis racquet 10.

[0040] The head portion 14 includes two striking sides 20, 22 each configured to strike a padel tennis game ball, of which only the striking side 20 is shown in Fig. 1 due to the view of the padel tennis racquet 10 shown therein. Each striking side 20, 22 defines a striking surface 23, 25 configured to contact the padel tennis ball. The head portion 14 preferably includes a core section, which is preferably made of a foam material, and at least one striking layer arranged on the core section on each striking side 20, 22, respectively.

[0041] The handle portion 12 has a first handle portion central plane HAP1 (see Fig. 2), which extends substantially parallel to at least one striking surface 23, 25, and a second handle portion central plane HAP2, which extends substantially perpendicularly to at least one striking surface 23, 25. Of the two handle portion central planes HAP1 and HAP2, only the second handle portion central plane HAP2 is shown in Fig. 1 due to the view of the padel tennis racquet 10 shown therein. The first handle portion central plane HAP1 is shown in Fig. 2 and described further below in relation to the embodiment shown in said Fig. 2. Moreover, the head portion 14 has a first head portion central plane HEP1 which extends substantially perpendicularly to at least one striking surface 23, 25 and a second head portion central plane HEP2 (see Fig. 2) which extends substantially parallel to at least one striking surface 23, 25.

[0042] The head portion 14 has a geometry which is asymmetric with respect to at least the second handle portion central plane HAP2. In particular, the second handle portion central plane HAP2 intersects the first head portion central plane HEP1 at an angle which deviates from 180°, preferably at an angle between 120° and 179°, more preferably between 130° and 178°, more preferably between 140° and 175°, most preferably between 150° and 170°.

[0043] Due to the above-identified asymmetric configuration of the head portion 14 of the embodiment shown in Fig. 1, a larger proportion of a total mass and/or a total volume of the head portion 14 may be arranged on one side 28 of the second handle portion central plane HAP2, if one fictively extends the second handle portion central plane HAP2 through the head portion 14, than on the other side 30 of the second handle portion central plane HAP2. Preferably a proportion of a total mass and/or a total volume of the head portion 14 arranged on the side 28 of the second handle portion central plane HAP2 is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion 14 arranged on the other side 30 of the second handle portion central plane HAP2.

[0044] Fig. 2 shows, in a side view, a further embodiment of the padel tennis racquet 10. As can be seen in Fig. 2, the head portion 14 of the padel tennis racquet 10 shown therein has a geometry which is asymmetric with respect to at least the first handle portion central plane HAP1. In particular, the striking surface 23 is distanced farther from the first handle portion central plane HAP1 than the other striking surface 25. For instance, the striking surface 23 may be distanced farther from the first handle portion central plane HAP1 than the other striking surface 25 by 2 mm to 18 mm, more preferably by 4 mm to 16 mm, more preferably by 4 mm to 14 mm, more preferably by 4 mm to 12 mm, most preferably by 4 mm to 10 mm. The striking surface 25 may be distanced from 6 mm to 18 mm, preferably from 8 mm to 18 mm, more preferably from 10 mm to 18 mm, most preferably from 12 mm to 18 mm, from the first handle portion central plane HAP1 and the other striking surface 23 may be distanced from 20 mm to 32 mm, preferably from 20 mm to 30 mm, more preferably from 20 mm to 28 mm, most preferably from 20 mm to 26 mm, from the first handle portion central plane HAP1.

[0045] Due to the above-identified asymmetric configuration of the head portion 14, a larger proportion of a total mass and/or a total volume of the head portion 14 may be arranged on one side 34 of the first handle portion central plane HAP1, if one fictively extends the first handle portion central plane HAP1 through the head portion 14, than on the other side 36 of the first handle portion central plane HAP1. Preferably, a proportion of a total mass and/or a total volume of the head portion 14 arranged on one side of the first handle portion central plane HAP1 is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion 14 arranged on the other side of the first handle portion central plane HAP1.

[0046] Moreover, as can be seen in Fig. 2, each striking surface 23, 25 has an outer perimeter 35, 37 which defines a side contour SC1, SC2 of the respective striking surface 23, 25, the respective side contour SC1, SC2 being defined with respect to the perspective shown in Fig. 2 which extends substantially along or parallel to the respective striking surface 23, 25. Optionally, the side contour SC1 defined by one striking surface 23 may be shaped differently than the side contour SC2 defined by the other striking surface 25.

[0047] Figs. 3 and 4 show a padel tennis racquet 10 according to a further embodiment of the present invention. In particular, Fig. 3 shows a front side of the padel tennis racquet 10, with the striking surface 23 facing the viewer, and Fig. 4 shows a rear side of the padel tennis racquet 10, with the striking surface 25 facing the viewer. As shown in Figs. 3 and 4, the outer perimeter 35, 37 of each striking surface 23, 25 defines a front contour FC1, FC2 of the respective striking surface 23, 25. The respec-

tive front contour FC1, FC2 is defined with respect to a perspective which is substantially perpendicular to the respective striking surface 23, 25. The front contour FC1 defined by one striking surface 23 is shaped differently than the front contour FC2 defined by the other striking surface 25.

[0048] The front contour FC2 of the striking surface 25 has a shape (see Fig. 4) which has a greater deviation from a circular shape than the front contour FC1 of the other striking surface 23 (see Fig. 3). More specifically, the front contour FC2 of the striking surface 25 has a substantially teardrop shape and the front contour FC1 of the other striking surface 23 has a shape which is closer to a circular shape.

[0049] In addition, the head portion 14 of the padel tennis racquet 10 shown in Figs. 3 and 4 includes a plurality of holes 40 defined therein. The holes 40 extend entirely through the head portion 14 from one striking side 20 to the other striking side 22. The holes 40 may reduce the weight and/or aerodynamic resistance of the head portion 14 during use.

[0050] Fig. 5 shows a comparison of the front contours FC1 and FC2 of the striking surfaces 23, 25 by superimposing said front contours FC1 and FC2. A reference contour RFC which has a circular shape has also been added to Fig. 5 for reference purposes.

Claims

1. A padel tennis racquet (10), including:

   a handle portion (12) configured to be gripped by a user; and
   a head portion (14) which is connected to the handle portion (12) and defines two striking surfaces (23, 25), each striking surface (23, 25) being configured to strike a padel tennis ball;
   wherein the handle portion (12) has a first handle portion central plane (HAP1), which extends substantially parallel to at least one striking surface (23, 25); and
   wherein the head portion (14) has a geometry which is asymmetric with respect to the first handle portion central plane (HAP1) .

2. The padel tennis racquet (10) according to claim 1, wherein each striking surface (23, 25) has an outer perimeter (35, 37) which defines a front contour (FC1, FC2) of the respective striking surface (23, 25), the respective front contour (FC1, FC2) being defined with respect to a perspective which is substantially perpendicular to the respective striking surface (23, 25), wherein the front contour (FC1) defined by one striking surface (23) is shaped differently than the front contour (FC2) defined by the other striking surface (25).

3. The padel tennis racquet (10) according to claim 1 or 2, wherein each striking surface (23, 25) has an outer perimeter (35, 37) which defines a side contour (SC1, SC2) of the respective striking surface (23, 25), the respective side contour (SC1, SC2) being defined with respect to a perspective which extends substantially along or parallel to the respective striking surface (23, 25), wherein the side contour (SC1) defined by one striking surface (23) is shaped differently than the side contour (SC2) defined by the other striking surface (25).

4. The padel tennis racquet (10) according to any of the preceding claims, wherein one striking surface (23) is distanced farther from the first handle portion central plane (HAP1) than the other striking surface (25).

5. The padel tennis racquet (10) according to any of the preceding claims, wherein one striking surface (23) is distanced farther from the first handle portion central plane (HAP1) than the other striking surface (25) by 2 mm to 18 mm, more preferably by 4 mm to 16 mm, more preferably by 4 mm to 14 mm, more preferably by 4 mm to 12 mm, most preferably by 4 mm to 10 mm.

6. The padel tennis racquet (10) according to claim 5, wherein one striking surface (25) is distanced from 6 mm to 18 mm, preferably from 8 mm to 18 mm, more preferably from 10 mm to 18 mm, most preferably from 12 mm to 18 mm, from the first handle portion central plane (HAP1) and the other striking surface (23) is distanced from 20 mm to 32 mm, preferably from 20 mm to 30 mm, more preferably from 20 mm to 28 mm, most preferably from 20 mm to 26 mm, from the first handle portion central plane (HAP1).

7. The padel tennis racquet (10) according to any of the preceding claims, wherein a larger proportion of a total mass and/or a total volume of the head portion (14) is arranged on one side (28) of the first handle portion central plane (HAP1) than on the other side (30) of the first handle portion central plane (HAP1).

8. The padel tennis racquet (10) according to any of the preceding claims, wherein the handle portion (12) has a second handle portion central plane (HAP2), which extends substantially perpendicularly to at least one striking surface (23, 25), wherein a larger proportion of a total mass and/or a total volume of the head portion (14) is arranged on one side (34) of the second handle portion central plane (HAP2) than on the other side (36) of the second handle portion central plane (HAP2).

9. The padel tennis racquet (10) according to any of

the preceding claims, wherein a proportion of a total mass and/or a total volume of the head portion (14) arranged on one side (28) of the first handle portion central plane (HAP1) is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion (14) arranged on the other side (30) of the first handle portion central plane (HAP1).

10. The padel tennis racquet (10) according to claim 8 or claim 9, when dependent from claim 8,, wherein a proportion of a total mass and/or a total volume of the head portion (14) arranged on one side (34) of the second handle portion central plane (HAP2) is at least 3%, preferably at least 5%, more preferably at least 10%, more preferably at least 15%, most preferably at least 20%, greater than a proportion of a total mass and/or a total volume of the head portion (14) arranged on the other side (36) of the second handle portion central plane (HAP2).

11. The padel tennis racquet (10) according to any of the preceding claims, wherein a first front contour (FC1) of one striking surface (23), the first front contour (FC1) being defined with respect to a perspective which is substantially perpendicular to the respective striking surface (23), has a substantially circular shape, and a second front contour (FC2) of the other striking surface (25), the second front contour (FC2) being defined with respect to a perspective which is substantially perpendicular to the respective striking surface (25), has a substantially teardrop shape.

12. The padel tennis racquet (10) according to any of the preceding claims, wherein a first front contour (FC2) of one striking surface (25), the first front contour (FC2) being defined with respect to a perspective which is substantially perpendicular to the respective striking surface (25), has a shape which has a greater deviation from a circular shape than a second front contour (FC1) of the other striking surface (23), the second front contour (FC1) being defined with respect to a perspective which is substantially perpendicular to the respective striking surface (23).

13. The padel tennis racquet (10) according to claim 8 or any of claims 9 to 12, when dependent from claim 8, wherein the head portion (14) has a first head portion central plane (HEP1) which extends substantially perpendicularly to at least one striking surface, wherein the second handle portion central plane (HAP2) intersects the first head portion central plane (HEP1), preferably at an angle between 120° and 179°, more preferably between 130° and 178°, more preferably between 140° and 175°, most preferably between 150° and 170°.

14. The padel tennis racquet (10) according to any of the preceding claims, wherein the head portion (14) includes at least one core section and at least one striking layer arranged at least partially on the core section, preferably at least on opposite sides of the core section.

15. The padel tennis racquet (10) according to claim 14, wherein the striking layer is at least partially made from one or more layers of a fiber composite material.

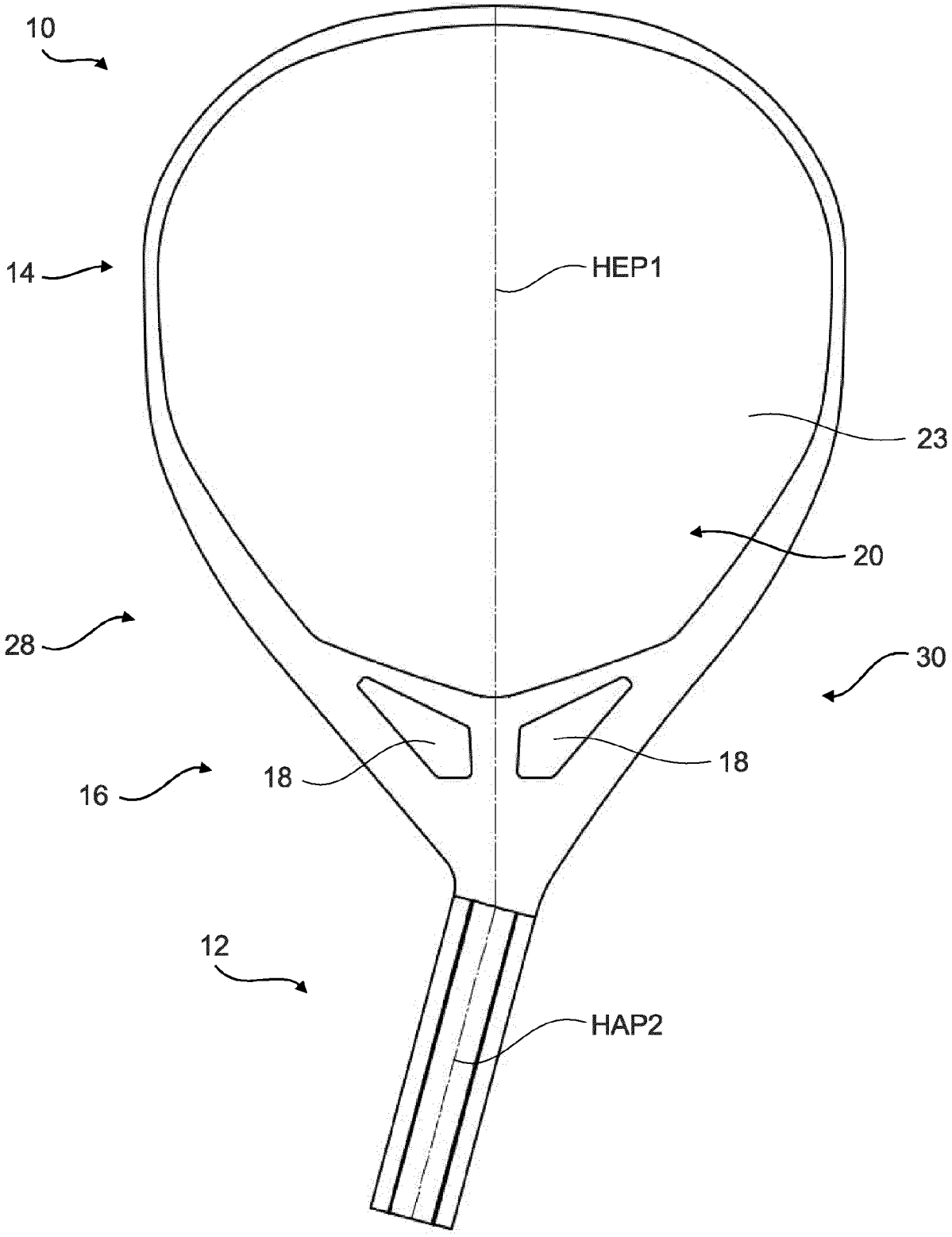

Fig. 1

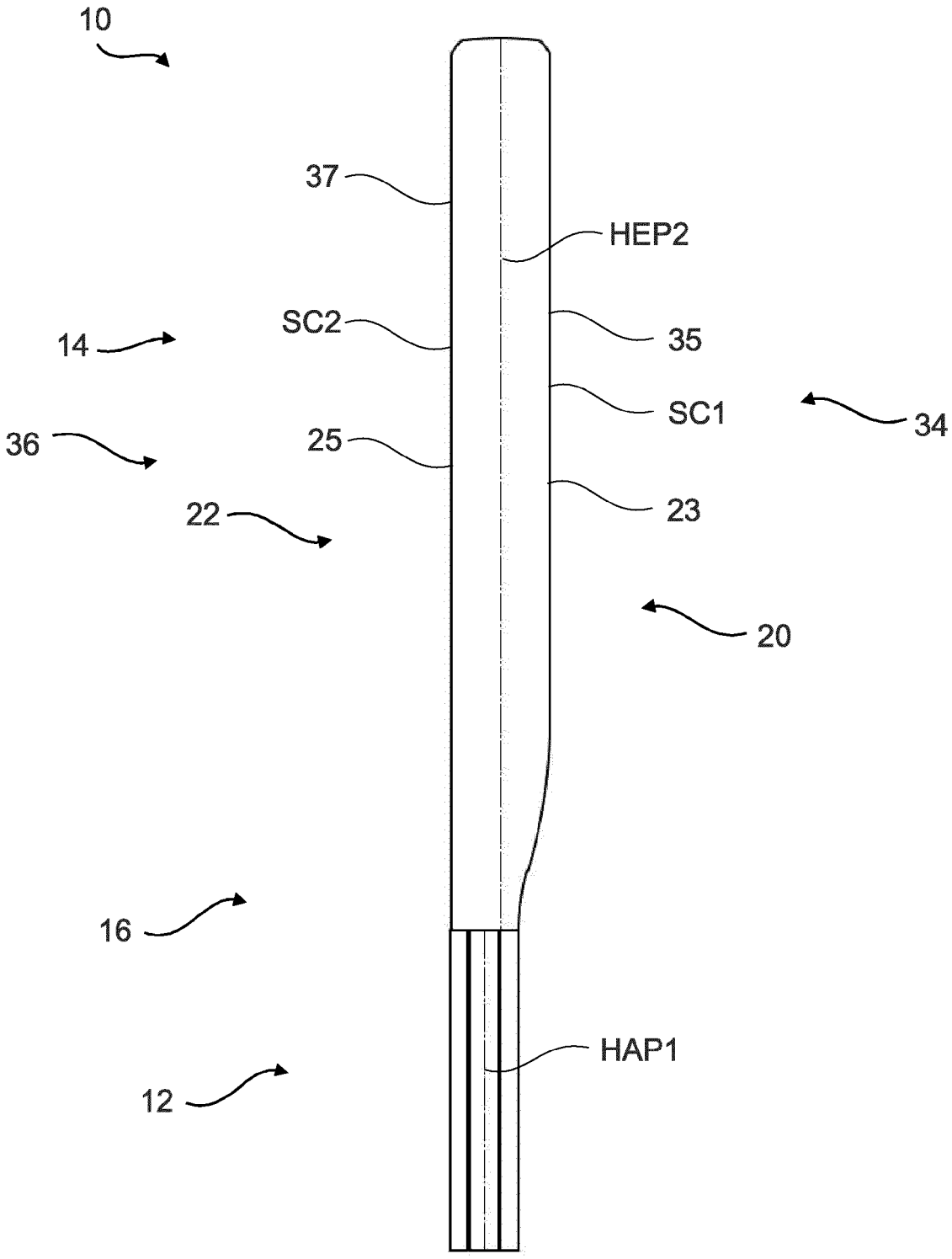

Fig. 2

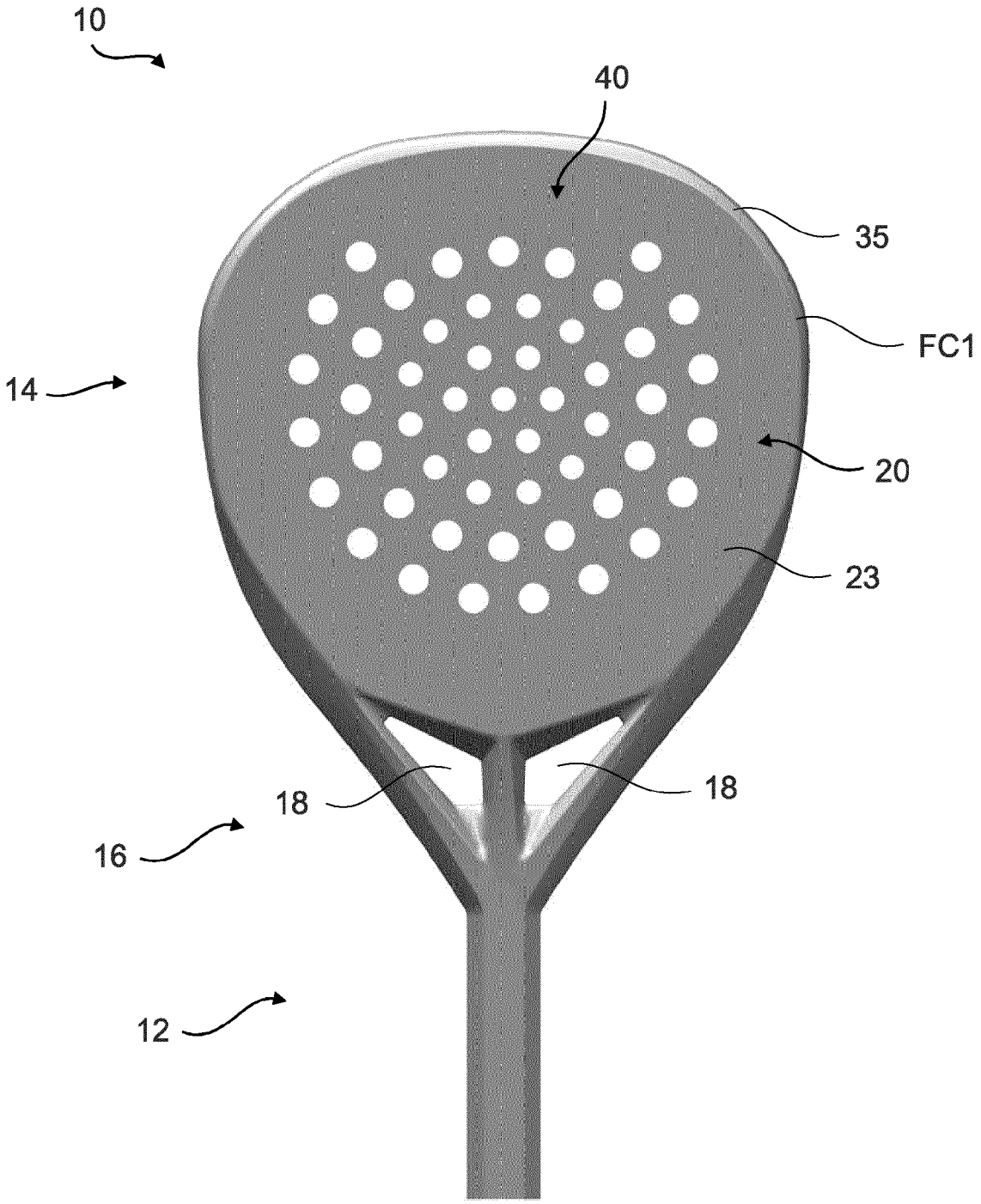

Fig. 3

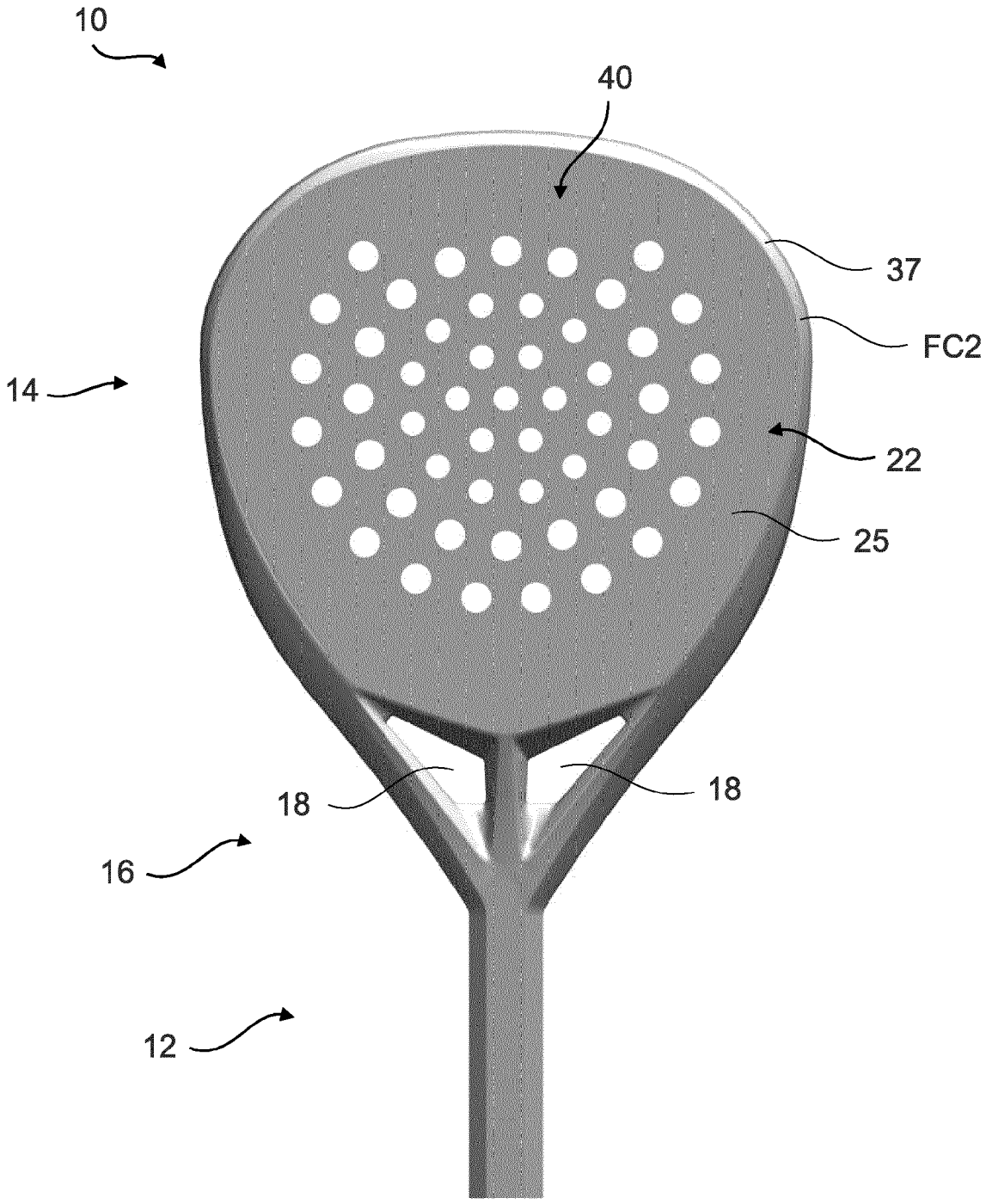

Fig. 4

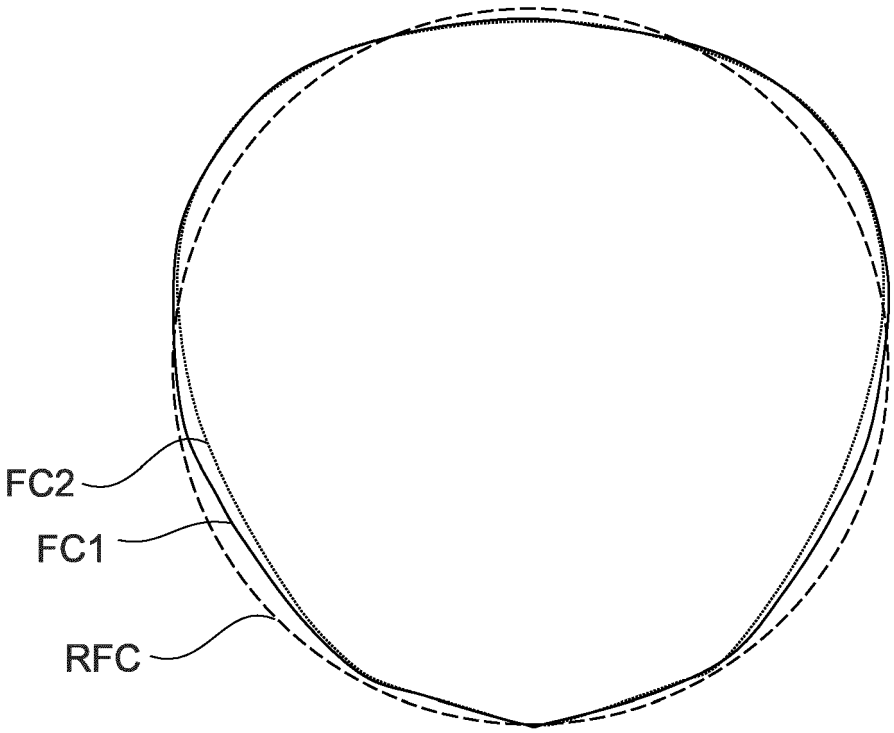

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 20 1629

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* the whole document *	10,13	
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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
Munich	14 March 2023	Tejada Biarge, Diego

CATEGORY OF CITED DOCUMENTS

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