



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.03.2022 Bulletin 2022/13

(51) International Patent Classification (IPC):
B63H 16/04 (2006.01)

(21) Application number: **20198228.7**

(52) Cooperative Patent Classification (CPC):
B63H 16/04

(22) Date of filing: **24.09.2020**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **Metze, Anna-Luise**
3480 Fredensborg (DK)
• **Vallès Gamundi, Xènia**
2800 Kgs. Lyngby (DK)
• **Lenau, Torben Anker**
1655 København V (DK)

(71) Applicant: **Danmarks Tekniske Universitet**
2800 Kgs. Lyngby (DK)

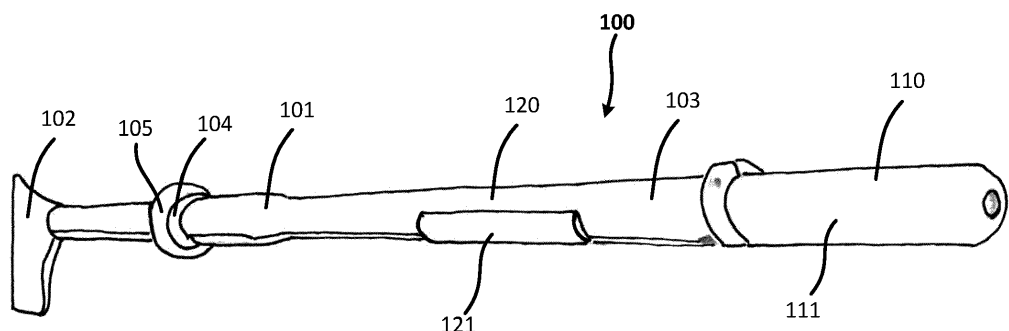
(74) Representative: **Guardian**
IP Consulting I/S
Diplomvej, Building 381
2800 Kgs. Lyngby (DK)

(54) **HANDLE FOR A MANUALLY OPERATED DEVICE**

(57) The present invention relates in one aspect to a handle for a manually operated device. The device comprises a shaft adapted for carrying the handle, the shaft defining a longitudinal direction of the device, the handle facilitating a user to connect to the device with two hands in order to transfer forces to the device during a power transfer phase of operating the device. During operation of the device a front side of the handle faces away from a user operating the device, and a rear side of the handle faces towards the user. The handle comprises a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially

circular at least at the rear side of the handle. The handle further comprises a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the handle. The rear side protrusion is adapted for receiving a palm portion of the hand of the user. In a further aspect a device comprising such a handle is provided. In a particular aspect the device is a sports or training equipment, such as a sweep rowing oar or a kayak paddle. In a yet further particular aspect, the device is a hand tool.

Fig. 3



Description

[0001] The present invention relates to a handle for a manually operated device adapted for manual operation by two hands, and a corresponding device comprising such a handle. In a particular aspect, the present invention relates to a rowing oar handle. In particular, the present invention relates to an oar handle for a sweep rowing oar. In a further aspect, the invention relates to an oar, comprising such a handle. In a further aspect, the invention particularly relates to a sweep rowing oar, comprising such a handle. In yet further aspects, the invention relates to a handle for a kayak paddle and a kayak paddle comprising such a handle.

BACKGROUND OF THE INVENTION

[0002] A rowing boat is propelled by one or more athletes using oars attached to an oarlock of the rowing boat. An oar has a blade portion for interacting with a body of water, a handle portion and a shaft connecting the blade and oar portions. The shaft of an oar typically carries a sleeve and a collar, which are arranged where the oar attaches to the oarlock of the rowing boat.

[0003] To propel the boat, the oars are moved in a cyclic motion. A complete cycle of the motion of an oar is termed a rowing stroke, which is performed and controlled by the athlete. In sports rowing terminology, the rowing stroke is commonly described as comprising catch, drive, release, and recovery. The blade enters the water at the catch in a squared position roughly vertical to the surface of the water. The drive begins at the catch and denotes the phase of the rowing stroke during which the blade is in the water to propel the boat. During the drive phase the blade is in the squared position with a front side of the blade facing in a sternward direction. The drive phase ends at the release, also called finish, where the blade is removed from the water and rotated into a feathered position roughly parallel to the surface of the water. The recovery begins at the release and denotes the phase of the rowing stroke returning to the catch position. During the recovery phase the blade is kept in the feathered position with the front side of the blade facing away from the water surface. Towards the end of the recovery phase, the blade is rotated back into the squared position to prepare for the catch. Feathering and squaring rotation occurs around a longitudinal axis of the oar, i.e. around an axis along the shaft of the oar.

[0004] In sports rowing the athlete faces towards stern of the boat and moves during the drive phase from a compression position leaning forward towards stern to a finish position leaning backwards towards the bow of the boat, while at the same time the oar pivots about the oarlock axis to move the blade from the catch to the release in a direction from bow towards stern. The shaft of the oar transmits the reaction forces resulting from the interaction of the blade with the water during the drive phase via the sleeve to the oarlock to propel the boat.

[0005] The athlete grips the oar and thus connects to the oar at the handle to drive and control the motion of the blade via the shaft. A good connection of the athlete to the oar handle is therefore important for efficient rowing. However, the connection also puts a lot of strain on the hands of the athlete and a well-known issue during training and racing are hand injuries due to repetitive strain, which only partly can be addressed by proper rowing technique, while other issues remain. The remaining issues include e.g. the formation of blisters and infections.

[0006] A known solution is the use of replaceable sheets applied as oar handle covers to the surface of the rowing handle, such as sheets made of synthetic suede. However, such sheets typically suffer considerably due to mechanical wear during use in both dry and wet conditions, and therefore need often replacement. Also, the sheets may be prone to fouling during storage after use, as a consequence of exposure to humidity and sweat during use.

[0007] Other known solutions provide specific handle shapes aimed at improving the ergonomics of the oar. An example of an ergonomic oar handle shape is, for example, given in GB 348,995 disclosing an oar with a handle that is made thinner in plane with the blade than in the direction at right angles thereto, with the result that the section takes the form of an oval, e.g. an ellipse. Another example of an ergonomic handle shape is given in US 9,346,528 B2 disclosing a hand grip having a cross-sectional profile and an axial extent delimited by opposing ends thereof, in which a resilient extension portion is provided at one side of the cross-sectional profile, and which extends substantially the length of the axial extent.

[0008] However, sports rowing is typically divided into two types of rowing, namely sculling and sweep rowing. For sculling each athlete uses two oars. For sweep rowing each athlete uses one oar gripping the handle with an inner hand at a location closer to the blade, and with an outer hand at a location further away from the blade than the inner hand as seen in a direction along the shaft of the oar. The inner hand typically controls the feathering and squaring of the blade by a bend of the wrist to cause rotation of the oar around its longitudinal axis along the shaft. The outer hand's wrist is typically kept straight throughout the entire rowing stroke allowing the handle to slide in a slightly relaxed grip of the outer hand during feathering and squaring rotation, and applying a firm outer hand grip primarily during the drive phase of the rowing stroke. During feathering and squaring, as well as during the recovery phase, the outer hand typically maintains a gentle contact with the oar handle to aid in controlling the vertical position of the blade with respect to the water, and contribute to proper roll balancing of the boat. As a consequence of these different functions of the hands throughout the sweep rowing stroke, the strain exerted on the athlete's inner hand and outer hand is different, which is disregarded by the above-mentioned prior art.

[0009] US 2008/0146099 A1 discloses a rowing oar

handle specifically designed for a sweep rowing oar. The rowing oar handle of US 2008/0146099 A1 comprises a first portion and a second portion, in which the first portion and the second portion are axially rotatable to one another, and in which in use the point of rotation is located between a user's hands. However, the solution introduces moving mechanical parts in the oar, thereby increasing equipment cost, introducing additional friction, requiring extra maintenance, and adding a source of potential equipment failure. Also, the rotatable handle disconnects the outer hand from any rotational control of the blade making it at the least more difficult for the athlete to control proper blade attitude during the drive phase of the rowing stroke.

[0010] While addressing some of the known issues, known solutions are still unsatisfying with regard to reducing blister formation and infections on the hands of the athletes. Furthermore, known solutions are also unsatisfying with regard to the excessive wear during use, a propensity to fouling during storage of the oar, a need for frequent replacement, or may even be incompatible with common rowing techniques.

[0011] It is therefore desirable to provide a handle design allowing for a good connection of the athlete to the oar overcoming or mitigating at least some of the above-mentioned disadvantages of the prior art. In particular, it is desirable to provide an improved handle design for a sweep rowing oar allowing for a good connection of the athlete to the oar while overcoming or mitigating at least some of the above-mentioned disadvantages of the prior art.

SUMMARY OF THE INVENTION

[0012] In one aspect, the invention relates to an oar handle for a sweep-rowing oar, the sweep rowing oar having a shaft carrying a blade on one end as seen in a longitudinal direction of the shaft, the shaft further being adapted for carrying the oar handle on an opposite end thereof; wherein during a drive phase of a rowing stroke a front side of the oar handle faces away from an athlete operating the oar, and a rear side of the oar handle faces towards the athlete. The oar handle comprises a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at the rear side of the handle. The oar handle further comprises a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the oar handle.

[0013] The term "transverse" as used herein refers to directions perpendicular to the longitudinal direction. The term "vertical" denotes transverse directions parallel to the direction from the top to the bottom of the oar handle. The top of the oar handle may be defined as facing up-

ward and away from the body of water when the oar is squared, i.e. when the oar is in a rotational orientation for the drive phase. Accordingly, the bottom of the oar handle is defined as facing opposite to the top, i.e. downward and towards the body of water when the oar is squared. The vertical direction is therefore essentially parallel to the plane of the blade, apart from a pitch angle of the blade. A horizontal direction is perpendicular to the vertical direction and the longitudinal direction of the oar. The term "horizontal" thus denotes transverse directions parallel to the direction from the front to the rear of the oar handle. The vertical direction is generally perpendicular to the horizontal direction, i.e. perpendicular to the direction from the front to the rear of the oar handle.

[0014] The oar handle may be detachably mounted to a sweep rowing oar, or may be integrated with the oar, i.e. part of the oar shaft itself. Also the first and/or second grips may be detachably mounted to the oar handle, or may be integrated with the oar handle. A detachable mount of the oar handle and/or of the first and/or second grips has the advantage that different sizes of the handle and/or grips may easily be provided without the need to invest in and store a large number of oars. Thereby the ergonomics of the oar handle may be more easily tailored to the specific needs of an athlete. Furthermore, detachable mounts of the oar handle and/or grips facilitate an improved oar maintenance, by making repair and replacement of the oar handle and/or grips easy. Furthermore, detachable handles and/or grips can be more easily stored under controlled conditions, than having to deal with the entire oar for maintenance, repair and storage.

[0015] In order to transfer rotational forces for feathering and squaring of the blade the oar handle is rotationally fixed with respect to the oar, when the oar handle is on the oar. Furthermore, at least the second grip is also rotationally fixed with respect to the oar handle for at least the same reason. Preferably, also the first grip is rotationally fixed with respect to the oar handle, thereby allowing the first hand to contribute to controlling the orientation around the longitudinal axis throughout the entire rowing stroke, and in particular during a drive phase thereof.

[0016] The shaft defines a longitudinal direction of the handle and the oar. As mentioned above, in sports rowing the athlete sits "backward", i.e. the athlete faces towards the stern of the rowing boat. During the drive phase, the front side of the handle thus faces astern and away from the torso of the athlete operating the oar, and the rear side of the handle faces ahead and towards the torso of the athlete operating the oar.

[0017] The first cross-sectional shape is adapted to facilitate rotational sliding of the first grip in a first hand of the athlete during feathering and squaring, and the second cross-sectional shape is adapted to do the opposite, namely to rotationally fix the second grip in a second control hand of the athlete during feathering and squaring.

[0018] The first grip is for the first hand, which is kept

essentially straight throughout the rowing stroke, i.e. without bending the wrist during feathering and squaring of the blade. By providing a first grip shape that facilitates easy rotation in a slightly relaxed grip of the first hand during feathering and squaring action, shear between the first hand and the first grip may be kept low, thereby keeping the risk of blister formation to a minimum.

[0019] The second grip of the oar handle is for the so-called control-hand controlling the rotation around the longitudinal axis of the oar for feathering and squaring of the blade. By providing or at least improving a rotationally secure grip to the control-hand, shear of the oar handle exerted on the control-hand during feathering and/or squaring action is reduced, thereby reducing the risk of blister formation in at least the control-hand as compared to e.g. a circular handle grip cross-section. Also the need for gripping the handle very hard with the control hand during feathering and squaring may be reduced by the protrusion facilitating a rotationally secure gripping of the second grip, thereby further reducing the risk of repetitive strain injuries.

[0020] The rearward protrusion is shaped and dimensioned to conveniently seat in the arched palm when the athlete grips around the second grip with the four fingers over the top of the oar handle and with the thumb around the bottom, in opposition to the four fingers, thereby providing a rotationally secure grip. The rearward pointing protrusion of the second grip projects in a proximal direction towards the wrist of the athlete's hand gripping around the second grip, thereby providing a shape engagement interacting with the arched palm of the athlete's hand supporting the application of a rotational force during feathering and squaring. More specifically, the rearward protrusion is conceived to seat roughly between the metacarpophalangeal joints of the four fingers and the thumb metacarpophalangeal joint, pointing towards the carpometacarpal joints, i.e. in a proximal direction towards the wrist. The shape engagement reduces the need for friction engagement during feathering and squaring as compared to a traditional circular transverse cross-sectional handle shape at the control hand, thereby reducing the shear forces on the athlete's control hand during feathering and squaring, as compared to a traditional circular oar handle cross-section.

[0021] Advantageously, the protrusion is formed as a convexly rounded edge protruding on the rear side of the second grip.

[0022] During the drive phase of the rowing stroke, the front side of the handle is the principal load bearing surface for transferring the pulling forces from the athlete to the oar. By providing a means for a rotationally secure gripping of the second grip at the rear side of the handle, which is particularly relevant for the feathering and squaring action, the front side design of the handle remains more flexible and may be optimized for its load transferring function during the drive phase of the rowing stroke. Also, by only requiring the first grip at the rear side of the handle to be shaped so as to facilitate easy sliding in a

loosened grip of the first hand during feathering and squaring rotation, the front side design of the handle remains more flexible and may be optimized for its load transferring function during the drive phase of the rowing stroke. While any such optimization of the front side of the handle for the drive phase of the rowing stroke needs to take into account the function of the first and second grips during feathering and squaring, an important design flexibility is thereby achieved allowing for an optimization of the handle shape also under potentially competing constraints in different phases of the rowing stroke with respect to improved rowing efficiency and/or improved ergonomics to reduce hand injuries.

[0023] The first and second transverse cross-sectional shapes may be described as a modified circular cross-section, comprising a circular core and outward protrusions extending radially outward from the circular core. A circular core of a given cross-sectional shape is the largest diameter circle that can be inscribed to fit inside the cross-sectional shape. A first cross-sectional shape of the first grip may thus be associated with a first circular core having a first core diameter, and a second cross-sectional shape of the second grip may be associated with a second circular core having a second core diameter.

[0024] Advantageously according to some embodiments, the rear side protrusion on the second grip is formed as a radial deviation from a circle bulging outwardly from a circular core to form a substantially convex, rounded edge on a circular base shape. Advantageously, a rearward protrusion height over a circular base surface may be between 5% and 50%, or between 10% and 40%, or between 20% and 30%, or about 25% of the base circle diameter. Thereby a convenient shape engagement is provided.

[0025] Further according to some embodiments of the oar handle, the first grip is an outer grip arranged at an outer portion of the oar handle for gripping by an outer hand, and wherein the second grip is an inner grip arranged at an inner portion of the oar handle for gripping by an inner hand.

[0026] The terms "inner" and "outer" define positions on the handle along the length of the oar, where an inner position is closer to the blade than an outer position. The oar handle thus comprises an inner grip portion and an outer grip portion, wherein the inner grip portion is arranged closer to the blade than the outer grip portion on the handle as seen along the length of the oar. At least a rear section of the inner grip portion is thus shaped to provide a rotationally secured grip for the inner hand acting as the control-hand. Furthermore, at least a rear portion of the outer grip portion is thus adapted to facilitate a rotation of the outer grip portion sliding through a slightly loosened grip of the outer hand.

[0027] Typically in sweep rowing, the control hand is the so-called inner hand placed closer to the blade of the oar than the so-called outer hand as seen in a longitudinal direction of the oar. With the athlete facing astern, for a

starboard sweep rowing position the inner hand is therefore the left hand, and the outer hand is the right hand. Accordingly, for a portside rowing position, the inner hand is the right hand and the outer hand is the left hand.

[0028] Advantageously according to some embodiments of a handle for a sweep rowing oar, an inner grip has a substantially triangular transverse cross-sectional shape and an outer grip has a substantially circular transverse cross-sectional shape thereby improving feathering and/or squaring rotation. A largely circular cross-section is provided for an outer grip arranged at an end furthest away from the blade of the oar, and a triangular cross-section is provided for an inner grip arranged closer to the blade of the oar than the outer grip. The triangular inner grip is shaped for a secure rotational grip facilitating improved control of the rotation of the oar during feathering and squaring by an inner hand of the athlete, whereas the circular outer grip allows for easy sliding rotation in a relaxed grip of the outer hand during feathering and squaring, as also discussed above.

[0029] The corners of the triangular cross-sectional shape are conveniently rounded to avoid sharp edges on the handle cutting into the hand of the athlete under load, yet providing an improved shape engagement for the control-hand, thereby reducing rotation induced shear on the control-hand of the athlete during feathering and squaring of the blade. Preferably, one of the rounded corners of the substantially triangular shape points in a proximal direction towards the athlete operating the oar, when the oar is oriented as during a drive phase of a rowing stroke.

[0030] According to some embodiments, the transverse cross-sectional shape of the second grip may be a modified triangular shape comprising convex, i.e. outwardly bulging sides connecting the three rounded corners of the triangular shape determining the shape engagement. Such a modified triangular cross-sectional shape has three convexly rounded corners, each defined by a respective radius of curvature as seen in a transverse cross-section perpendicular to the longitudinal direction, and three sides connecting the rounded corners, each having an associated bulging radius of curvature, which is substantially larger than any of the radii of curvature of the three rounded corners. The rounded corners defining the modified triangle are thus the three rounded corners that have the smallest radius of curvature.

[0031] Further according to some embodiments of the oar handle, the first cross-sectional shape is flattened at a front side thereof. As mentioned above, a front side of the oar handle is the load bearing surface during a drive phase. It turns out that an effective and ergonomic power transfer is achieved, if the first grip has a flattened front side forming a flattened resting surface for the four fingers of the first hand gripping over the top of the first grip, to distribute the load when transferring pulling forces from the hand of the athlete to the first grip during the drive phase of the rowing stroke. Furthermore, the flattened front surface facing in a direction away from the athlete

also allows to reduce shear on the athlete's hand during the drive phase, and may thus further contribute to reduce blister formation.

[0032] Further according to some embodiments of the oar handle, the first cross-sectional shape has two convex front side protrusions arranged to form the flattened front side. An upper front side protrusion is placed on the front side, in a top half thereof, wherein the top of the oar handle is defined as facing upward, away from the body of water during the drive phase of the rowing stroke. A lower front side protrusion is placed on the front side in a bottom half thereof, wherein the bottom of the oar handle is defined as facing downward, towards the body of water during the drive phase of the rowing stroke.

[0033] The peaks of the upper and lower front side protrusions thus point from the front side radially outward in upward and downward directions, respectively, when the handle is oriented for the drive phase. The shoulders of the protrusions located between the peaks form the flattened front surface, and the upper and lower outside shoulders run essentially tangentially towards the top and bottom of the oar handle, respectively.

[0034] The flattened surface is adapted to act as the principal load bearing surface during the drive phase. Advantageously during a drive stroke, the peak of the upper protrusion is adapted to seat the proximal inter phalangeal joints of the four fingers reaching over the top, the proximal phalangeal portions of the four fingers resting against the outside shoulder of the upper protrusion, and the thumb typically resting in opposition against the bottom of the handle and the outside shoulder of the lower protrusion.

[0035] Advantageously, a vertical distance of the two peaks of the front side protrusions is less than the transverse dimension of the handle in a vertical direction from the top to the bottom. Thereby a conveniently tapering front half of the handle having a truncated flattened front side is provided. Further advantageously, the front side protrusions are formed as rounded edges.

[0036] Further according to some embodiments of the oar handle, a height of one or both of the two front side protrusions over a circular core of the first grip decreases in a longitudinal direction from a first grip inner end towards a first grip outer end. The height of the protrusions on the first grip may thus be tapered down in a direction away from the blade. With the first grip being the outer grip, the height of the protrusions thus tapers down towards the fifth finger (little finger) of the first (outer) hand. Thereby, the athlete operating the oar may grip the first grip of the oar handle with the outer hand at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0037] Further according to some embodiments of the oar handle, the second cross-sectional shape is flattened at a front side thereof. In combination with the rear side protrusion the flattened front side of the second cross-sectional shape synergistically enhances the shape engagement for a rotationally secure grip of the control

hand. Furthermore, as already mentioned above, a front side of the oar handle is the load bearing surface during a drive phase. It turns out that an effective and ergonomic power transfer is achieved, if the second grip has a flattened front side forming a flattened resting surface for the four fingers of the second hand gripping over the top of the second grip, to distribute the load when transferring pulling forces from the hand of the athlete to the second grip during the drive phase of the rowing stroke. Furthermore, the flattened front surface also allows to reduce shear on the athlete's hand during the drive phase, and may thus further contribute to reduce blister formation.

[0038] Further according to some embodiments of the oar handle, the second cross-sectional shape has two convex front side protrusions arranged to form the flattened front side. As for the first grip, an upper front side protrusion of the second grip is also placed on the front side, in a top half thereof, wherein the top of the oar handle is defined as facing upward, away from the surface of the water during the drive phase of the rowing stroke, and a lower front side protrusion of the second grip is also placed on the front side in a bottom half thereof, wherein the bottom of the oar handle is defined as facing downward, towards the surface of the water during the drive phase of the rowing stroke.

[0039] The triangular shape of the second grip resulting from the combination of the rear side protrusion with the two front side protrusions further enhances the shape engagement for a rotationally secure grip of the control hand.

[0040] According to some embodiments, the second grip acting as the control grip may thus have a substantially triangular shape with rounded corners as seen in a transverse cross-section, wherein the rear side protrusion pointing towards the athlete during the drive phase forms one of the corners of the triangle, and the two front side protrusions form the two further corners of the triangle. The two front side protrusions thus further enhance the shape engagement for a rotationally secure grip of the control hand.

[0041] According to some embodiments, the sides of the triangle may furthermore convexly bulge in a radially outward direction to support a natural arching of the second hand gripping around the second grip.

[0042] The peaks of the upper and lower front side protrusions point from the front side radially outward in upward and downward directions, respectively, when the handle is oriented for the drive phase. The shoulders of the protrusions located between the peaks form the flattened front surface, and the upper and lower outside shoulders run essentially tangentially towards the top and bottom of the oar handle, respectively.

[0043] The flattened surface is adapted to act as the principal load bearing surface during the drive phase. Advantageously during a drive stroke, the peak of the upper protrusion is adapted to seat the proximal interphalangeal joints of the four fingers reaching over the top, the proximal phalangeal portions of the four fingers

resting against the outside shoulder of the upper protrusion, and the thumb typically resting in opposition against the bottom of the handle and the outside shoulder of the lower protrusion, whereas the rear side protrusion seats against the palm of the hand pointing in a proximal direction towards the wrist as already described above.

[0044] Advantageously, a vertical distance of the two peaks of the front side protrusions is less than the transverse dimension of the handle in a vertical direction from the top to the bottom. Thereby a conveniently tapering front half of the handle having a truncated flattened front side is provided. Further advantageously, the front side protrusions are formed as rounded edges.

[0045] Further according to some embodiments of the oar handle, a height of one or both of the two front side protrusions over a circular core of the second grip decreases in a longitudinal direction from a second grip outer end towards a second grip inner end, i.e. in a direction towards the blade. With the second hand being the inner hand, the height of the protrusions thus tapers down in a direction towards the fifth finger (little finger) of the second (inner) hand. Thereby, the athlete operating the oar may grip the second grip of the oar handle with the inner hand at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0046] Further according to some embodiments of the oar handle, a height of the rear side protrusion over a circular core of the second grip decreases in a longitudinal direction from a second grip outer end towards a second grip inner end, i.e. also in a direction towards the blade. With the second hand being the inner hand, the height of the protrusions thus tapers down in a direction towards the fifth finger (little finger) of the second (inner) hand. Thereby, the athlete operating the oar may grip the second grip of the oar handle with the inner hand at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0047] Further according to some embodiments of the oar handle, a height of the protrusions over a circular core is up to 15 mm, up to 12 mm, up to 10 mm, or between 2 mm and 8 mm, or between 3 mm and 6 mm. Thereby a convenient grip shape is achieved.

[0048] Advantageously according to some embodiments, a height of one or more of the protrusions over a circular core may vary in a longitudinal direction of the oar, wherein the circular core of a given cross-sectional shape is the largest diameter circle that can be inscribed to fit inside the given cross-sectional shape.

[0049] Advantageously according to some embodiments a transverse dimension of the first grip in a vertical direction is between 2 cm and 5 cm, or between 3 cm and 4 cm. Further advantageously according to some embodiments, a transverse dimension of the second grip in a vertical direction is between 2 cm and 5 cm, or between 3 cm and 4 cm.

[0050] Advantageously, a first perimeter of the first cross-sectional shape has a length between 6 cm and

15 cm, or between 9 cm and 13 cm. Further advantageously, a second perimeter of the second cross-sectional shape has a length between 6 cm and 15 cm, or between 9 cm and 13 cm.

[0051] Advantageously according to some embodiments, the first perimeter of the first grip varies in a longitudinal direction of the oar. Further advantageously, the second perimeter of the second grip varies in a longitudinal direction of the oar.

[0052] Further according to some embodiments of the oar handle, a perimeter of the first grip decreases in a longitudinal direction from a first grip inner end towards a first grip outer end, i.e. in a direction away from the blade, towards the fifth finger (little finger) of the first (outer) hand. Thereby, the athlete operating the oar may grip the first grip of the oar handle with the outer hand at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0053] Further according to some embodiments of the oar handle, a perimeter of the second grip decreases in a longitudinal direction from a second grip outer end towards a second grip inner end, i.e. in a direction towards the blade, towards the fifth finger (little finger) of the second (inner) hand. Thereby, the athlete operating the oar may grip the second grip of the oar handle with the inner hand at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0054] Further according to some embodiments of the oar handle, a length of the first grip in the longitudinal direction of the oar is between 6 cm and 15 cm, or between 9 cm and 13 cm, or about 11 cm. Thereby, a well-defined grip for the first hand is provided with a first cross-sectional shape extending over at least the full width of the first hand, which facilitates easy rotation in a loosened grip thereof, during feathering and squaring as controlled by the second hand.

[0055] Further according to some embodiments of the oar handle, a length of the second grip in the longitudinal direction of the oar is between 15 cm and 30 cm, or between 20 cm and 25 cm, or about 23 cm. Thereby, a wide grip for placing the second hand is provided with a second cross-sectional shape for improved feathering and squaring action, which is extended over a width largely exceeding the full width of the second hand, thereby allowing to easily vary the placement of the control hand on the second grip in a longitudinal direction.

[0056] Further according to some embodiments of the oar handle, a surface layer of the first and/or second grips is made of leather, rubber, or synthetic suede, or a fabric comprising polyester and/or polypropylene. The surface layer of the first and second grips may be of any suitable material and structure, such as a single layer material, or a multi-layer material, and including a fabric. The fabric may be of any suitable structure, such as knitted, crochet, woven or nonwoven. A fabric comprising polyester and/or polypropylene has the advantage that it is water repellent and sweat resistant. By combining the first and/or second

grips with a proven surface layer material, such as leather, cork, rubber, or synthetic suede, proven advantages of such grip surfaces can be maintained, e.g. in terms of gripping performance in dry and wet conditions, while at least some of the known disadvantages are mitigated by the grip shape, e.g. reducing shear and friction induced wear on the surface layer material. Thereby, an oar handle with proven surface properties, and yet enhanced durability may be provided.

[0057] In a further aspect, the invention relates to an oar for sweep rowing, the oar comprising a shaft carrying a blade on a first end thereof as seen in a longitudinal direction along the shaft, and an oar handle arranged on a second end of the shaft opposite of the first end, wherein the oar handle is an oar handle for a sweep-rowing oar according to any of the embodiments disclosed herein. Thereby at least the same advantages are achieved as already discussed in the context of the oar handle.

[0058] The sweep-rowing oar has inner and outer grips with two different cross-sectional shapes. Thereby a sweep-rowing oar is provided, wherein a combination of two different cross-sectional shapes are provided for use on the same oar. As mentioned above, a first cross-sectional shape is adapted to facilitate rotational sliding of a first grip in a first hand of the athlete, typically the outer hand, during feathering and squaring, and a second cross-sectional shape is adapted to do the opposite, namely to rotationally fix a second grip in a second hand of the athlete, typically the inner hand, also called the control-hand, during feathering and squaring.

[0059] Further according to one aspect, a handle for a manually operated device is provided, the device comprising a shaft adapted for carrying the handle, the shaft defining a longitudinal direction of the device, the handle facilitating a user to connect to the device with two hands in order to transfer forces to the device during a power transfer phase of operating the device ; wherein during operation of the device a front side of the handle faces away from a user operating the device (at least during the power transfer phase), and a rear side of the handle faces towards the user (at least during the power transfer phase); the handle comprising a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at least at the rear side of the handle; wherein the handle further comprises: a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the handle, the rear side protrusion being adapted for receiving a palm portion of the hand of the user.

[0060] Further according to one aspect, a device for manual operation by a user is provided, the device comprising a shaft defining a longitudinal direction of the device, and a handle arranged on the shaft, the handle facilitating the user to connect to the device with two hands,

wherein during operation of the device a front side of the handle faces away from a user operating the device, and a rear side of the handle faces towards the user; the handle comprising: a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at least at the rear side of the handle; wherein the handle further comprises: a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the handle.

[0061] The first and second grips are arranged in longitudinal alignment with each other, and thus in alignment with a longitudinal axis of the handle. Furthermore, the handle is arranged on the shaft of the device in alignment with the longitudinal axis defined by the shaft of the device. As also mentioned above, the handle may be an integral part of the shaft of the device. Alternatively, the entire handle, or the first grip and/or the second grip may be detachably fixed to the shaft of the device to allow for an easy replacement of the handle, or the individual grips for easy customisation, for hygienic purposes, or for adequate storage, service, maintenance, and/or repair.

[0062] The device may be, for example, a piece of sports equipment or a hand tool. The operation of the device involves two hands connecting to the device by gripping around a handle arranged on a shaft of the device. Operation comprises a power transfer phase where the user applies working forces via the handle to the shaft of the device. Operation of the device further involves a rotation of the shaft around the longitudinal axis of the device in a loosened grip of the first hand, the rotation being controlled by the second hand.

[0063] The first grip is for receiving the first hand of the user, when connecting to the handle of the device. The first grip is adapted to facilitate easy rotation in a loosened grip of the first hand. An envelope to the contour of the transverse cross-section of the first grip should therefore fall within a circle fitting into a slightly loosened hand of the user. A typical radius of curvature of a convex envelope to the rear side of the first grip therefore approximately corresponds to half the height of the first grip as seen in a vertical direction, such as to within 20% of half the height, or to within 15% of half the height, or to within 10% of half the height, or to within 5% of half the height.

[0064] The second grip is for receiving the second hand of the user when connecting to the handle of the device, wherein the rear side protrusion is adapted for receiving a palm portion of the hand of the user. The second grip is thus adapted to provide a shape engagement with the second hand of the user controlling the rotational movement around the longitudinal axis of the shaft, in particular with the arched palm portion of the second hand engaging the rear side protrusion. Thereby the rotational engagement of the handle with the second hand is improved, and the shear interaction between the

device and the second hand controlling the rotational movement is reduced. As a consequence, the risk of repetitive strain injuries is reduced, including the risk of blister formation in the second hand controlling the rotational movement of the device.

[0065] The functioning of the manually operable device has been described in detail above in the context of rowing, in particular referring to an oar handle for sweep rowing and a sweep rowing oar. However, the skilled person will understand that the handle comprising first and second grips according to embodiments of the invention is also useful in the context of other sports and training equipment or in the context of hand tools where the manual operation involves gripping the device with two hands, and moving the device using the two hands, wherein the movement performed includes a power transfer phase (called drive phase above, in the context of sweep rowing) and a rotation around a longitudinal axis of the device in a loosened grip of the first hand, wherein the rotation is controlled by the second hand (called feathering and squaring actions above, in the context of sweep rowing). Thereby corresponding advantages are achieved also in the context of other sports and training equipment or hand tools.

[0066] Furthermore, various features of advantageous embodiments presented in the context of a sweep rowing oar are also useful in the context of other sports and training equipment, or hand tools, whereby corresponding advantages are achieved. For example, the first and/or second grips may be combined in a synergistic manner with a flattened front side, as well as with a longitudinally tapering profile with a decreasing perimeter and/or protrusion height of the transverse cross-sectional profile as seen in a longitudinal direction of the handle (i.e. along the longitudinal direction of the shaft), e.g. as further detailed above in the context of a sweep rowing oar, whereby corresponding advantages are achieved. Advantageously, the tapering provides a decreasing perimeter and/or profile height in a direction away from a central location of the handle between the first and second grips, i.e. in a direction from the index to the little finger of the first and/or second hands gripping the first and second grips, respectively.

[0067] Further according to some embodiments, the device is a sweep rowing oar comprising a blade on a first end of the shaft as seen in a longitudinal direction along the shaft, and wherein the handle is an oar handle arranged on a second end of the shaft opposite of the first end. Further according to some embodiments of the device the oar handle is an oar handle for a sweep-rowing oar according to any of the embodiments disclosed herein.

[0068] Further according to some embodiments, the device is a kayak paddle comprising a first blade at a first end of the shaft as seen in a longitudinal direction along the shaft, a second blade at a second end of the shaft opposite of the shaft and a handle portion arranged on a centre portion of the shaft, between the first and second

ends thereof. In a kayak paddle the front side is facing opposite of the face of the blade bearing the load during the power phase of the kayak stroke propelling the boat and towards the bow of the kayak. Correspondingly, the rear side is now facing in essentially the same direction as said load bearing face of the blade and astern. In some embodiments, the first and second blades may be arranged twisted with respect to each other, about the longitudinal axis defined by the shaft. The front side is then still defined as facing away from the athlete during the power phase of the kayaking stroke propelling the boat, and away from the wrist of the second hand gripping the paddle by the second grip, and the rear side is pointing in the opposite direction, towards the athlete, and into the arched palm of the second hand gripping the device by the second grip of the handle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0069] Preferred embodiments of the invention will be described in more detail in connection with the appended drawings, which schematically show in

- Fig. 1 a transverse cross-sectional view of a first grip of an oar handle according to one embodiment,
- Fig. 2 a transverse cross-sectional view of a second grip of the oar handle of Fig.1;
- Fig. 3 a perspective view of the rear side of a sweep rowing oar according to one embodiment;
- Fig. 4 a perspective view of the front side of the sweep rowing oar of Fig.3;
- Fig. 5 an end-on perspective view of the bottom side of the sweep rowing oar of Fig.3; and in
- Fig. 6 an end-on perspective view of the bottom side of a sweep rowing oar according to a further embodiment.

DETAILED DESCRIPTION

[0070] Referring to Figs. 1 and 2 transverse cross-sections of an oar handle 103 of a starboard sweep-rowing oar are shown as seen in a longitudinal direction from the handle towards a blade of the oar. In Figs. 1 and 2, the longitudinal direction points into the drawing plane, and the transverse vertical V and horizontal H directions are in the drawing plane, i.e. perpendicular to the longitudinal direction, as indicated by a cross hair in the centre of the oar handle cross-sections. In Figs. 1 and 2, the oar is shown in a squared position, i.e. with the blade oriented vertically as e.g. during the drive phase of a rowing stroke. A front side of the oar handle thus faces in a horizontal direction H away from the athlete 99, and a rear side of the oar handle faces towards the athlete 99. As men-

tioned above, a front side of the oar handle is the load bearing surface during the drive phase. A top of the oar handle faces upward in a vertical direction V, and a bottom of the oar handle faces downward in a vertical direction.

[0071] Fig.1 shows a first grip 110 having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at the rear side 111. The first cross-sectional shape is flattened at a front side thereof. The flattened front side forms a flattened resting surface for the four fingers of the first hand gripping over the top of the first grip 110, to distribute the load when transferring pulling forces from the hand of the athlete to the first grip 110 during the drive phase of the rowing stroke. An effective and ergonomic power transfer is thereby achieved.

[0072] The flattened front side of the first cross-sectional shape is formed by two convex front side protrusions 112, 113 over a first cylindrical base shape as outlined by the broken line circle in Fig.1. An upper front side protrusion 112 is placed on the front side, in a top half thereof, wherein the top of the oar handle is defined as facing upward, away from the body of water during the drive phase of the rowing stroke. A lower front side protrusion 113 is placed on the front side in a bottom half thereof, wherein the bottom of the oar handle is defined as facing downward, towards the body of water during the drive phase of the rowing stroke. The peaks of the upper and lower front side protrusions 112, 113 thus point from the front side radially outward in upward and downward directions, respectively, when the handle 110 is oriented for the drive phase. The shoulders of the protrusions located between the peaks form the flattened front surface, and the upper and lower outside shoulders run essentially tangentially towards the top and bottom of the oar handle, respectively. A convenient shape is e.g. provided by a height of the upper and lower front side protrusions 112, 113 over the circular base (broken line) of at least 2%, or at least 4%, or at least 6%, and up to 10%, or up to 15%, or up to 20% of the base circle diameter. A thin surface layer 114 made of a soft material is provided as a padding around the first grip 110, such as a thin layer of leather, synthetic suede, fabric, or cork.

[0073] Fig.1 further shows schematically a right hand in a suitable gripping posture with the four fingers of the right hand reaching over the top of the first grip, and the thumb reaching under the oar handle to rest against the bottom of the first grip. The peak of the upper protrusion seats the proximal inter phalangeal joints of the four fingers reaching over the top, the proximal phalangeal portions of the four fingers resting against the outside shoulder of the upper protrusion, and the thumb typically resting in opposition against the bottom of the first grip and the outside shoulder of the lower protrusion. A vertical distance of the two peaks of the front side protrusions is less than the transverse dimension of the handle in a vertical direction from the top to the bottom. Thereby a

conveniently tapering front half of the handle having a truncated flattened front side is provided.

[0074] Fig. 2 shows a second grip 120 having a second cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction. The second cross-sectional shape differs from the first cross-sectional shape in that the second cross-sectional shape comprises a rear side protrusion 121 at the rear side of the second grip 120. The rear side protrusion 121 is formed as a convexly rounded edge protruding on the rear side of the second grip 120. Similar to the first cross-sectional shape, the second cross-sectional shape is flattened at a front side thereof. The flattened front side forms a flattened resting surface for the four fingers of the second hand gripping over the top of the second grip 120, to distribute the load when transferring pulling forces from the hand of the athlete 99 to the second grip 120 during the drive phase of the rowing stroke. An effective and ergonomic power transfer is thereby achieved.

[0075] Fig. 2 further shows schematically a left hand engaging the oar handle 103 as a control hand in a suitable gripping posture with the four fingers of the left hand reaching over the top of the second grip 120, and the thumb reaching under the oar handle to rest against the bottom of the second grip 120. The rearward protrusion 121 is located between the metacarpophalangeal joints of the four fingers (knuckles) and the thumb metacarpophalangeal joint, pointing towards the carpometacarpal joints CMC, in a proximal direction towards the wrist. The rearward protrusion 121 is shaped and dimensioned to conveniently seat in the arched palm when the athlete 99 grips around the second grip 120 with the four fingers over the top and with the thumb around the bottom, in opposition to the four fingers. By projecting in a proximal direction towards the wrist of the athlete's 99 hand gripping around the second grip 120, the rearward pointing protrusion 121 of the second grip 120 provides a shape engagement interacting with the arched palm of the athlete's 99, for a rotationally secure grip supporting the application of a rotational force during feathering and squaring. The shape engagement also reduces the need for friction engagement during feathering and squaring as compared to a traditional circular transverse cross-sectional handle shape at the control hand, thereby reducing the shear forces on the athlete's control hand during feathering and squaring, as compared to a traditional circular oar handle cross-section.

[0076] The rear side protrusion 121 on the second grip 120 is formed as a radial deviation from a circle bulging outwardly from a second circular base shape, as outlined by the broken line in Fig. 2, to form a substantially convex, rounded edge protruding over a cylindrical core. A convenient shape engagement is e.g. provided by a rear side protrusion height over a circular base surface of at least 5%, at least 10%, or at least 15%, and up to 20%, up to 25%, or up to 30% of the base circle diameter.

[0077] As mentioned above, the second cross-sectional shape is also flattened at the front side. In combination

with the rear side protrusion the flattened front side of the second cross-sectional shape synergistically enhances the shape engagement for a rotationally secure grip of the control hand. The second cross-sectional shape of the second grip 120 has two convex protrusions over a second circular base shape arranged to form the flattened front side. As for the first grip 110, an upper front side protrusion 122 of the second grip 120 is placed on the front side, in a top half thereof, and a lower front side protrusion 123 of the second grip 120 is placed on the front side in a bottom half thereof. A convenient shape engagement is e.g. provided by a height of the upper and lower front side protrusions over the circular base surface of at least 2%, or at least 4%, or at least 6%, and up to 10%, or up to 15%, or up to 20% of the base circle diameter.

[0078] The triangular engagement of the second grip 120 resulting from the combination of the rear side protrusion 121 with the two front side protrusions 122, 123 further enhances the shape engagement for a rotationally secure grip of the control hand.

[0079] The peaks of the upper and lower front side protrusions 122, 123 point from the front side radially outward in upward and downward directions, respectively, when the second grip is oriented for the drive phase. The shoulders of the protrusions located between the peaks form the flattened front surface, and the upper and lower outside shoulders run essentially tangentially towards the top and bottom of the second grip 120 of the oar handle 103, respectively.

[0080] The peak of the upper protrusion 122 is adapted to seat the proximal inter phalangeal joints of the four fingers reaching over the top, the proximal phalangeal portions of the four fingers resting against the outside shoulder of the upper protrusion. The thumb rests in opposition against the bottom of the second grip 120 and the outside shoulder of the lower protrusion 123, whereas the rear side protrusion 121 seats against the palm of the hand pointing in a proximal direction towards the wrist as already described above.

[0081] A vertical distance of the two peaks of the front side protrusions 122, 123 is less than the transverse dimension of the handle at the second grip 120 in a vertical direction from the top to the bottom. Thereby a conveniently tapering front half of the second grip having a truncated flattened front side is provided. The front side protrusions are formed as rounded edges with a radius of curvature at the peak of about 20-40% of the transverse dimension of the handle at the second grip in a vertical direction from the top to the bottom. A grip surface layer 124 is provided as a padding around the second grip 120, such as a thin layer of leather, synthetic suede, fabric, or cork.

[0082] Referring to Figs. 3, 4 and 5 a sweep rowing oar 100 is shown in a perspective view, wherein Fig. 3 shows the rear side, and Fig. 4 shows the front side of the oar 100. While a starboard sweep rowing oar is depicted in the figures, a port side sweep rowing oar is anal-

ogously obtained by mirroring the starboard rowing oar accordingly. The sweep rowing oar 100 has a shaft 101 carrying a blade 102 on one end as seen in a longitudinal direction of the shaft 101. The shaft further carries an oar handle 103 on an opposite end thereof. Between the blade 102 and the handle 103, the oar further carries a collar 104 with a button 105 defining the mounting position of the oar 100 in an oar lock of a rowing boat (not shown). The oar handle 103 has a first grip 110 with a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction. The first grip 110 is the outer grip of the sweep rowing oar 100. The first cross-sectional shape is substantially circular at the rear side 111 of the first grip 110, as best seen in Fig.3. The oar handle 103 further comprises a second grip 120 having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction. The second grip 120 is the inner grip of the sweep rowing oar 100. The second cross-sectional shape comprises a rear side protrusion 121 at the rear side of the second grip 120, as also seen in Fig.3. The front side of the oar handle features flattened surfaces on both the first and second grips 110, 120. The flattened front side of the first grip 110 is formed by upper and lower front side protrusions 112, 113, and the flattened front side of the second grip is formed by upper and lower front side protrusions 122, 123, as already discussed above with reference to Figs. 1 and 2. In Figs.3 and 4 the oar handles are shown bare, without a padding layer on the grip surface to reveal the shape of the first and second grips 110, 120. The protrusions are here shown to be formed by add-on material added to a traditional handle with a transverse circular cross-section. Thereby, a retro-fit is easily possible. However, an oar handle shape may also be integrated already in the original oar handle design. Furthermore, the first grip 110 for receiving the outer hand is here shown as a replaceable grip, which by means of a clamping engagement engages a cooperating stem on the oar 100. Thereby, the first grip 110 may easily be replaced. It is also conceivable that the entire oar handle 103 may be detachably mounted to the shaft of the oar for easy replacement and/or safe storage. However, the first grip 110 may also be fully integrated with the oar handle 103. Furthermore, the oar handle 103 may be also be fully integrated with the shaft 101 of the oar 100.

[0083] Fig.5 shows a further perspective view of the sweep rowing oar 100 of Figs.3 and 4, as seen end-on along the shaft 101 towards the blade 102, showing in particular the oar handle 103 from below. As already described above, the first grip 110 has at the outer end of the oar handle 103, furthest away from the blade 102, a transverse cross-sectional shape with a circular rear side 111 and a flattened front side formed by upper and lower front side protrusions 112, 113, added onto a core body with a circular cross-section. The upper and lower front side protrusions 112, 113 extend in a longitudinal direction essentially over the entire width of the first grip 110,

from a first grip inner end 114 to a first grip outer end 115. The width of the first grip is typically between 10 cm and 15 cm, or about 11 cm. The transverse cross-sectional shape of the oar handle 103 shown in Figs. 3-5 is essentially the same over the entire width of the first grip 110. The perimeter of the first cross-sectional shape may be dimensioned to fit to the hand of the athlete so as to allow a closed grip around the first grip of the handle with the four fingers over the top of the first grip 110 and the thumb in opposition under the bottom of the first grip 110. For example, the perimeter of the first transverse cross-sectional shape may be dimensioned to correspond to the circumference of a conventional circular oar handle for the outer hand, such as between 9 cm and 12 cm, or about 10 cm.

[0084] The second grip 120 at the inner end of the oar handle 103, closest to the blade 102, has an essentially triangular transverse cross-sectional shape with a rear side protrusion 121 and a flattened front side formed by upper and lower front side protrusions 122, 123, added onto a core body with a circular cross-section. The upper and lower front side protrusions 122, 123 extend in a longitudinal direction essentially over the entire width of the second grip 120, from a second grip inner end 124 to a second grip outer end 125. The width of the second grip is typically between 20 cm and 25 cm, or about 23 cm. The transverse cross-sectional shape of the second grip 120 of the oar handle 103 shown in Figs. 3-5 is essentially the same over the entire width of the second grip 120. The perimeter of the second cross-sectional shape may also be dimensioned to fit to the hand of the athlete so as to allow a closed grip around the second grip of the handle with the four fingers over the top of the second grip 110 and the thumb in opposition under the bottom of the second grip 110. For example, the perimeter of the first transverse cross-sectional shape may be dimensioned to correspond to the circumference of a conventional circular oar handle for the inner hand, such as between 9 cm and 12 cm, or about 10 cm.

[0085] The peaks of the front and rear side protrusions 112, 113, 121, 122, 123 on the first and second grips 110, 120 are rounded off, and the shoulders of the protrusions 112, 113, 121, 122, 123 fall tangentially off towards the circular cylindrical core body. While the protrusions here are shown as add-on profiles attached to a circular cylindrical core body, the cross-sectional shape may, of course, also be integrally formed in a core body of the oar handle, which may or may not be integrated with the shaft of the sweep-rowing oar as described above.

[0086] Fig.6 shows a perspective view of a sweep rowing oar 200 according to a further embodiment, as seen end-on along a shaft 201 and towards a blade 102 of the oar 200, showing in particular an oar handle 203 of the oar 200 from below. The sweep-rowing oar 200 has a shaft 201 with a blade 202 at one end, and an oar handle 203 at the opposite end. The shaft 201 furthermore carries a collar 204 with a button 205. The oar handle 203

comprises a first grip 210 with upper and lower front side protrusions 212, 213 over a first cylindrical core, and a second grip with rear side protrusion 221 as well as upper and lower front side protrusions 222, 223 over a second cylindrical core.

[0087] The sweep-rowing oar 200 shown in Fig.6 corresponds to the sweep-rowing oar 100 shown in Figs. 3-5, apart from the transverse cross-sectional shapes of the first and second grips 210, 220 varying in a longitudinal direction over the width of the first and second grips, respectively. More particularly, the perimeter of the transverse cross-sectional shapes of the first and second grips 210, 220 is gradually varied in a longitudinal direction along the oar 200 so as to decrease in a direction from the index finger towards the little finger, respectively. As shown here, the transverse cross-sectional shapes of the first and second grips 210, 220 taper off in a longitudinal direction, to reduce a height of the protrusions 212, 213, 221, 222, 223 in a direction from the index finger towards the little finger, as best seen in a comparison between Fig.5 and Fig.6. The rounded upper and lower front side protrusions 212, 213 of the first grip 210 thus decrease in height from a first grip inner end 214 towards a first grip outer end 215. Furthermore, the rounded upper and lower front side protrusions 222, 223, as well as the rear side protrusion 221 of the second grip 220 decrease in height from a second grip outer end 224 towards a second grip inner end 215. Thereby, the athlete operating the oar has the possibility to grip the first and second grips 210, 220 of the oar handle 203 at different longitudinal positions according to preference and/or according to the size of the hands of the athlete.

[0088] The peak of the protrusions on the first and second grips 110, 210, 120, 220 of the oars 100, 200 is rounded off to provide conveniently rounded gripping edges on the oar handles 103, 203. A convenient radius of curvature at the peak of the protrusions is at least 3 mm, or at least 4 mm, or at least 5 mm, and up to 8 mm, up to 10mm, or up to 12 mm. Furthermore, for a core diameter of the cylindrical base shape of between 25mm and up to 40mm a height of the protrusions over the circular core as seen in a radial direction is typically between 2 mm and up to 8 mm, with the constraint to match a pre-determined perimeter of the transverse cross-sectional shape at a given longitudinal position on the oar handle. The pre-determined perimeter may be kept constant along the respective grips, or may be gradually changed (tapered geometry). As mentioned above, a perimeter of the transverse cross-sectional shape of the first and second grips of the oar handle may be at least 9 cm, and up to 13 cm, wherein in a longitudinally tapered grip geometry the perimeter of the first and second grips may gradually vary in a predetermined sub-range thereof, along the longitudinal direction of the oar handle as also mentioned above.

Claims

1. Oar handle for a sweep-rowing oar, the sweep rowing oar having a shaft carrying a blade on one end as seen in a longitudinal direction of the shaft, the shaft further being adapted for carrying the oar handle on an opposite end thereof; wherein during a drive phase of a rowing stroke a front side of the oar handle faces away from an athlete operating the oar, and a rear side of the oar handle faces towards the athlete; the oar handle comprising:

a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at the rear side of the oar handle;

characterized in that the oar handle further comprises:

a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the oar handle.

2. Oar handle according to claim 1, wherein the first grip is an outer grip arranged at an outer portion of the oar handle for gripping by an outer hand, and wherein the second grip is an inner grip arranged at an inner portion of the oar handle for gripping by an inner hand.
3. Oar handle according to any of the preceding claims, wherein the first cross-sectional shape is flattened at a front side thereof.
4. Oar handle according to claim 3, wherein the first cross-sectional shape has two front side protrusions (212, 213) arranged to form the flattened front side.
5. Oar handle according to claim 4, wherein a height of one or both of the two front side protrusions (212, 213) over a circular core of the first grip (210) decreases in a longitudinal direction from a first grip inner end (214) towards a first grip outer end (215).
6. Oar handle according to any of the preceding claims, wherein the second cross-sectional shape is flattened at a front side thereof.
7. Oar handle according to claim 6, wherein the second cross-sectional shape has two front side protrusions arranged to form the flattened front side.
8. Oar handle according to claim 7, wherein a height of one or both of the two front side protrusions (222, 223) over a circular core of the second grip (220)

decreases in a longitudinal direction from a second grip outer end (225) towards a second grip inner end (224).

is an oar handle for a sweep-rowing oar according to any one of claims 1-12.

9. Oar handle according to any of the preceding claims, wherein a height of the rear side protrusion (221) over a circular core of the second grip (210) decreases in a longitudinal direction from a second grip outer end (225) towards a second grip inner end (224). 5
10
10. Oar handle according to any of the preceding claims, wherein a height of the protrusions (112, 113, 121, 122, 123, 212, 213, 221, 222, 223) over a circular core is up to 15 mm, up to 12 mm, up to 10 mm, or between 2 mm and 8 mm. 15
11. Oar handle according to any of the preceding claims, wherein a perimeter of the first grip (210) decreases in a longitudinal direction from a first grip inner end (214) towards a first grip outer end (215). 20
12. Oar handle according to any of the preceding claims, wherein a perimeter of the second grip (220) decreases in a longitudinal direction from a second grip outer end (225) towards a second grip inner end (224). 25
13. Device for manual operation by a user, the device comprising a shaft defining a longitudinal direction of the device, and a handle arranged on the shaft, the handle facilitating the user to connect to the device with two hands, wherein during operation of the device a front side of the handle faces away from a user operating the device, and a rear side of the handle faces towards the user; the handle comprising: 30
35
a first grip having a first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the first cross-sectional shape is substantially circular at the rear side of the handle; 40
characterized in that the handle further comprises:
a second grip having a second cross-sectional shape different from the first cross-sectional shape as seen in a transverse plane perpendicular to the longitudinal direction, wherein the second cross-sectional shape comprises a rear side protrusion at the rear side of the handle. 45
50
14. Device according to claim 13, wherein the device is a sweep rowing oar comprising a blade on a first end of the shaft as seen in a longitudinal direction along the shaft, and wherein the handle is an oar handle arranged on a second end of the shaft opposite of the first end. 55
15. Device according to claim 14, wherein the oar handle

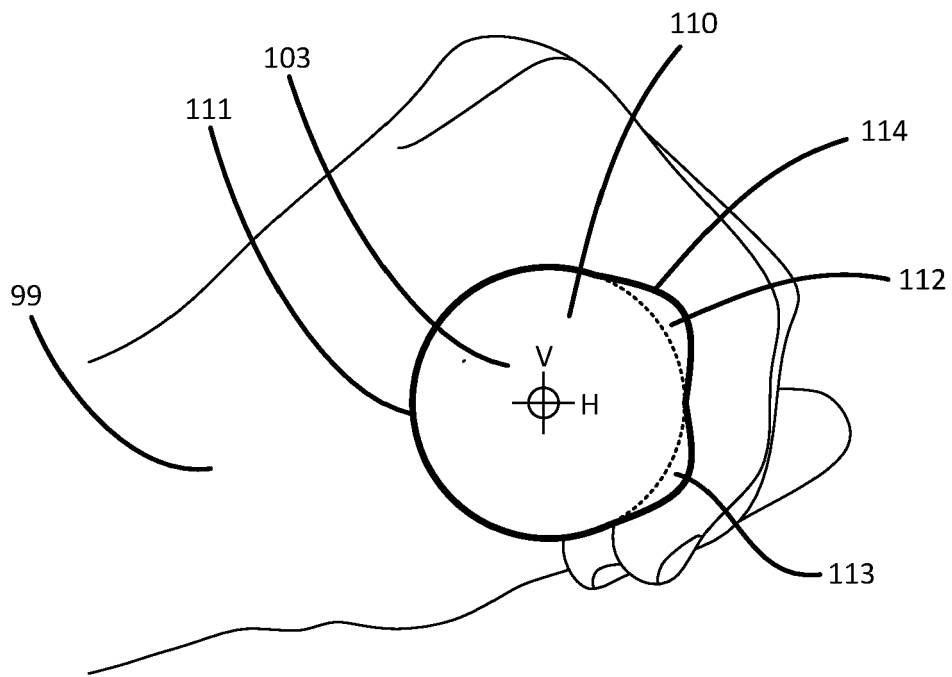


Fig. 1

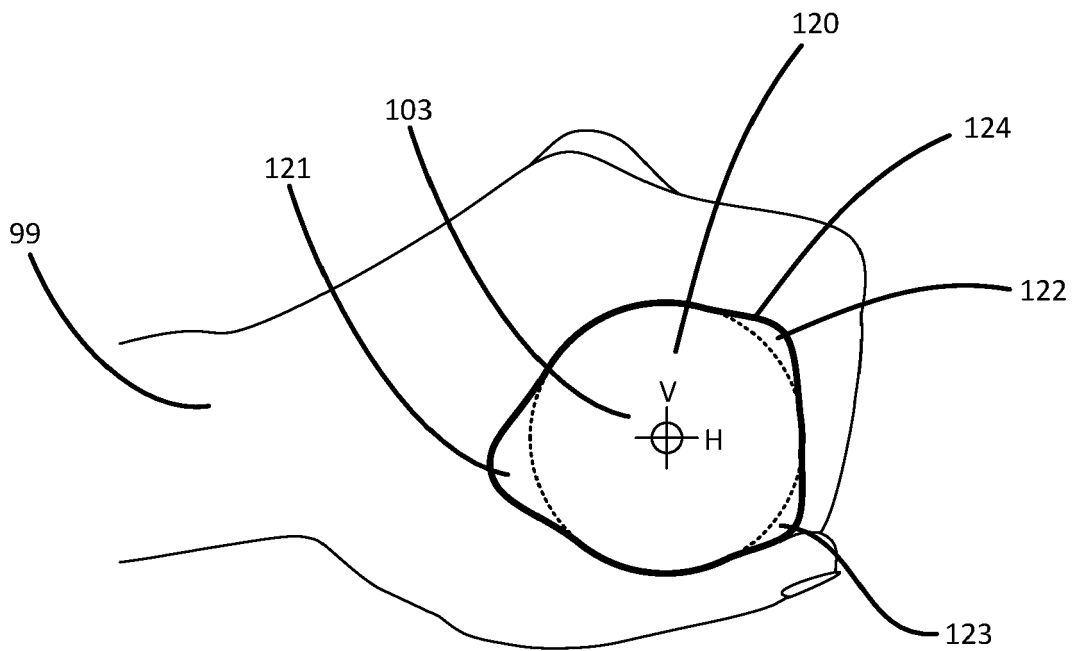


Fig. 2

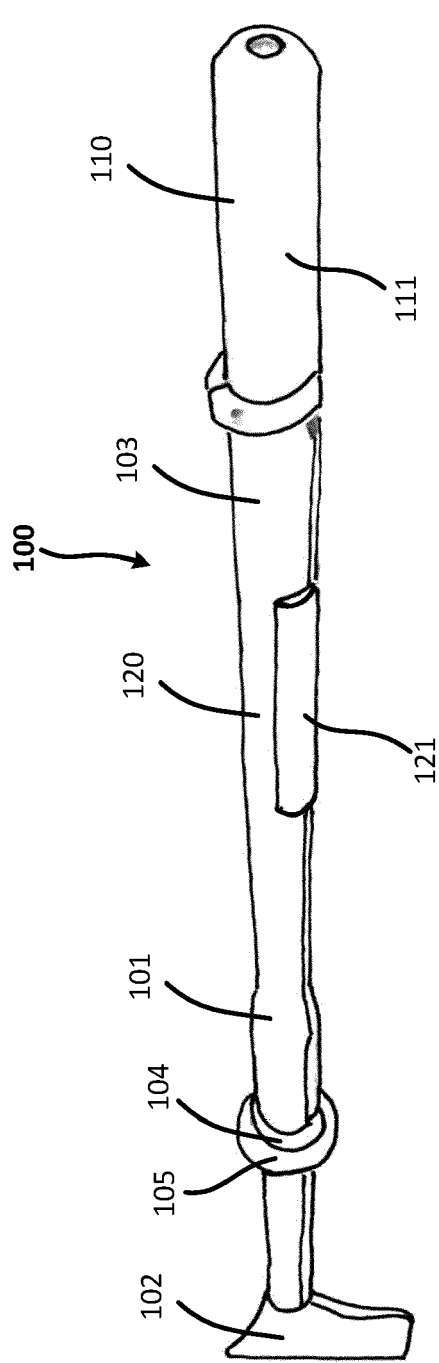


Fig. 3

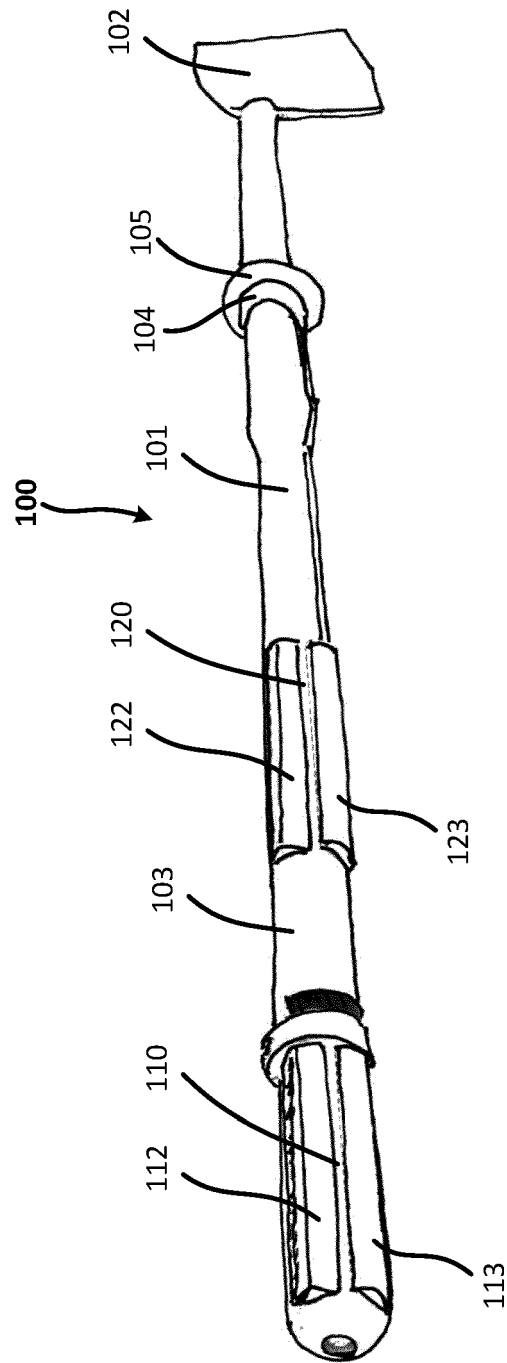


Fig. 4

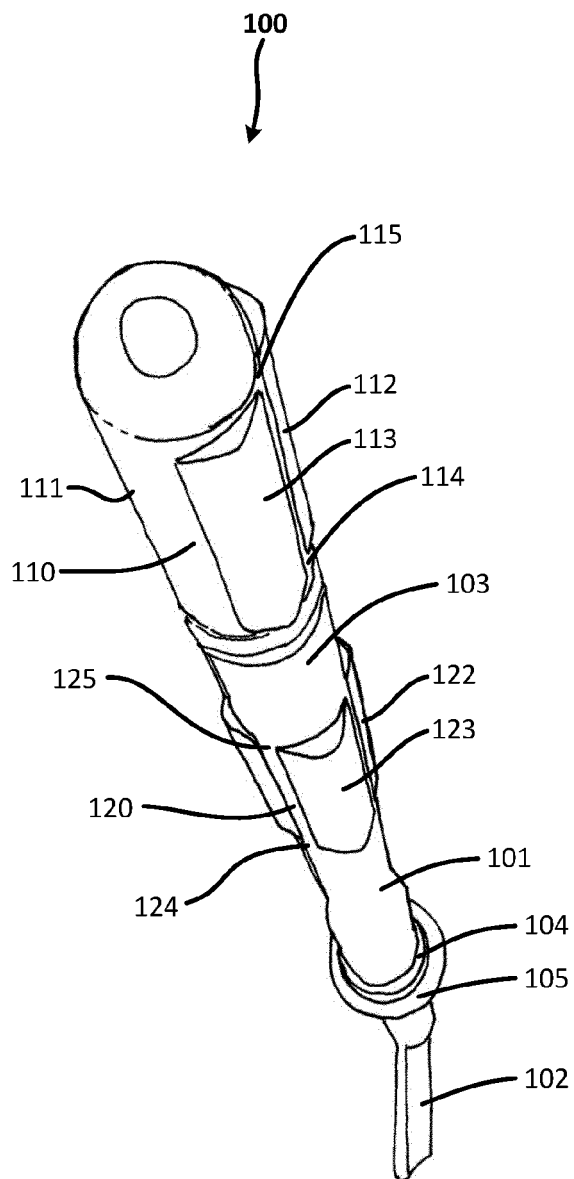


Fig. 5

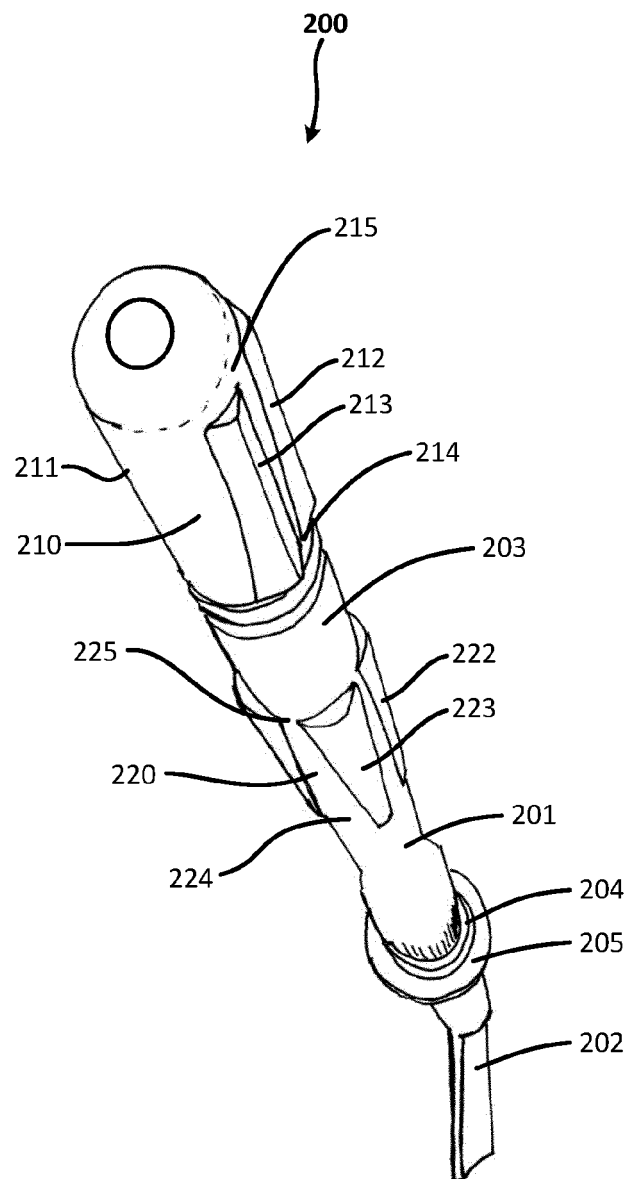


Fig. 6



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 19 8228

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 328 617 B1 (GUNNELL LANCE F [US]) 11 December 2001 (2001-12-11) * column 3, line 44 - line 50 * * column 5, line 64 * * figures 1,5,6 *	1,2,9, 10,12,13 3-8,11, 14,15	INV. B63H16/04
A	----- US 6 537 117 B1 (LARSON BRAD J [US] ET AL) 25 March 2003 (2003-03-25) * column 5, line 4 * * column 7, line 55 * * figure 8 *	1,2,9, 10,12,13	
A	----- GB 1 308 605 A (WILSON PRESTWICK LTD) 21 February 1973 (1973-02-21) * page 1, line 75 - page 2, line 2 * * page 2, line 40 - line 47 * * figures 1-3 *	1-15	
A	----- US 282 856 A (MICHAEL F. DAVIS) 7 August 1883 (1883-08-07) * page 1, line 80 - line 90 * * figure 1 *	1-15	TECHNICAL FIELDS SEARCHED (IPC)
A	----- US 2006/286878 A1 (WEBB EMILY [GB]) 21 December 2006 (2006-12-21) * paragraph [0004] - paragraph [0005] * * paragraph [0012] * * paragraph [0015] * * paragraph [0021] * * paragraph [0025] *	1-15	B63H
A	----- US 2008/254691 A1 (SCOTT RICHARD A [US]) 16 October 2008 (2008-10-16) * paragraph [0033] * * figure 11 *	1-15	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 March 2021	Examiner Roldán Abalos, Jaime
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

 1
 EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 19 8228

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-03-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6328617	B1	11-12-2001	NONE
US 6537117	B1	25-03-2003	NONE
GB 1308605	A	21-02-1973	NONE
US 282856	A	07-08-1883	NONE
US 2006286878	A1	21-12-2006	AU 2006201895 A1 23-11-2006 CA 2545888 A1 05-11-2006 DE 102006021349 A1 09-11-2006 GB 2425762 A 08-11-2006 US 2006286878 A1 21-12-2006
US 2008254691	A1	16-10-2008	NONE

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 348995 A [0007]
- US 9346528 B2 [0007]
- US 20080146099 A1 [0009]