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(54) **A STRENGTH TRAINING BAR WITH TRANSLATIONAL AND ROTATABLE HANDGRIPS**

(57) A strength training bar (1) comprising:
- a bar (100), extending along a longitudinal direction (10) and adapted to support weights (3);
- at least two handgrips (201;202), adapted to rotate with respect to said bar (100) and to be fixable in a releasable manner to said bar in multiple predetermined rotating positions (301) with respect to said bar (100); each of said at least two handgrips (201;202) further being adapted to be fixable in a releasable manner at multiple predetermined translational positions (302) along said longitudinal direction (10) of said bar (100).

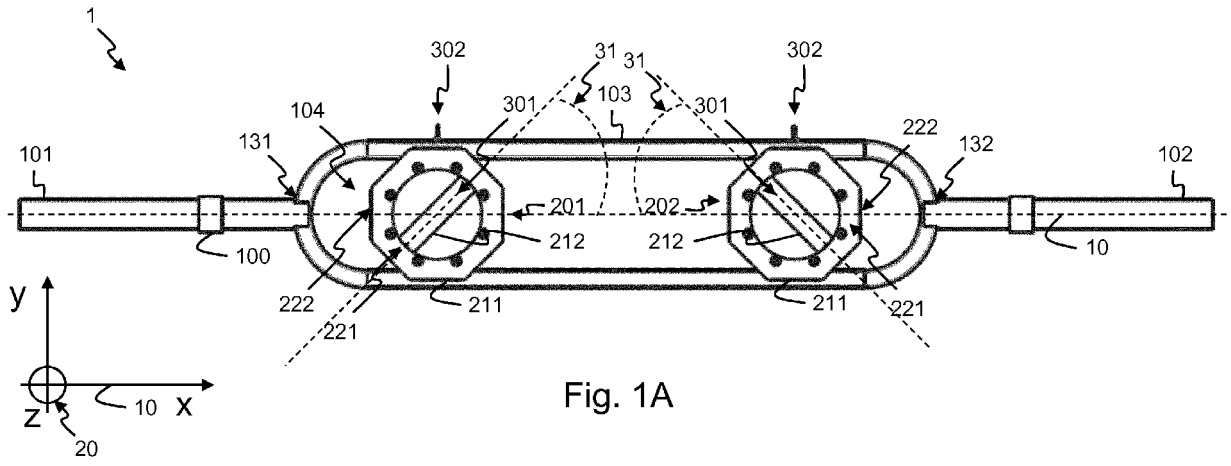

Fig. 1A

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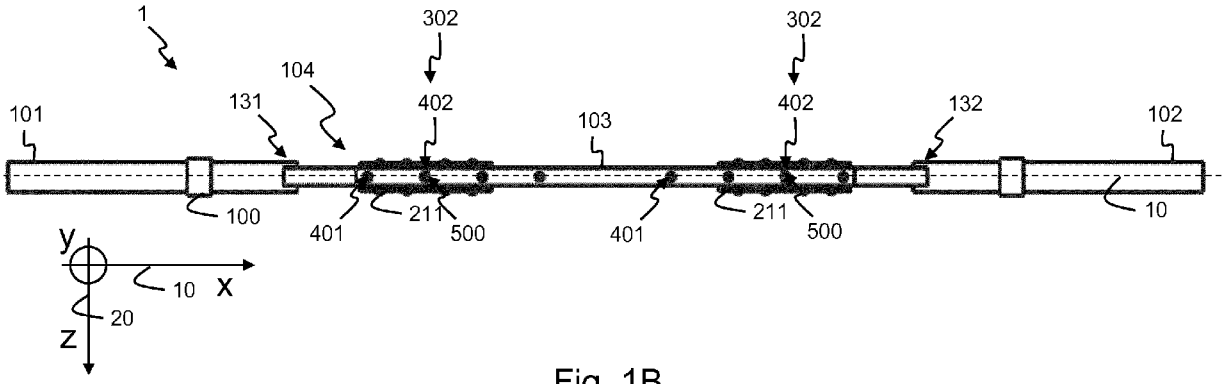
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Fig. 1B

Description

Field of the Invention

[0001] The present invention generally relates to fitness bars or barbells used for muscular strength training.

Background of the Invention

[0002] Strength training is a type of physical exercise specializing in the use of resistance to induce muscular contraction which builds the strength, the anaerobic endurance and the size of skeletal muscles. Strength training provides significant functional benefits and improvement in overall health and well-being, including increased bone, muscle, tendon, and ligament strength and toughness, improved joint function, reduced potential for injury, increased bone density, increased metabolism, increased fitness and improved cardiac function. Training commonly uses the technique of progressively increasing the force output of the muscle through incremental weight increases and uses a variety of exercises and types of equipment to target specific muscle groups.

[0003] Sports where strength training is of high importance are bodybuilding, weightlifting, powerlifting, strongman, Highland games, shot put, discus throw, and javelin throw. Many other sports use strength training as part of their training regimen, such as for example tennis, American football, wrestling, track and field, rowing, lacrosse, basketball, pole dancing, hockey, professional wrestling, rugby union, rugby league, and soccer. Strength training for other sports and physical activities is becoming increasingly popular.

[0004] When it comes to strength training, barbells are efficient tools. Barbells functionally challenge the muscles, the joints, and the balance all at once, which research has proven can lead to significant strength gains compared to traditional exercises. A barbell is a piece of exercise equipment used in weight training, bodybuilding, weightlifting and powerlifting, wherein the barbell comprises a bar and usually further comprises weights attached at each end of the bar. For example, weight plates can be slid onto the outer portions of the bar to increase or decrease the desired total weight. A men's Olympic bar typically comprises a 2m20 long metal bar, for example a steel bar, with grooved or knurled handgrips. A women's Olympic bar is similar to a men's bar but is typically shorter with a smaller grip section diameter. Olympic bars demonstrate a suitable whip, i.e. an ability to store elastic energy, and they can support incremental weight plates at both ends up to a total of 220kg. Collars are used to prevent plates from moving outward unevenly so that the lifter does not experience uneven force.

[0005] Specialty barbells come in all shapes and sizes which adds variety to the training and allows working around muscular limitations or injuries. Other strength training bars, such as for example a Standard bar, a Squat bar, a Deadlift bar, a Bench Press bar, etc. differ from the Olympic fitness bar in length, thickness of the handgrips, cross-section of the bar, etc.. Bars comprising vertical handles also exist, such as for example a trap bar, a Swiss bar, a EZ Curl bar, etc., and are for example used to make strength exercising easier on the joints, for example by making exercises more shoulder-friendly.

[0006] Even though existing bars are designed to train weightlifting and bench pressing, each bar can only be used for a limited number of exercises, and each exercise only trains a limited number of muscles. For example, a bench press is typically used for training strength of chest muscles, while a barbell is typically used for training strength of shoulders and arm and legs muscles, while a pull up bar is typically used for training strength of abdominal muscles. In other words, a wide variety of equipment is necessary to train several muscles and/or to perform many training exercises. Additionally, strength training bars usually demonstrate standardized designs such that one bar fits several morphologies and such that multiple users may perform training exercises with the same bar. This results in a lack of flexibility of the equipment used for strength training. Also, the fact that each bar fits several morphologies limits the ergonomics of the strength training bars.

[0007] It is an objective of the present invention to disclose a device that overcomes the above identified shortcomings of existing solutions. More particularly, it is an objective to disclose a strength training bar which can be used for a great variety of training exercises and which enables training a greater variety of muscles in the upper and/or in the lower body through multiple training exercises, while remaining compatible with weight plates and lifting racks that already exist in fitness and training and sporting centres.

Summary of the Invention

[0008] According to a first aspect of the present invention, the above defined objectives are realized by a strength training bar comprising:

- a bar, extending along a longitudinal direction and adapted to support weights;
- at least two handgrips, adapted to rotate with respect to the bar and to be fixable in a releasable manner to the bar in multiple predetermined rotating positions with respect to the bar; each of the at least two handgrips further being adapted to be fixable in a releasable manner at multiple predetermined translational positions along the longitudinal direction of the bar.

[0009] The strength training bar according to the present invention can be used to exercise a plurality of muscles via a plurality of training exercises. To each training exercise correspond a predetermined rotating position and/or a predetermined translational position of the

handgrips of the strength training bar. In other words, only one strength training bar according to the present invention is necessary to exercise different muscles and/or to perform several training exercises, wherein each training exercise trains one or more muscles. For example, the strength training bar according to the present invention can be used to exercise muscles from the upper body and/or to exercise muscles from the lower body, for example by lifting the strength training bar and performing bending movements of the arms and/or of the legs carrying or supporting the weight of the strength training bar. This improves the efficiency of an exercising session during which a user of the strength training bar according to the present invention can exercise the strength of several muscles using only one fitness bar.

[0010] Each predetermined rotating position and each predetermined translational position corresponds to specific muscles that are trained when using the strength training bar with handgrips at these respective positions.

[0011] The design of the strength training bar according to the present invention brings several advantages. First, the design of the strength training bar is made flexible and can be modified thanks to the presence of handgrips which are fixable to the bar in multiple predetermined rotating positions and at multiple predetermined translational positions along the bar. In other words, the position of the handgrips on the bar and their inclinations with respect to the bar can be adapted and adjusted such that one user of the strength training bar according to the present invention exercises multiple muscles, and also such that multiple users of a single strength training bar according to the present invention can exercise multiple muscles using the same strength training bar. The strength training bar according to the present invention fits different users. This allows multiple users to exercise with the same strength training bar even though they do not have for example the same shoulder span or the same shoulder breadth or the same need to train the same muscles via the same training exercises. The design of the strength training bar according to the present invention therefore allows a flexible personalization of strength training bar to the morphology of the user of the bar by allowing the user to rotate the handgrips to different predetermined rotating positions with respect to the bar and/or to translate the handgrips to different predetermined translational positions along the bar, thereby adapting the design strength training bar to his/her morphology. This improves the ergonomics of the strength training bar, this brings comfort to all the users of the strength training bar during their respective exercising sessions and this also reduces the risk of injuries during exercising sessions as it is easy to modify the position of the handgrips on the bar to exercise different muscles.

[0012] The strength training bar according to the present invention is further compatible with weights and lifting racks which already exist in fitness centers and sporting centres. The strength training bar according to the present invention further complies with safety requirements of sporting centres.

[0013] A strength training bar according to the present invention is for example a barbell, a Standard bar, a Squat bar, a Deadlift bar, a Bench Press bar, an Olympic fitness bar, a trap bar, a Swiss bar, a EZ Curl bar, etc.. A strength training bar is for example a fitness bar, i.e. a bar used for strength training in fitness centers, in gyms or sporting centres.

[0014] The handgrips are fixed to the bar in a releasable manner such that the handgrips remain in a fixed position at a predetermined translational position and in a predetermined rotating position during an exercise, and each handgrip is releasable from the predetermined translational position and the predetermined rotating position in between two exercises such that each handgrip can be fixed to the bar in a different predetermined translational position and/or in a different predetermined rotating position. The handgrips can be fixed in a releasable manner independently from each other in predetermined rotating positions and/or at predetermined translational positions. Alternatively, the handgrips can rotate with respect to the bar in a coordinated movement with respect to each other and/or the handgrips can translate along the bar in a coordinated movement with respect to each other. For example, the handgrips can be rotated with respect to the bar in a mirror movement with each other with respect to the middle of the bar. For example, the handgrips can be translated with respect to the bar in a mirror movement with each other with respect to the middle of the bar. The handgrips for example can slide along the longitudinal direction of the bar. The handgrips for example can slide independently from one another along the longitudinal direction of the bar. Alternatively, the handgrips can be released from the bar and slide in a coordinated movement with respect to each other. For example, the handgrips can be released from the bar and slide with respect to the bar in a mirror movement with each other with respect to the middle of the bar. Alternatively, the handgrips can be separated from the bar and each handgrip can be repositioned at a different predetermined translational position.

[0015] According to an optional aspect of the invention, each of the handgrips is fixable in a releasable manner in four different predetermined rotating positions with respect to the bar.

[0016] Each predetermined rotating position and each predetermined translational position corresponds to specific muscles that are trained when using the strength training bar with handgrips at these respective positions.

[0017] According to an optional aspect of the invention:

- each of the at least two handgrips is adapted to rotate around an axis traverse the longitudinal direction;
- the multiple predetermined rotating positions correspond to an angle of:
    - 0 degree;
    - 45 degrees;

◦ 90 degrees;
◦ -45 degrees;

formed between each of the at least two handgrips and the longitudinal direction when each of the at least two handgrips is fixed in a releasable manner to the bar.

[0018] This way, each handgrip can be fixed to the bar in a releasable manner traverse to the longitudinal direction of the bar when the handgrip is fixed such that the angle formed between the handgrip and the longitudinal direction is equal to 90 degrees. For example, with handgrips under an angle of 0 degree with respect to the longitudinal direction of the bar, a user of the bar exercises his/her biceps and his/her triceps. Each handgrip can be fixed to the bar in a releasable manner parallel to the longitudinal direction of the bar when the handgrip is fixed such that the angle formed between the handgrip and the longitudinal direction is equal to 0 degree. For example, with handgrips under an angle of 0 degree with respect to the longitudinal direction of the bar, a user of the bar exercises his/her biceps and his/her triceps. Alternatively, each handgrip can be fixed to the bar in a releasable manner under an angle of 45 degrees with respect to the longitudinal direction of the bar when the handgrip is fixed such that the angle formed between the handgrip and the longitudinal direction is equal to +/-45 degrees. For example, with handgrips under an angle of +/-45 degrees with respect to the longitudinal direction of the bar, a user of the bar exercises his/her biceps and his/her dorsal muscles. Each predetermined rotating position corresponds to specific muscles that are trained when using the strength training bar with handgrips at these respective predetermined rotating positions.

[0019] According to an optional aspect of the invention, the bar comprises:

- a first bar end, adapted to support one or more weights;
- a second bar end, adapted to support one or more weights;
- a middle bar section comprising an oval shape, wherein the oval shape extends along the longitudinal direction; and wherein the middle bar section is connected on a first end to the first bar end and connected on a second end opposite to the first end to the second bar end; and wherein the middle bar section comprises bar punch holes formed at the multiple predetermined sliding positions along the bar, wherein the bar punch holes are adapted to receive a locking pin;

and wherein each of said at least two handgrips comprises:

- a handgrip profile, wherein an outer diameter of the handgrip profile fits the oval shape of the middle bar section; and wherein the outer diameter of the handgrip profile comprises handgrip punch holes, each of the handgrip punch holes being adapted to receive a locking pin; and
- a handle fitting the handgrip profile.

[0020] This way, the strength training bar comprises a middle bar section comprising an oval shape in which at least two handgrips fit. Each handgrip can further translate along the longitudinal directional of the bar in the oval shape of the middle bar section. In other words, the oval shape of the middle bar section forms a guide along which the handgrips of the strength training bar can translate. The bar punch holes are distributed along the entire length of the oval shape of the middle bar section. The handgrip punch holes are defined such that at least one handgrip punch hole coincides with at least one bar punch hole of the oval shape of the middle bar section such that the handgrip can be fixed in a releasable manner to the middle bar section when a locking pin is inserted in the punch holes. Additionally, the oval shape of the middle bar section brings stiffness and mechanical strength to the strength training bar and makes the strength training bar compatible with lifting racks already existing in fitness centers. One or more weights can be supported on each end of the bar along the longitudinal direction, thereby distributing the weights along the longitudinal direction of the bar.

[0021] According to an optional aspect of the invention:

- each of the handgrip profiles is adapted to be translated in the oval shape along the longitudinal direction of the bar; and
- each of the handgrip profiles is adapted to be fixed in a releasable manner to the bar at multiple predetermined translational positions along the longitudinal direction.

[0022] This way, each handgrip profile can rotate with respect to the longitudinal direction and can be translated along the longitudinal direction and can be fixed in a releasable manner at each predetermined translational position along the bar in a predetermined rotation position, thereby offering a broad arrangement possibility of the handgrips and a broad scope of exercises. Alternatively, each handgrip profile can be fixed in a releasable manner at each predetermined translational position along the bar in particular predetermined rotation positions, thereby focusing on the exercise of a particular set of muscles and/or focusing on a particular set of exercises. Each of the handgrip profiles is for example adapted to slide in the oval shape along the longitudinal direction of the bar.

[0023] According to an optional aspect of the invention:

- each of the handgrip profiles comprises a regular, octagonal profile;
- the handgrip punch holes are formed in each side of the regular, octagonal profile; and

- each of the handles is fixed onto the respective regular, octagonal profile such that the handle interconnects two opposite sides of the regular, octagonal profile.

[0024] Alternatively, each of the handgrip profiles comprises an octagonal profile. The handgrip punch holes are for example formed in the middle of each side of the regular, octagonal profile. Alternatively, the handgrip punch holes are for example formed on each apex of the regular, octagonal profile. Each of the handles is fixed onto the respective regular, octagonal profile such that the handle interconnects the middle of two opposite sides of the regular, octagonal profile. This way, the handgrips demonstrate structural and mechanical strength which resists the weight of the bar supporting weights when a user lifts the bar and performs flexion exercises while carrying the strength training bar. The handles can be used to make their respective handgrip profiles rotate with respect to the longitudinal direction of the bar.

[0025] According to an optional aspect of the invention, the handgrip punch holes are formed such that each of the handgrip profiles is fixed in a releasable manner to the bar in one of said multiple predetermined rotating positions with respect to the bar when one of the handgrip punch holes coincides with one of the bar punch holes and when a locking pin fits in the handgrip punch hole coinciding with one of the bar punch holes.

[0026] This way, each handgrip can be securely fixed in a releasable manner in a predetermined rotating position and at a predetermined translational position when a locking pin is inserted in a handgrip punch hole coinciding with a bar punch hole. This ensures the handgrips do not rotate with respect to the longitudinal direction of the bar nor translate along the longitudinal direction of the bar during a strength training exercise. This minimizes the risk of injuries.

[0027] According to an optional aspect of the invention:

- each outer diameter of the handgrip profiles is adapted to translate in the oval shape of the middle bar section along the longitudinal direction of the bar;
- each of the handgrip profiles further comprises:
    - a rotating ring adapted to rotate with respect to the outer diameter of the handgrip profile; wherein the rotating ring comprises an outer ring diameter comprising semi-circular protrusions;
    - a plurality of actuating means fixed to the respective handgrip profile between the outer ring diameter and the outer diameter;
    - a plurality of locking pins; wherein each locking pin is fixed to one of the actuating means; and wherein each locking pin fits in the handgrip punch holes;
- each of the handles is fixed on to the handgrip profile such that the handle interconnects two opposite handgrip punch holes of the outer diameter;
- each of the handgrip profiles further comprises a locking mechanism, wherein the locking mechanism is adapted to:
    - allow the respective handgrip profile to translate in the oval shape along the longitudinal direction of the bar when the rotating ring is rotated with respect to the outer diameter such that the semi-circular protrusions are positioned between two consecutive handgrip punch holes, thereby allowing the actuating means to pull the locking pins inwards such that the locking pins are released from the handgrip punch holes;
    - fix the respective handgrip profile in a releasable manner at one of the multiple predetermined translational positions along the longitudinal direction of said bar and in one of the predetermined rotating positions with respect to the bar when the rotating ring is rotated with respect to the outer diameter such that the semi-circular protrusions push the actuating means outwards such that the locking pins fit through the handgrip punch holes.

[0028] This way, translating the handgrip profiles and/or rotating the handgrip profiles is made easy. Modifying the position of the handgrips of the strength training bar is made semi-automatic. All the locking pins of a handgrip profile can be indeed simultaneously released from the handgrip punch holes and the bar punch holes, thereby releasing the handgrip profile at once from the bar by actuating the locking mechanism which allows the handgrip profile to translate along the longitudinal direction of the bar. This allows a user of the strength training bar to fully enjoy the adaptive and flexible character of the strength training bar according to the present invention. The semi-circular protrusions are regularly defined along the outer ring diameter of the rotating ring. The handgrip punch holes are for example periodically distributed along the outer diameter of the handgrip, and the semi-circular protrusions are distributed along the outer ring diameter according to the same period than the handgrip punch holes along the outer diameter. Alternatively, the handgrip profiles comprise a plurality of springs between the outer ring diameter and the outer diameter, wherein the springs are adapted to pull the locking pins inwards thereby releasing the locking pins are the handgrip punch holes when the semi-circular protrusions are positioned between two consecutive handgrip punch holes in an unlocked state of the locking mechanism, and wherein the semi-circular protrusions are further adapted to push the springs such that the springs push the locking pins in the handgrip punch holes when the semi-circular protrusions coincide with the handgrip punch holes in a locked state of the locking mechanism.

[0029] According to an optional aspect of the invention, each of the handgrip profiles further comprises a locking

through path adapted to host a respective locking mechanism; and wherein each of the locking mechanisms comprises a bistable locking mechanism.

[0030] This way, the handgrip profiles are securely fixed to the bar at a predetermined translational position and in a predetermined rotating position when a user of the strength training bar uses it. With the bistable locking mechanism, the risk that the handgrips of the strength training bar translate and/or rotate during exercise is minimized as the locking mechanism fixes the respective handgrip. This reduces the risk of injuries during exercise.

[0031] Bistability is understand as work done on the bistable locking mechanism to move it just past the peak, at which point the bistable locking mechanism goes "over centre" to its secondary stable position. The result is a toggle-type action- work applied to the bistable locking mechanism below a threshold sufficient to send it 'over center' results in no change to the mechanism's state. Springs are a known method of achieving an "over centre" action. A spring attached to a simple two position ratchet-type mechanism can create a bistable locking mechanism that is clicked or toggled between two mechanical states.

[0032] According to an optional aspect of the invention, the locking through path comprises a locking point and a locking guide connected to the locking point; and wherein each of the bistable locking mechanisms comprises:

- a knob;
- a spring adapted to translate between the locking point and the locking guide in the locking through path;
- a locking ring arranged between the knob and the spring, adapted to:
    - ◦ fit in a releasable manner in the locking point when the rotating ring is rotated with respect to the outer diameter such that the semi-circular protrusions push the actuating means outwards such that the locking pins fit through the handgrip punch holes, thereby fixing the handgrip profile in a releasable manner to the bar in one of the predetermined rotating positions with respect to the bar and at one of the predetermined translational positions along the longitudinal direction of the bar;
    - ◦ rest in a releasable manner on the locking guide when the rotating ring is rotated with respect to the outer diameter such that the semi-circular protrusions are positioned between two consecutive handgrip punch holes, thereby allowing the actuating means to pull the locking pins inwards such that the locking pins are released from the handgrip punch holes, thereby allowing the handgrip profile to rotate with respect to the bar and to be translated along the longitudinal direction of the bar.

[0033] According to an optional aspect of the invention, each of the at least two handgrips comprises:

- a translational section adapted to translate along the longitudinal directional of the bar and further adapted to be fixed to the bar in a releasable manner at the multiple predetermined translational positions along the longitudinal direction;
- a base section adapted to be fixed onto the translational section in a releasable manner in multiple predetermined rotating positions with respect to the bar; and wherein the base section is further adapted to support one or more weights; and
- a handle fixedly mounted onto the base section.

[0034] This way, each translational section can translate along the longitudinal directional of the bar. In other words, the bar forms a translation guide along which the translational sections of the strength training bar can translate. One or more weights can be supported on base section. Each handle is fixedly mounted onto the base section. This ensures the handles do not rotate with respect to the longitudinal direction of the bar nor translate along the longitudinal direction of the bar during a strength training exercise. This minimizes the risk of injuries.

[0035] According to an optional aspect of the invention:

- the bar comprises a plurality of translational engagement recesses formed at the multiple predetermined translational positions along the bar, each translational engagement recess being adapted to fit a translation locking pin; and
- each of the translational sections comprises a translation locking pin, adapted to engage in a releasable manner in the translational engagement recesses of the bar, thereby fixing said respective translational section to the bar in a releasable manner at one of the predetermined translational positions along the longitudinal direction when the translation locking pin fits in one of the translational engagement recesses.

[0036] The translational engagement recesses are evenly distributed along the entire length of the bar. Alternatively, the translational engagement recesses are closer to each other close to the middle of the strength training bar. The translation locking pin fits in every translational engagement recess, thereby securely fixing in a releasable manner its respective translational section to the bar. For example, the translational sections are clicked onto the bar.

[0037] According to an optional aspect of the invention:

- each of the base section further comprises a rotation locking pin; and
- each of the translational sections further comprises

punch holes adapted to receive a rotation locking pin of the respective base section, wherein the punch holes are formed such that an angle of:

- 0 degree;
- 45 degrees;
- 90 degrees;
- -45 degrees;

is formed between the handle and the longitudinal direction when a rotation locking pin of the respective base section engages in a releasable manner in one of the punch holes, thereby fixing the respective base section to the translational section in a releasable manner in one of the predetermined rotating positions with respect to the bar.

[0038] This way, each base section can be fixed onto a respective translational section in a releasable manner such that the angle formed between the handle and the longitudinal direction is equal to 90 degrees. For example, the base sections are clipped onto the respective translational sections when a rotation locking pin of the respective base section engages in a releasable manner in one of the punch holes of the respective translational section. With handles under an angle of 0 degree with respect to the longitudinal direction of the bar, a user of the bar for example exercises his/her biceps and his/her triceps. Each base section can be fixed onto a respective translational section in a releasable manner such that the angle formed between the handle and the longitudinal direction is equal to 0 degree. For example, with handles under an angle of 0 degree with respect to the longitudinal direction of the bar, a user of the bar exercises his/her biceps and his/her triceps. Alternatively, each handle can be fixed to the bar in a releasable manner under an angle of 45 degrees with respect to the longitudinal direction of the bar when the handle is fixed such that the angle formed between the handle and the longitudinal direction is equal to +/-45 degrees. For example, with handles under an angle of +/-45 degrees with respect to the longitudinal direction of the bar, a user of the bar exercises his/her biceps and his/her dorsal muscles. Each predetermined rotating position corresponds to specific muscles that are trained when using the strength training bar with handles at these respective predetermined rotating positions.

[0039] According to an optional aspect of the invention, the bar has a circular cross-section.

[0040] This makes the strength training bar compatible with weight plates and lifting racks already existing in fitness centers.

[0041] According to an optional aspect of the invention, the bar has a triangular cross-section.

[0042] This makes the strength training bar compatible with weight plates and lifting racks already existing in fitness centers.

[0043] According to an optional aspect of the invention, the strength training bar further comprises one or more locking pins.

[0044] According to an optional aspect of the invention, the strength training bar further comprises one or more weights.

[0045] According to a second aspect of the invention, there is provided a use of a strength training bar according to a first aspect of the invention for training strength, wherein:

- each of the handgrips is set in a predetermined rotating position with respect to the bar by rotating the handgrip with respect to the bar and by fixing the handgrip in a releasable manner to the bar in the predetermined rotating position;
- each of the handgrips is further set in a predetermined translational position along the longitudinal direction of the bar by translating the handgrip along the longitudinal direction of the bar and by fixing the handgrip in a releasable manner to the bar in the predetermined translational position.

Brief Description of the Drawings

[0046]

Fig. 1 schematically illustrates an embodiment of a strength training bar according to the present invention. Fig. 1A schematically represents a front view, while Fig. 1B schematically represents a top view and Fig. 1C schematically represents a side view of a strength training bar according to the present invention. Fig. 1D schematically represents a front view of a handgrip profile. Fig. 1E schematically represents a side view of a strength training bar according to the present invention.

Fig. 2A and 2B respectively schematically illustrates the magnitude of the displacement and of the stress of a strength training bar according to the present invention which comprises one or more weights.

Fig. 3 schematically illustrates an embodiment of a strength training bar according to the present invention.

Fig. 4A schematically illustrates an embodiment of a handgrip according to the present invention. Fig. 4B schematically illustrates an embodiment of a bar according to the present invention.

Fig. 5 schematically illustrates an embodiment of a handgrip according to the present invention.

Fig. 6 schematically illustrates an embodiment of a translational section according to the present invention.

Fig. 7 schematically illustrates an embodiment of a strength training bar according to the present invention.

Fig. 8A, 8B and 8C schematically illustrate an embodiment of a bistable locking mechanism according to the present invention.

Fig. 9A and 9B schematically illustrate an embodiment of a rotating ring and an actuating means according to the present invention.

Fig. 10 schematically illustrates a cross-section of an embodiment of a fixed strength training bar according to the present invention.

Fig. 11 schematically illustrates a cross-section of an embodiment of a released strength training bar according to the present invention.

Detailed Description of Embodiment(s)

[0047] According to an embodiment shown in Fig. 1A, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which each comprise handles 212 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions 301 with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handles 212 of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between each of the handles 212 of the handgrips 201;202 and the longitudinal direction 10 when each of the two handles 212 of the handgrips 201;202 is fixed in a releasable manner to the bar 100. In Fig. 1A, the handgrip 202 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to -45 degrees is formed between the handle 212 of the handgrip 202 and the longitudinal direction 10. According to alternative embodiments, the angle 31 formed between the handgrips 201;202 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. Each of the handgrip profiles comprises a regular, octagonal profile 221. Each handle 212 is fixed onto the respective regular, octagonal profile 221 such that the handle 212 interconnects two opposite sides 222 of the regular, octagonal profile 221. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights.

[0048] According to an embodiment shown in Fig. 1B, which schematically illustrates a top view of the embodiment shown in Fig. 1A, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. Each of the handgrip profiles comprises a regular, octagonal profile 221. Each handle 212 is fixed onto the respective regular, octagonal profile 221 such that the handle 212 interconnects two opposite sides 222 of the

regular, octagonal profile 221. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights. The middle bar section 103 comprises bar punch holes 401 formed at the multiple predetermined translational positions 302 along the bar 100. The bar punch holes 401 are through holes 401. The bar punch holes 401 are adapted to receive a locking pin 500. Also, the handgrip profile 211 comprises handgrip punch holes 402. The handgrip punch holes 402 are through holes. The handgrip punch holes 402 are adapted to receive a locking pin 500. The handgrip punch holes 402 are formed on each handgrip profile 211 in each side 222 of the regular, octagonal profile 221. The handgrip punch holes 402 are formed such that each of the handgrip profiles 221 is fixed in a releasable manner to the bar 100 in one of the multiple predetermined rotating positions 301 with respect to the bar 100 when one of the handgrip punch holes 402 coincides with one of the bar punch holes 401 and when a rotating locking pin 500 fits in the handgrip punch hole 402 coinciding with one of the bar punch holes 401.

[0049] According to an embodiment shown in Fig. 1C, which schematically illustrates a side view of the embodiment shown in Fig. 1A, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions 301 with respect to the bar 100. For example, the handles 212 of the handgrips 201;202 can be rotated with respect to their respective handgrip profiles 211 and with respect to the longitudinal direction 10 of the bar 100. This way, each handle 212 can be fixed in a releasable manner to the bar 100 in multiple predetermined rotating positions 301 with respect to the longitudinal direction of the bar 100. Alternatively, the handgrips can be unmounted and removed from the oval section 104 of the strength training bar 100 and therefore from one first predetermined translational position and/or from one first predetermined rotating position, and further repositioned at a second translational position and/or at a second predetermined rotating position on the strength training bar wherein the second translational position and/or the second predetermined rotating position are different from the first ones. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between each of the handgrips 201;202 and the longitudinal direction 10 when each of the two handgrips 201;202 is fixed in a releasable manner to the bar 100. In Fig. 1C, the handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to 45 degrees is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. In Fig. 1C, the handgrip 202 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to -45 degrees is formed between the handle 212 of the handgrip 202 and the longitudinal direction 10. According to alternative embodiments, the angle 31 formed between the handgrips 201;202 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. Each of the handgrip profiles comprises a regular, octagonal profile 221. Each handle 212 is fixed onto the respective regular, octagonal profile 221 such that the handle 212 interconnects two opposite sides 222 of the regular, octagonal profile 221. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights. The middle bar section 103 comprises bar punch holes 401 formed at the multiple predetermined translational positions 302 along the bar 100. The bar punch holes 401 are through holes 401. The bar punch holes 401 are adapted to receive a locking pin 500. Also, the handgrip profile 211 comprises handgrip punch holes 402. The handgrip punch holes 402 are through holes. The handgrip punch holes 402 are adapted to receive a locking pin 500. The handgrip punch holes 402 are formed on each handgrip profile 211 in each side 222 of the regular, octagonal profile 221. The handgrip punch holes 402 are formed such that each of the handgrip profiles 221 is fixed in a releasable manner to the bar 100 in one of the multiple predetermined rotating positions 301 with respect to the bar 100 when one of the handgrip punch holes 402 coincides with one of the bar punch holes 401 and when a rotating locking pin 500 fits in the handgrip punch hole 402 coinciding with one of the bar punch holes 401.

[0050] According to an embodiment show in Fig. 1D, a handgrip 201 comprises a handgrip profile 211. The handgrip profile 211 comprises a regular, octagonal profile 221 which comprises eight sides 222 comprising two opposite sides 5;6. The handgrip profile 211 further comprises a handle 212 fixed onto the regular, octagonal profile 221 such that the handle 212 interconnects the two opposite sides 5;6 of the regular, octagonal profile 221 in the middle of each side 5;6.

[0051] According to an embodiment show in Fig. 1E, which schematically illustrates a side view of the embodiment shown in Fig. 1A, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The bar 100 comprises a first bar end 101 adapted to support weights. The strength training bar 1 further comprises two handgrips which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions with respect to the bar 100. Each of the two handgrips can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100 via a locking pin 500.

[0052] According to an embodiment show in Fig. 2A, the results of a simulation of the displacement magnitude in mm of a half of a strength training bar 1 under the weight of one or more weights is schematically depicted. Components with reference numbers identical to Fig. 1A-1E fulfil the same function. The results are depicted for only one half of the strength training bar 1 for clarity reasons. Similar simulation results would be obtained for the other half of the strength training bar 1, i.e. for the first bar end, as the strength training bar 1 is symmetrical. The strength training bar 1 comprises a hollow bar 100 which comprises a middle bar section 103 which comprises an oval shape 104 connected on a second end 132 to the second bar end 102. On Fig. 2A, a strength training bar 1 without any force applied on the second bar end 102 is depicted as the strength training bar 7 for which a displacement magnitude along the entire bar 100 is equal to 0mm. The results depicted on Fig. 2A of the strength training bar 8 show the displacement magnitude of the second bar end 102 under a vertical force of 600N exerted on 200mm of the second bar end 102 by weights. As can be seen on Fig. 2A, the displacement magnitude is almost null all along the oval shape 104 of the middle bar section 103 as illustrated by point B. As can be further seen on Fig. 2A, the displacement magnitude along the second end 132 increases the furthest the distance along the second bar end 102 from the second end 132. A maximum displacement magnitude of 14.45mm as illustrated by point A is simulated for such force at the point of the second bar end 102 the furthest from the second end 132.This indicates that the strength training bar 1 according to the present invention can withstand a given load condition without causing injuries to the user due to excessive bending. A total displacement of 28mm for a force of 1200N, i.e. 240kg and the intrinsic weight of the strength training bar 1, can be expected.

[0053] According to an embodiment show in Fig. 2B, the results of a simulation of the Von Mises stress in MPa of a half of a strength training bar 1 under the weight of one or more weights is schematically depicted for the conditions of Fig. 2A. Components with reference numbers identical to Fig. 1A-1E fulfil the same function. The results are depicted for only one half of the strength training bar 1 for clarity reasons. Similar simulation results would be obtained for the other half of the strength training bar 1, i.e. for the first bar end, as the strength training bar 1 is symmetrical. The strength training bar 1 comprises a hollow bar 100 which comprises a middle bar section 103 which comprises an oval shape 104 connected on a second end 132 to the second bar end 102. The simulated values of Von Mises stress illustrate an average plastic deformation of the strength training bar 1 equal to 235MPa. The maximum value of Von Mises stress induced in the material is 117MPa as illustrated by point B, which is less than the ultimate tensile strength of the material which is for example steel which demonstrates a yield strength around 250MPa and further demonstrates an ultimate tensile strength larger than 400MPa, which is an indication that the strength training bar 1 will not fail under a wait of 1200N at the second bar end 102 and at the first end bar. The minimum value of Von Mises stress induced in the material is close to 0 as illustrated by point A.

[0054] According to an embodiment shown in Fig. 3A, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights 3. The strength training bar 1 further comprises two handgrips 201;202 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar 100 in multiple predetermined rotating positions with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. Each of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. Each of the handgrips 201;202 comprises a translational section 231 which translates along the longitudinal direction 10 of the bar 100. Each translation section 231 can be fixed to the bar 100 in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10. Each handgrip 201;202 further comprises a base section 232 which is fixed onto the translational section 231 in a releasable manner in multiple predetermined rotating positions with respect to the bar 100. Each base section 232 is further adapted to support one or more weights 3. Each handgrip 201;202 further comprises a handle 233 which is fixedly mounted onto a respective base section 232. The bar 100 has a triangular cross-section. According to an alternative embodiment, the bar 100 has a circular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights which are supported on each

end of the bar 100.

[0055] According to an embodiment shown in Fig. 3B, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights 3. Components with reference numbers identical to Fig. 3A fulfil the same function. A handgrip 201 can rotate with respect to the bar 100 and can be fixed in a releasable manner to the bar 100 in multiple predetermined rotating positions 301 with respect to the bar 100. A handgrip 201 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. A handgrip 201 comprises a translational section 231 which translates along the longitudinal direction 10 of the bar 100. The translation section 231 can be fixed to the bar 100 in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10. A handgrip 201 further comprises a base section 232 which is fixed onto the translational section 231 in a releasable manner in multiple predetermined rotating positions with respect to the bar 100. In other words, the base section 232 can rotate with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10. In other words, the translation section 231 remains fixed in a releasable manner at the predetermined translational position 302 without rotating with respect to the longitudinal direction 10 of the bar 100 when the base section 232 rotates with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10 of the bar 100. The base section 232 is further adapted to support one or more weights 3, for example one weight on each side of the base section 232 along the longitudinal direction 10 of the bar 100. A handgrip 201 further comprises a handle 233 which is fixedly mounted onto a respective base section 232. The bar 100 has a triangular cross-section. According to an alternative embodiment, the bar 100 has a circular cross-section. The base section 232 of the handgrip 201 can rotate around an axis 20 traverse to the longitudinal direction 10. For example, the base section 232 of the handgrip 201 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between the handgrip 201 and the longitudinal direction 10 when the handgrip 201 is fixed in a releasable manner to the bar 100. In Fig. 3B, a first example of a handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to 90 degrees is formed between the handle of the handgrip 201 and the longitudinal direction 10. In Fig. 3B, a second example of a handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to 45 degrees is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. In Fig. 3B, a third example of a handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle 31 equal to 0 degree is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. According to alternative embodiments, the angle 31 formed between the handgrip 201 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10.

[0056] According to an embodiment shown in Fig. 4A, a handgrip 201 comprises a translational section 231, a base section 232 carrying weights 3 and a handle 233. Components with reference numbers identical to Fig. 3A fulfil the same function. The handgrip 201 can rotate with respect to the bar and can be fixed in a releasable manner to the bar in multiple predetermined rotating positions with respect to the bar. The translational section 231 translates along the longitudinal direction 10 of the bar. The translation section 231 can be fixed to the bar in a releasable manner at multiple predetermined translational positions along the longitudinal direction 10. A handgrip 201 further comprises the base section 232 which is fixed onto the translational section 231 in a releasable manner in multiple predetermined rotating positions with respect to the bar. In other words, the base section 232 can rotate with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10. In other words, the translation section 231 remains fixed in a releasable manner at the predetermined translational position without rotating with respect to the longitudinal direction 10 of the bar when the base section 232 rotates with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10 of the bar. The base section 232 is further adapted to support one or more weights 3, for example one weight on each side of the base section 232 along the longitudinal direction 10 of the bar. A handgrip 201 further comprises a handle 233 which is fixedly mounted onto a respective base section 232. According to an embodiment shown in Fig. 4B, a bar 100 comprises a plurality of translational engagement recesses 130. The translational engagement recesses 130 are not through. According to an alternative embodiment, the translational engagement recesses 130 are through holes in the bar 100. The translational engagement recesses 130 are formed at the multiple predetermined translational positions 302 along the bar 100 and each translational engagement recess 130 can fit a translation locking pin 501. The translation section 231 of the handgrip 201 of Fig. 4A further comprises a translation locking pin which engages in a releasable manner in the translational engagement recesses 130 of the bar 100 of Fig. 4B, thereby fixing the translational section 231 to the bar 100 in a releasable manner at one of the predetermined translational positions 302 along the longitudinal direction 10 when the translation locking pin fits in one of the translational engagement recesses 130. The base section 232 further comprises a rotation locking pin 502 and the translational section 231 further comprises punch holes which can receive the rotation locking pin 502 of the respective base section 232.

[0057] According to an embodiment shown in Fig. 5 and on the zoom on Fig. 5, a handgrip 201 comprises a

translational section 231, a base section 232 carrying weights 3 and a handle 233. Components with reference numbers identical to Fig. 4A and Fig. 4B fulfil the same function. The handgrip 201 can rotate with respect to the bar and can be fixed in a releasable manner to the bar in multiple predetermined rotating positions with respect to the bar 100. The translational section 231 translates along the longitudinal direction 10 of the bar 100. The translation section 231 can be fixed to the bar 100 in a releasable manner at multiple predetermined translational positions along the longitudinal direction 10. A handgrip 201 further comprises the base section 232 which is fixed onto the translational section 231 in a releasable manner in multiple predetermined rotating positions with respect to the bar 100. In other words, the base section 232 can rotate with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10. In other words, the translation section 231 remains fixed in a releasable manner at the predetermined translational position 302 without rotating with respect to the longitudinal direction 10 of the bar 100 when the base section 232 rotates with respect to the translation section 231 around an axis 20 traverse to the longitudinal direction 10 of the bar 100. The base section 232 is further adapted to support one or more weights 3, for example one weight on each side of the base section 232 along the longitudinal direction 10 of the bar 100. A handgrip 201 further comprises a handle 233 which is fixedly mounted onto a respective base section 232. According to an embodiment shown in Fig. 5, a bar 100 comprises translational engagement recesses 130. The translational engagement recesses 130 are not through. According to an alternative embodiment, the translational engagement recesses 130 are through holes in the bar 100. The translational engagement recesses 130 are formed at the multiple predetermined translational positions 302 along the bar 100 and each translational engagement recess 130 can fit a translation locking pin 501. The translation section 231 of the handgrip 201 of Fig. 5 further comprises a translation locking pin 501 which engages in a releasable manner in the translational engagement recesses 130 of the bar 100 of Fig. 5, thereby fixing the translational section 231 to the bar 100 in a releasable manner at one of the predetermined translational positions 302 along the longitudinal direction 10 when the translation locking pin 501 fits in one of the translational engagement recesses 130.

[0058] According to an embodiment shown in Fig. 6, a handgrip 201 comprises a translational section 231, a base section 232 carrying weights 3 and a handle 233. Components with reference numbers identical to Fig. 4A and Fig. 4B and Fig. 5 fulfil the same function. The base section 232 further comprises a rotation locking pin 502. The translation section 231 further comprises punch holes 403 which are through and which can receive a rotation locking pin 502 of the base section 232. The punch holes 402 are formed such that an angle 31 of 0 degree, 45 degrees, 90 degrees or - 45 degrees is formed between the handle 233 and the longitudinal direction 10 when the rotation locking pin 502 of the base section 232 engages in a releasable manner in one of the punch holes 502, thereby fixing the base section 232 to the translational section 231 in a releasable manner in one of the predetermined rotating positions 301 with respect to the bar 100. The multiple predetermined rotating positions correspond to the angle 31 formed between the handle 233 and the longitudinal direction 10 when the handgrip 201 is fixed in a releasable manner to the bar 100.

[0059] According to an embodiment shown in Fig. 7, a strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which each comprise handles 212 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions 301 with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handles 212 of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between each of the handles 212 of the handgrips 201;202 and the longitudinal direction 10 when each of the two handles 212 of the handgrips 201;202 is fixed in a releasable manner to the bar 100. In Fig. 7, the handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle equal to 0 degrees is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. According to alternative embodiments, the angle formed between the handgrips 201;202 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has

a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights. Each of the handgrip profiles 211 of the strength training bar 1 further comprises a rotating ring 601 adapted to rotate with respect to the outer diameter 21 of the handgrip profile 211. The rotating ring 601 comprises an outer ring diameter 602 comprising semi-circular protrusions 603. The semi-circular protrusions 603 are regularly defined along the outer ring diameter 602. According to an alternative embodiment, the semi-circular protrusions are not periodically defined along the outer ring diameter 602. Each of the handgrip profiles 211 further comprises a plurality of actuating means 604 fixed to the handgrip profile 211 between the outer ring diameter 602 and the outer diameter 21. Each of the handgrip profiles 211 further comprises a plurality of locking pins 500 wherein each of the locking pins 500 fits in the handgrip punch holes 402, and consequently fit in the each of the bar punch holes. Each of the handles 212 is fixed on to the handgrip profile 211 such that the handle 212 interconnects two opposite handgrip punch holes 402 of the outer diameter 21. Each of the handgrip profiles 211 further comprises a locking mechanism wherein the locking mechanism 605 is adapted to allow the respective handgrip profile 211 to translate in the oval shape 104 along the longitudinal direction 10 of the bar 100 when the rotating ring 601 is rotated with respect to the outer diameter 21 such that the semi-circular protrusions 603 are positioned between two consecutive handgrip punch holes 40, thereby allowing the actuating means 604 to pull the locking pins 500 inwards such that the locking pins 500 are released from the handgrip punch holes 402. Each locking mechanism 605 is further adapted to fix the respective handgrip profile 211 in a releasable manner at one of the multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100 and in one of the predetermined rotating positions 301 with respect to the bar 100 when the rotating ring 601 is rotated with respect to the outer diameter 21 such that the semi-circular protrusions 603 push the actuating means 604 outwards such that the locking pins 500 fit through the handgrip punch holes 402 and consequently also fit in the bar punch holes. The locking mechanism comprises a bistable locking mechanism 607 which is inserted in a locking through path of the handgrip profiles 211 to host the bistable locking mechanism 607. The locking through path comprises a locking point and a locking guide 609 connected to the locking point. The bistable locking mechanism 607 comprises a knob 610.

[0060] According to an embodiment shown in Figs. 8A and 8B and 8C, a locking mechanism 605 comprises a bistable locking mechanism 607. Bistability is understand as work done on the bistable locking mechanism 607 to move it just past the peak, at which point the bistable locking mechanism 607 goes "over centre" to its secondary stable position. The result is a toggle-type action-work applied to the bistable locking mechanism 607 below a threshold sufficient to send it 'over center' results in no change to the mechanism's state. Springs are a known method of achieving an "over centre" action. A spring attached to a simple two position ratchet-type mechanism can create a bistable locking mechanism 607 that is clicked or toggled between two mechanical states. The handgrip 211 comprises a handle 212 and a locking through path 606 to host the locking mechanism 605. The locking through path 606 comprises a locking point 608 and a locking guide 609 connected to the locking point 608. The bistable locking mechanism 607 fits in the locking point 608 and the locking guide 609. The bistable locking mechanism 607 comprises a knob 610, a spring 611 which can translate between the locking point 608 and the locking guide 609 in the locking through path 606. The bistable locking mechanism 607 further comprises a locking ring 612 arranged between the knob 610 and the spring 611. In Fig. 8A, the locking ring 612 fits in a releasable manner in the locking point 608 almost entirely, thereby securely fixing in a releasable manner the bistable locking mechanism 607 and securely fixing in a releasable manner the rotating ring 601 and preventing the rotating ring 601 from rotating with respect to the outer diameter. In this position, the semi-circular protrusions push the actuating means outwards such that the locking pins fit through the handgrip punch holes and consequently through the bar punch holes thereby fixing the handgrip profile 211 in a releasable manner to the bar. For example, the spring 611 on Fig. 8A is in a compressed state and the spring on Fig. 8B and 8C is in a relaxed state. According to an alternative embodiment, the spring 611 is in a relaxed state in Fig. 8A and the spring 611 is in an elongated state in Fig. 8B and 8C. On Fig. 8B, the bistable locking mechanism 607 is unlocked and the locking ring 612 does not fit in the locking through path 606 while the spring 611 is still able to translate between the locking point 608 and the locking guide 609. In this position, the locking ring 612 rests in a releasable manner on the locking guide 609 while the spring 611 is still in the locking guide 609. In this position, the semi-circular protrusions are positioned between two consecutive handgrip punch holes, thereby allowing the actuating means to pull the locking pins inwards such that the locking pins are released from the handgrip punch holes, thereby allowing the actuating means outwards such that the locking pins fit through the handgrip punch holes and consequently through the bar punch holes thereby handgrip profile to rotate with respect to the bar and to be translated along the longitudinal direction of the bar. The handle 212 is for example fixed to the rotating ring 601. A rotation of the handle 212 thereby triggers a rotation of the rotating ring 601 of the handgrip profile 211.

[0061] According to an embodiment shown in Figs. 9A and 9B, a handgrip profile 211 comprises an outer diameter 21 and the outer diameter 21 is such that the handgrip profile can translate in the oval shape 104 of the middle bar section 103 along the longitudinal direction 10 of the bar. The handgrip profile 211 further comprises

a rotating ring 601 adapted to rotate with respect to the outer diameter 21. The rotating ring 601 comprises an outer ring diameter 602 which comprises semi-circular protrusions 603. Semi-circular recesses are therefore defined between two consecutive semi-circular protrusions 603. The handgrip profile 211 further comprises a plurality of actuating means 604 fixed to the handgrip profile 211 between the outer ring diameter 602 and the outer diameter 21. The handgrip profile 211 further comprises a plurality of locking pins 500 wherein each of the locking pins 500 is fixed to one of the actuating means. The locking pins 500 fit in the handgrip punch holes 402 of the handgrip profile 211 when the semi-circular protrusions 603 push on the actuating means 604 such that the actuating means 604 push the locking pins 500 in the handgrip punch holes 402. In an unlocked state depicted in Fig. 9A of the locking mechanism, the semi-circular protrusions 603 of the outer ring diameter 602 are positioned between two consecutive handgrip punch holes 402, thereby allowing the actuating means 604 to follow the recesses of the outer ring diameter 602 of the rotating ring 601. The actuating means 604 then pull the locking pins 500 inwards the handgrip profile 211 such that the locking pins are released from the handgrip punch holes 402. In a locked state depicted in Fig. 9B of the locking mechanism, the semi-circular protrusions 603 of the outer ring diameter 602 are each aligned with one of the handgrip punch holes 402 along a radius of the handgrip profile 211, thereby pushing the actuating means 604 outwards the handgrip profile 211 such that the locking pins 500 fit through the handgrip punch holes 402. According to an alternative embodiment, the handgrip profiles 211 comprise a plurality of springs between the outer ring diameter 602 and the outer diameter 21, wherein the springs are adapted to pull the locking pins 500 inwards thereby releasing the locking pins 500 are the handgrip punch holes 402 when the semi-circular protrusions 603 are positioned between two consecutive handgrip punch holes 402 in an unlocked state of the locking mechanism, and wherein the semi-circular protrusions 603 are further adapted to push the springs such that the springs push the locking pins 500 in the handgrip punch holes 402 when the semi-circular protrusions 603 coincide with the handgrip punch holes in a locked state of the locking mechanism.

[0062] An embodiment of a cross-section of a strength training bar 1 as depicted in Fig. 7 and comprising details as shown in Fig. 8A, 8B, 8C, 9A and 9B is shown in Fig. 10. Components having identical reference numbers fulfil the same function. The strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which each comprise handles 212 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions 301 with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handles 212 of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between each of the handles 212 of the handgrips 201;202 and the longitudinal direction 10 when each of the two handles 212 of the handgrips 201;202 is fixed in a releasable manner to the bar 100. In Fig. 10, the handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle equal to 0 degrees is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. According to alternative embodiments, the angle formed between the handgrips 201;202 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights. Each of the handgrip profiles 211 of the strength training bar 1 further comprises a rotating ring 601 adapted to rotate with respect to the outer diameter 21 of the handgrip profile 211. The rotating ring 601 comprises an outer ring diameter 602 comprising semi-circular protrusions 603. The semi-circular protrusions 603 are regularly defined along the outer ring diameter 602. According to an alternative embodiment, the semi-circular protrusions are not periodically defined along the outer ring diameter 602. Each of the handgrip profiles 211 further comprises a plurality of actuating means 604 fixed to the handgrip profile 211 between the outer ring diameter 602 and the outer diameter 21. Each of the handgrip profiles 211 further comprises a plurality of locking pins 500 wherein each of the locking pins 500 fits in the handgrip punch holes 402, and consequently fit in the each of the bar punch holes 401. Each of the handles 212 is fixed on to

the handgrip profile 211 such that the handle 212 interconnects two opposite handgrip punch holes 402 of the outer diameter 21. Each of the handgrip profiles 211 further comprises a locking mechanism 605 wherein the locking mechanism 605 is adapted to fix the respective handgrip profile 211 in a releasable manner at one of the multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100 and in one of the predetermined rotating positions 301 with respect to the bar 100 when the rotating ring 601 is rotated with respect to the outer diameter 21 such that the semi-circular protrusions 603 push the actuating means 604 outwards such that the locking pins 500 fit through the handgrip punch holes 402 and consequently also fit in the bar punch holes. In a locked state depicted in Fig. 10 of the locking mechanism, the semi-circular protrusions 603 of the outer ring diameter 602 are each aligned with one of the handgrip punch holes 402 along a radius of the handgrip profile 211, thereby pushing the actuating means 604 outwards the handgrip profile 211 such that the locking pins 500 fit through the handgrip punch holes 402. According to an alternative embodiment, the handgrip profiles 211 comprise a plurality of springs between the outer ring diameter 602 and the outer diameter 21, wherein the semi-circular protrusions 603 are further adapted to push the springs such that the springs push the locking pins 500 in the handgrip punch holes 402 when the semi-circular protrusions 603 coincide with the handgrip punch holes in a locked state of the locking mechanism.

[0063] An embodiment of a cross-section of a strength training bar 1 as depicted in Fig. 7 and comprising details as shown in Fig. 8A, 8B, 8C, 9A, 9B and 10 is shown in Fig. 11. Components having identical reference numbers fulfil the same function. The strength training bar 1 comprises a bar 100 extending along a longitudinal direction 10 and adapted to support weights. The strength training bar 1 further comprises two handgrips 201;202 which each comprise handles 212 which can rotate with respect to the bar 100 and which can be fixed in a releasable manner to the bar in multiple predetermined rotating positions 301 with respect to the bar 100. Each of the two handgrips 201;202 can be fixed in a releasable manner at multiple predetermined translational positions 302 along the longitudinal direction 10 of the bar 100. For example, each of the two handgrips 201;202 can be fixed in a releasable manner in four different predetermined rotating positions 301 with respect to the bar 100. Each of the handles 212 of the handgrips 201;202 can rotate around an axis 20 traverse to the longitudinal direction 10. The multiple predetermined rotating positions 301 correspond to an angle 31 formed between each of the handles 212 of the handgrips 201;202 and the longitudinal direction 10 when each of the two handles 212 of the handgrips 201;202 is fixed in a releasable manner to the bar 100. In Fig. 11, the handgrip 201 is fixed in a releasable manner to the bar 100 such that an angle equal to 0 degrees is formed between the handle 212 of the handgrip 201 and the longitudinal direction 10. According to alternative embodiments, the angle formed between the handgrips 201;202 and the longitudinal direction 10 can be 0 degree, 45 degrees, 90 degrees or -45 degrees with respect to the longitudinal direction 10. The bar 100 comprises a first bar end 101 adapted to support weights, a second bar end 102 adapted to support weights, and a middle bar section 103 which comprises an oval shape 104. The oval shape 104 extends along the longitudinal direction 10. The oval shape 104 is connected on a first end 131 to the first bar end 101 and on a second end 132 opposite to the first end 131 to the second bar end 102. Each handgrip 201;202 comprises a handgrip profile 211 wherein an outer diameter 21 of the handgrip profile 211 fits the oval shape 104 of the middle bar section 103. Each handgrip 201;202 further comprises a handle 212 which fits the handgrip profile 211. Each handgrip profile 211 can slide in the respective oval shape 104 along the longitudinal direction 10 of the bar 100. Each handgrip profile 211 can be fixed in a releasable manner to the bar 100 at multiple predetermined translational positions 302 along the longitudinal direction 10. The bar 100 has a circular cross-section. According to an alternative embodiment, the bar 100 has a triangular cross-section. According to a further alternative embodiment, the strength training bar 1 comprises one or more weights. Each of the handgrip profiles 211 of the strength training bar 1 further comprises a rotating ring 601 adapted to rotate with respect to the outer diameter 21 of the handgrip profile 211. The rotating ring 601 comprises an outer ring diameter 602 comprising semi-circular protrusions 603. The semi-circular protrusions 603 are regularly defined along the outer ring diameter 602. According to an alternative embodiment, the semi-circular protrusions are not periodically defined along the outer ring diameter 602. Each of the handgrip profiles 211 further comprises a plurality of actuating means 604 fixed to the handgrip profile 211 between the outer ring diameter 602 and the outer diameter 21. Each of the handgrip profiles 211 further comprises a plurality of locking pins 500 wherein each of the locking pins 500 fits in the handgrip punch holes 402, and consequently fit in the each of the bar punch holes 401. Each of the handles 212 is fixed on to the handgrip profile 211 such that the handle 212 interconnects two opposite handgrip punch holes 402 of the outer diameter 21. Each of the handgrip profiles 211 further comprises a locking mechanism 605 wherein the locking mechanism 605 is adapted to allow the respective handgrip profile 211 to translate in the oval shape 104 along the longitudinal direction 10 of the bar 100 when the rotating ring 601 is rotated with respect to the outer diameter 21 such that the semi-circular protrusions 603 are positioned between two consecutive handgrip punch holes 40, thereby allowing the actuating means 604 to pull the locking pins 500 inwards such that the locking pins 500 are released from the handgrip punch holes 402. In an unlocked state depicted in Fig. 11 of the locking mechanism, the semi-circular protrusions 603 of the outer ring diameter 602 are positioned between two consec-

utive handgrip punch holes 402, thereby allowing the actuating means 604 to follow the recesses of the outer ring diameter 602 of the rotating ring 601. The actuating means 604 then pull the locking pins 500 inwards the handgrip profile 211 such that the locking pins are released from the handgrip punch holes 402 and from the bar punch holes 401. According to an alternative embodiment, the handgrip profiles 211 comprise a plurality of springs between the outer ring diameter 602 and the outer diameter 21, wherein the springs are adapted to pull the locking pins 500 inwards thereby releasing the locking pins 500 are the handgrip punch holes 402 when the semi-circular protrusions 603 are positioned between two consecutive handgrip punch holes 402 in an unlocked state of the locking mechanism.

[0064] Although the present invention has been illustrated by reference to specific embodiments, it will be apparent to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments, and that the present invention may be embodied with various changes and modifications without departing from the scope thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein. In other words, it is contemplated to cover any and all modifications, variations or equivalents that fall within the scope of the basic underlying principles and whose essential attributes are claimed in this patent application. It will furthermore be understood by the reader of this patent application that the words "comprising" or "comprise" do not exclude other elements or steps, that the words "a" or "an" do not exclude a plurality, and that a single element, such as a computer system, a processor, or another integrated unit may fulfil the functions of several means recited in the claims. Any reference signs in the claims shall not be construed as limiting the respective claims concerned. The terms "first", "second", third", "a", "b", "c", and the like, when used in the description or in the claims are introduced to distinguish between similar elements or steps and are not necessarily describing a sequential or chronological order. Similarly, the terms "top", "bottom", "over", "under", and the like are introduced for descriptive purposes and not necessarily to denote relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances and embodiments of the invention are capable of operating according to the present invention in other sequences, or in orientations different from the one(s) described or illustrated above.

Claims

1. A strength training bar (1) comprising:

- a bar (100), extending along a longitudinal direction (10) and adapted to support weights (3);
- at least two handgrips (201;202), adapted to rotate with respect to said bar (100) and to be fixable in a releasable manner to said bar in multiple predetermined rotating positions (301) with respect to said bar (100); each of said at least two handgrips (201;202) further being adapted to be fixable in a releasable manner at multiple predetermined translational positions (302) along said longitudinal direction (10) of said bar (100).

2. A strength training bar (1) according to claim 1, wherein each of said handgrips (201;202) is fixable in a releasable manner in four different predetermined rotating positions (301) with respect to said bar (100).

3. A strength training bar (1) according to any of the preceding claims, wherein:

- each of said at least two handgrips (201;202) is adapted to rotate around an axis (20) traverse said longitudinal direction (10);
- said multiple predetermined rotating positions (301) correspond to an angle (31) of:
  - 0 degree;
  - 45 degrees;
  - 90 degrees;
  - -45 degrees;

formed between each of said at least two handgrips (201;202) and said longitudinal direction (10) when each of said at least two handgrips (201;202) is fixed in a releasable manner to said bar (100).

4. A strength training bar (1) according to claims 3, wherein said bar (100) comprises:

- a first bar end (101), adapted to support one or more weights (3);
- a second bar end (102), adapted to support one or more weights (3);
- a middle bar section (103) comprising an oval shape (104), wherein said oval shape (104) extends along said longitudinal direction (10); and wherein said middle bar section (103) is connected on a first end (131) to said first bar end (101) and connected on a second end (132) opposite to said first end (131) to said second bar end (102); and wherein said middle bar section (103) comprises bar punch holes (401) formed at said multiple predetermined translational positions (302) along said bar (100), wherein said bar punch holes (400) are adapted to receive a

locking pin (500);

and wherein each of said at least two handgrips (201;202) comprises:

- a handgrip profile (211), wherein an outer diameter (21) of said handgrip profile (211) fits said oval shape (104) of said middle bar section (103); and wherein said outer diameter (21) of said handgrip profile (211) comprises handgrip punch holes (402), each of said handgrip punch holes (402) being adapted to receive a locking pin (500); and
- a handle (212) fitting said handgrip profile (211).

5. A strength training bar (1) according to claim 4, wherein:

- each of said handgrip profiles (211) is adapted to be translated in said oval shape (104) along said longitudinal direction (10) of said bar (100); and
- each of said handgrip profiles (211) is adapted to be fixed in a releasable manner to said bar (100) at multiple predetermined translational positions (302) along said longitudinal direction (10).

6. A strength training bar (1) according to claim 5, wherein:

- each of said handgrip profiles (211) comprises a regular, octagonal profile (221);
- said handgrip punch holes (402) are formed in each side (222) of said regular, octagonal profile (221); and
- each of said handles (212) is fixed onto said respective regular, octagonal profile (221) such that said handle (212) interconnects two opposite sides (222) of said regular, octagonal profile (221).

7. A strength training bar (1) according to claim 6, wherein said handgrip punch holes (402) are formed such that each of said handgrip profiles (221) is fixed in a releasable manner to said bar (100) in one of said multiple predetermined rotating positions (301) with respect to said bar (100) when one of said handgrip punch holes (402) coincides with one of said bar punch holes (401) and when a locking pin (500) fits in said handgrip punch hole (402) coinciding with one of said bar punch holes (401).

8. A strength training bar (1) according to claim 5, wherein:

- each outer diameter (21) of said handgrip profiles (211) is adapted to translate in said oval shape (104) of said middle bar section (103) along said longitudinal direction (10) of said bar (100);
- each of said handgrip profiles (211) further comprises:

  ◦ a rotating ring (601) adapted to rotate with respect to said outer diameter (21) of said handgrip profile (211); wherein said rotating ring (601) comprises an outer ring diameter (602) comprising semi-circular protrusions (603);
  ◦ a plurality of actuating means (604) fixed to said respective handgrip profile (211) between said outer ring diameter (602) and said outer diameter (21);
  ◦ a plurality of locking pins (500); wherein each locking pin (500) is fixed to one of said actuating means (604); and wherein each locking pin (500) fits in said handgrip punch holes (402);

- each of said handles (212) is fixed on to said handgrip profile (211) such that said handle (212) interconnects two opposite handgrip punch holes (402) of said outer diameter (21);
- each of said handgrip profiles (211) further comprises a locking mechanism (605), wherein said locking mechanism (605) is adapted to:

  ◦ allow said respective handgrip profile (211) to translate in said oval shape (104) along said longitudinal direction (10) of said bar (100) when said rotating ring (601) is rotated with respect to said outer diameter (21) such that said semi-circular protrusions (603) are positioned between two consecutive handgrip punch holes (402), thereby allowing said actuating means (604) to pull said locking pins (500) inwards such that said locking pins (500) are released from said handgrip punch holes (402);
  ◦ fix said respective handgrip profile (211) in a releasable manner at one of said multiple predetermined translational positions (302) along said longitudinal direction (10) of said bar (100) and in one of said predetermined rotating positions (301) with respect to said bar (100) when said rotating ring (601) is rotated with respect to said outer diameter (21) such that said semi-circular protrusions (603) push said actuating means (604) outwards such that said locking pins (500) fit through said handgrip punch holes (402).

9. A strength training bar (1) according to claim 8,

wherein each of said handgrip profiles (211) further comprises a locking through path (606) adapted to host a respective locking mechanism (605); and wherein each of said locking mechanisms (605) comprises a bistable locking mechanism (607).

10. A strength training bar (1) according to claim 9, wherein said locking through path (606) comprises a locking point (608) and a locking guide (609) connected to said locking point (608); and wherein each of said bistable locking mechanisms (607) comprises:

- a knob (610);
- a spring (611), adapted to translate between said locking point (608) and said locking guide (609) in said locking through path (606);
- a locking ring (612) arranged between said knob (610) and said spring (611), adapted to:
  - fit in a releasable manner in said locking point (608) when said rotating ring (601) is rotated with respect to said outer diameter (21) such that said semi-circular protrusions (603) push said actuating means (604) outwards such that said locking pins (500) fit through said handgrip punch holes (402), thereby fixing said handgrip profile (211) in a releasable manner to said bar (100) in one of said predetermined rotating positions (301) with respect to said bar (100) and at one of said predetermined translational positions (302) along said longitudinal direction (10) of said bar (100);
  - rest in a releasable manner on said locking guide (609) when said rotating ring (601) is rotated with respect to said outer diameter (21) such that said semi-circular protrusions (603) are positioned between two consecutive handgrip punch holes (402), thereby allowing said actuating means (604) to pull said locking pins (500) inwards such that said locking pins (500) are released from said handgrip punch holes (402), thereby allowing said handgrip profile (211) to rotate with respect to said bar (100) and to be translated along said longitudinal direction (10) of said bar (100).

11. A strength training bar (1) according to claim 3, wherein said each of said at least two handgrips (201;202) comprises:

- a translational section (231), adapted to translate along said longitudinal directional (10) of said bar (100) and further adapted to be fixed to said bar (100) in a releasable manner at said multiple predetermined translational positions (302) along said longitudinal direction (10);
- a base section (232), adapted to be fixed onto said translational section (231) in a releasable manner in multiple predetermined rotating positions (301) with respect to said bar (100); and wherein said base section (232) is further adapted to support one or more weights (3); and
- a handle (233) fixedly mounted onto said base section (232).

12. A strength training bar (1) according to claim 11, wherein:

- said bar (100) comprises a plurality of translational engagement recesses (130) formed at said multiple predetermined translational positions (302) along said bar (100), each translational engagement recess (130) being adapted to fit a translation locking pin (501); and
- each of said translational sections (231) comprises a translation locking pin (501), adapted to engage in a releasable manner in said translational engagement recesses (130) of said bar (100), thereby fixing said respective translational section (231) to said bar (100) in a releasable manner at one of said predetermined translational positions (302) along said longitudinal direction (10) when said translation locking pin (501) fits in one of said translational engagement recesses (130).

13. A strength training bar (1) according to claim 11 or 12, wherein:

- each of said base section (232) further comprises a rotation locking pin (502); and
- each of said translational sections (231) further comprises punch holes (403) adapted to receive a rotation locking pin (502) of said respective base section (232), wherein said punch holes (502) are formed such that an angle (31) of:
  - 0 degree;
  - 45 degrees;
  - 90 degrees;
  - -45 degrees;

is formed between said handle (233) and said longitudinal direction (10) when a rotation locking pin (502) of said respective base section (232) engages in a releasable manner in one of said punch holes (502), thereby fixing said respective base section (232) to said translational section (231) in a releasable manner in one of said predetermined rotating positions (301) with respect to said bar (100).

14. A strength training bar (1) according to any of the

previous claims, wherein said strength training bar (1) further comprises said one or more weights (3).

15. Use of a strength training bar (1) according to any of the previous claims for training strength, wherein:

- each of said handgrips (201;202) is set in a predetermined rotating position with respect to said bar (100) by rotating said handgrip (201;202) with respect to said bar (100) and by fixing said handgrip (201;202) in a releasable manner to said bar (100) in said predetermined rotating position;
- each of said handgrips (201;202) is further set in a predetermined translational position along said longitudinal direction (10) of said bar (100) by translating said handgrip (201;202) along said longitudinal direction (10) of said bar (100) and by fixing said handgrip (201;202) in a releasable manner to said bar (100) in said predetermined translational position.

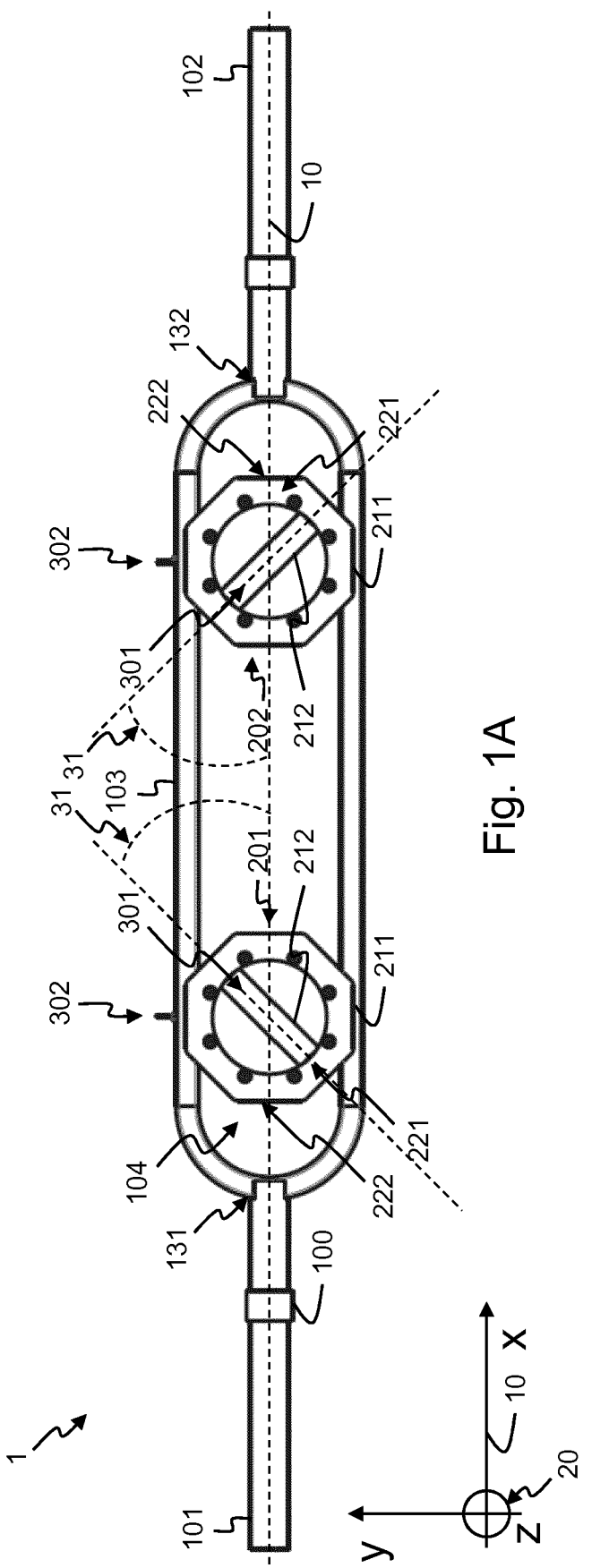
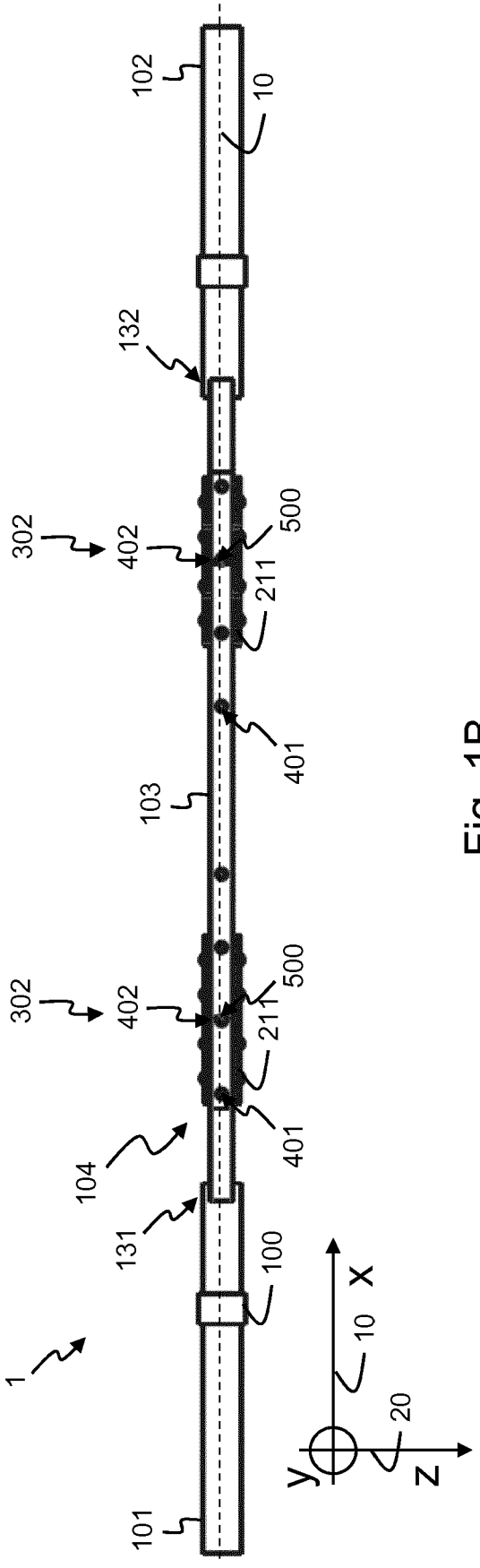

1
101
100
131
104
222
221
212
211
202
201
301
31
103
302
132
102
10
x
y
z
20

Fig. 1A


1
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131
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401
402
500
211
103
302
132
102
10
x
y
z
20

Fig. 1B

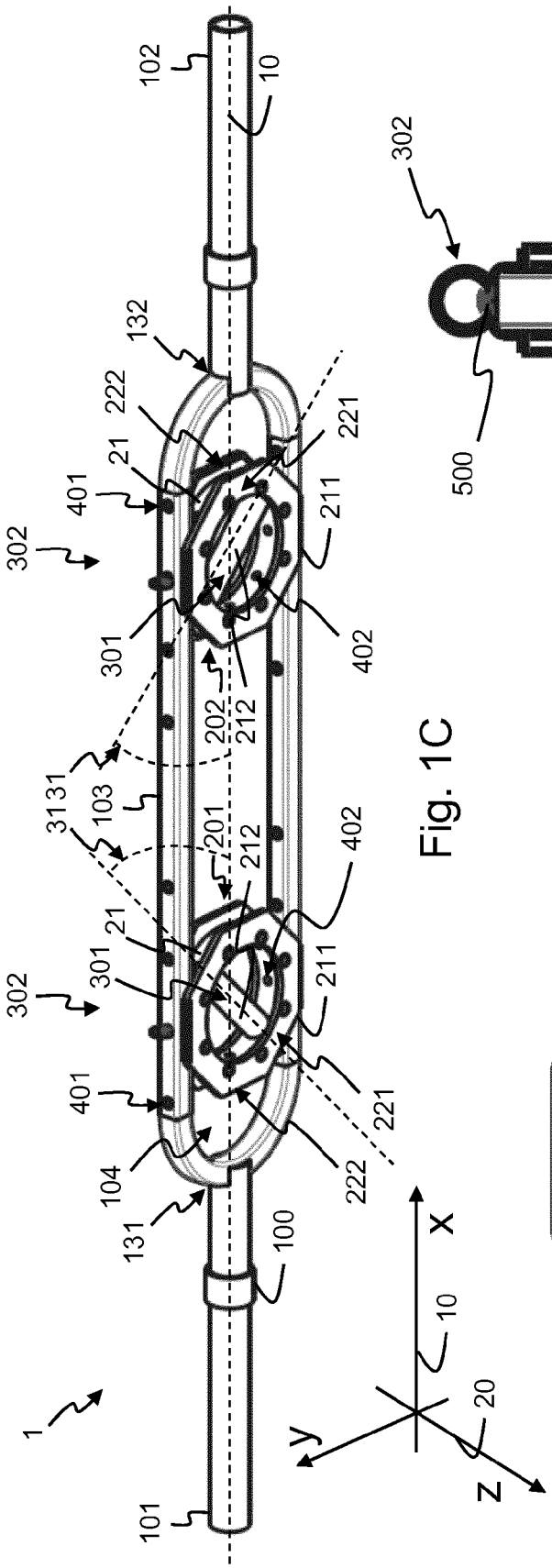


Fig. 1C

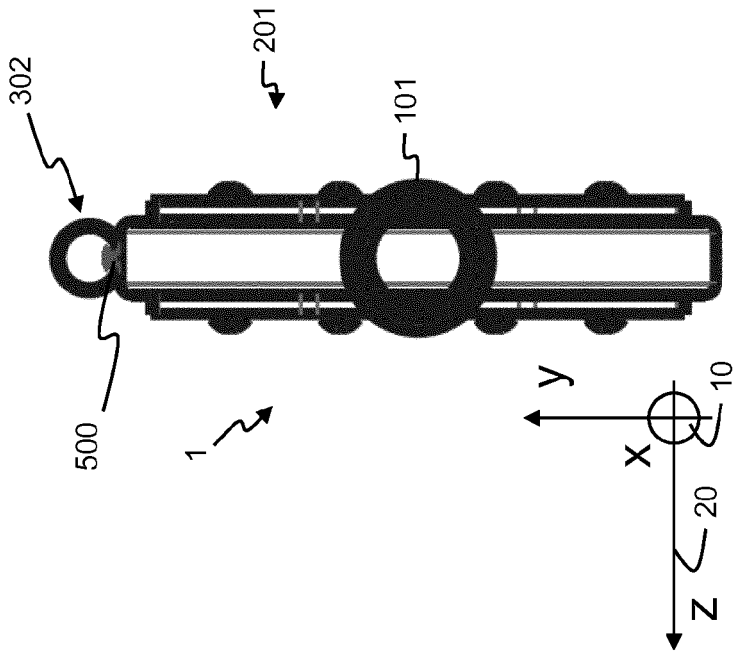


Fig. 1E

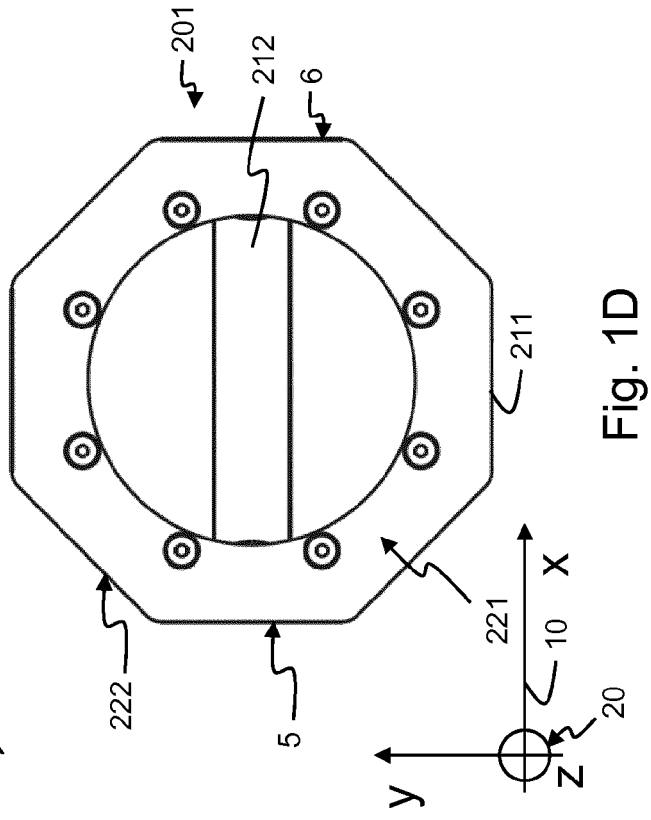
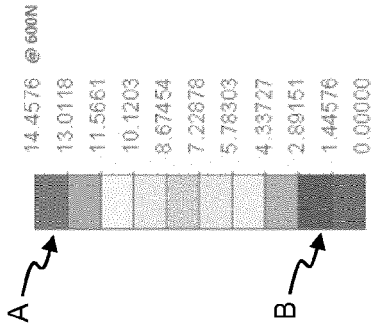


Fig. 1D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5.78303
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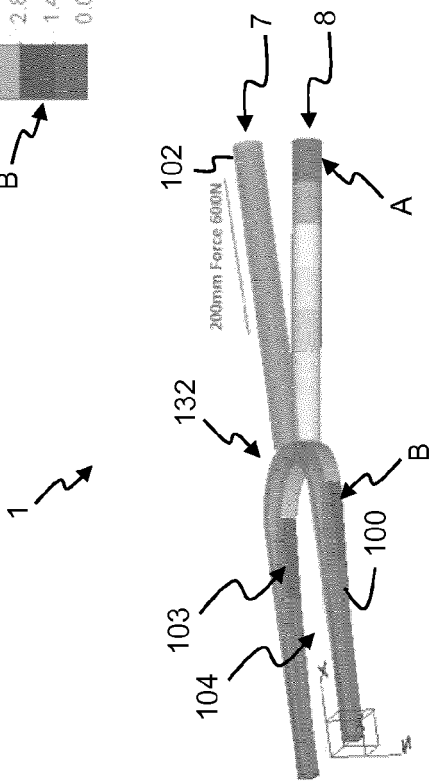
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102
7
8
A
B
132
103
104
100
200mm Force 600N

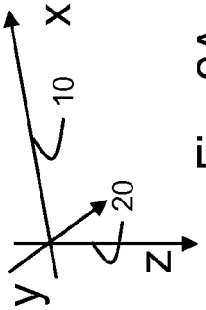
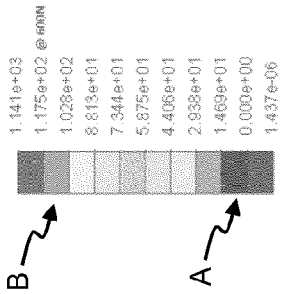

x
y
z
10
20

Fig. 2A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B
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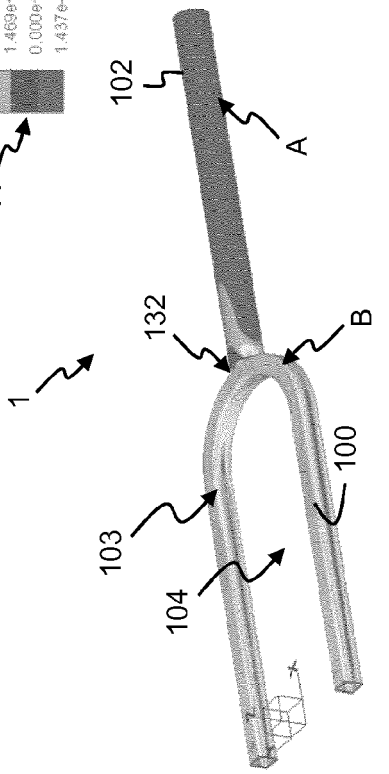
1.469e+01
0.000e+00
1.437e-06


1
102
A
B
132
103
104
100

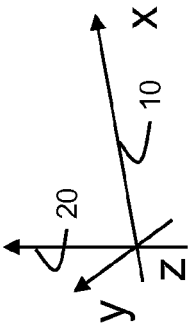

x
y
z
10
20

Fig. 2B

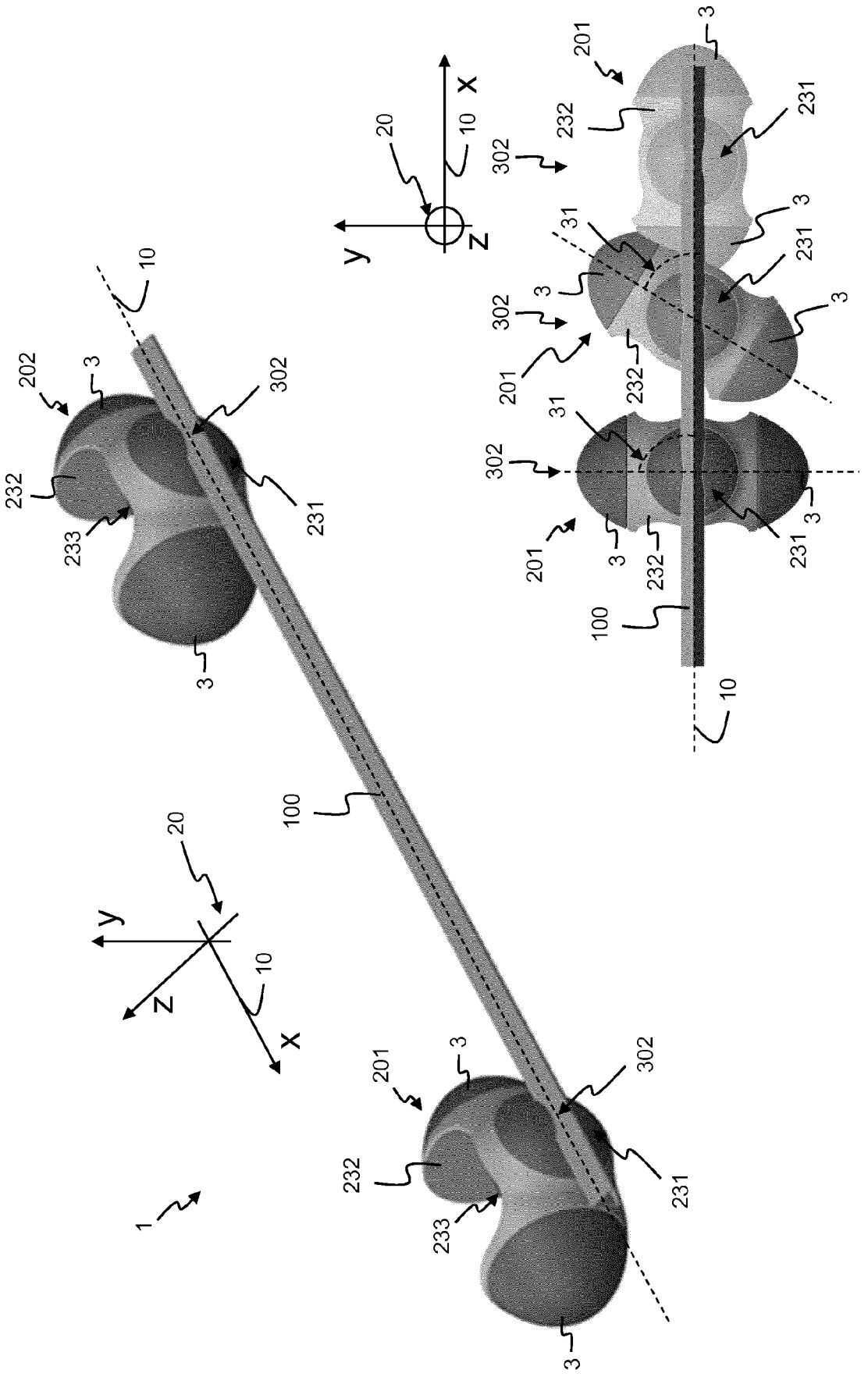


Fig. 3A

Fig. 3B

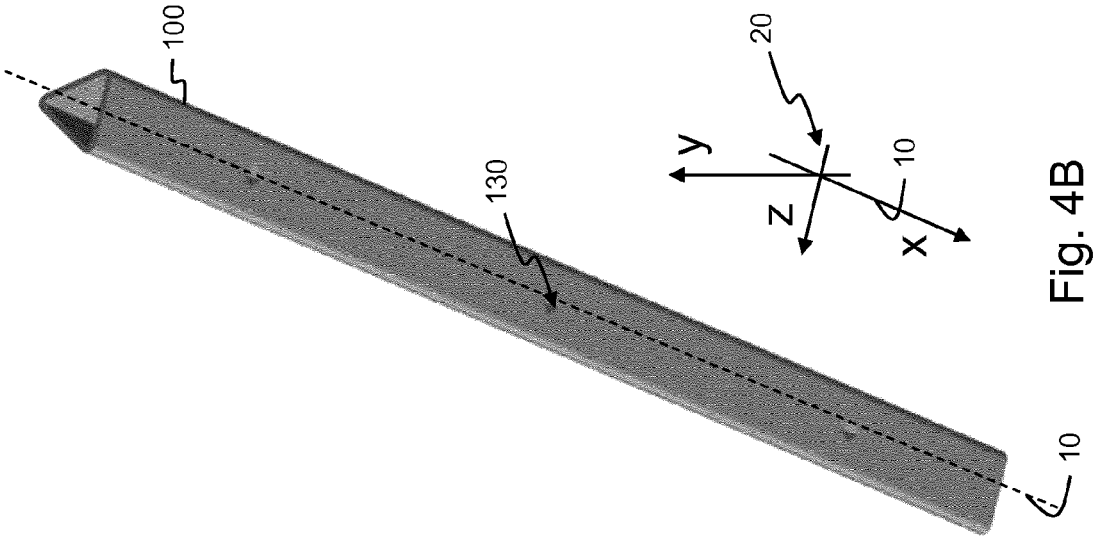


Fig. 4B

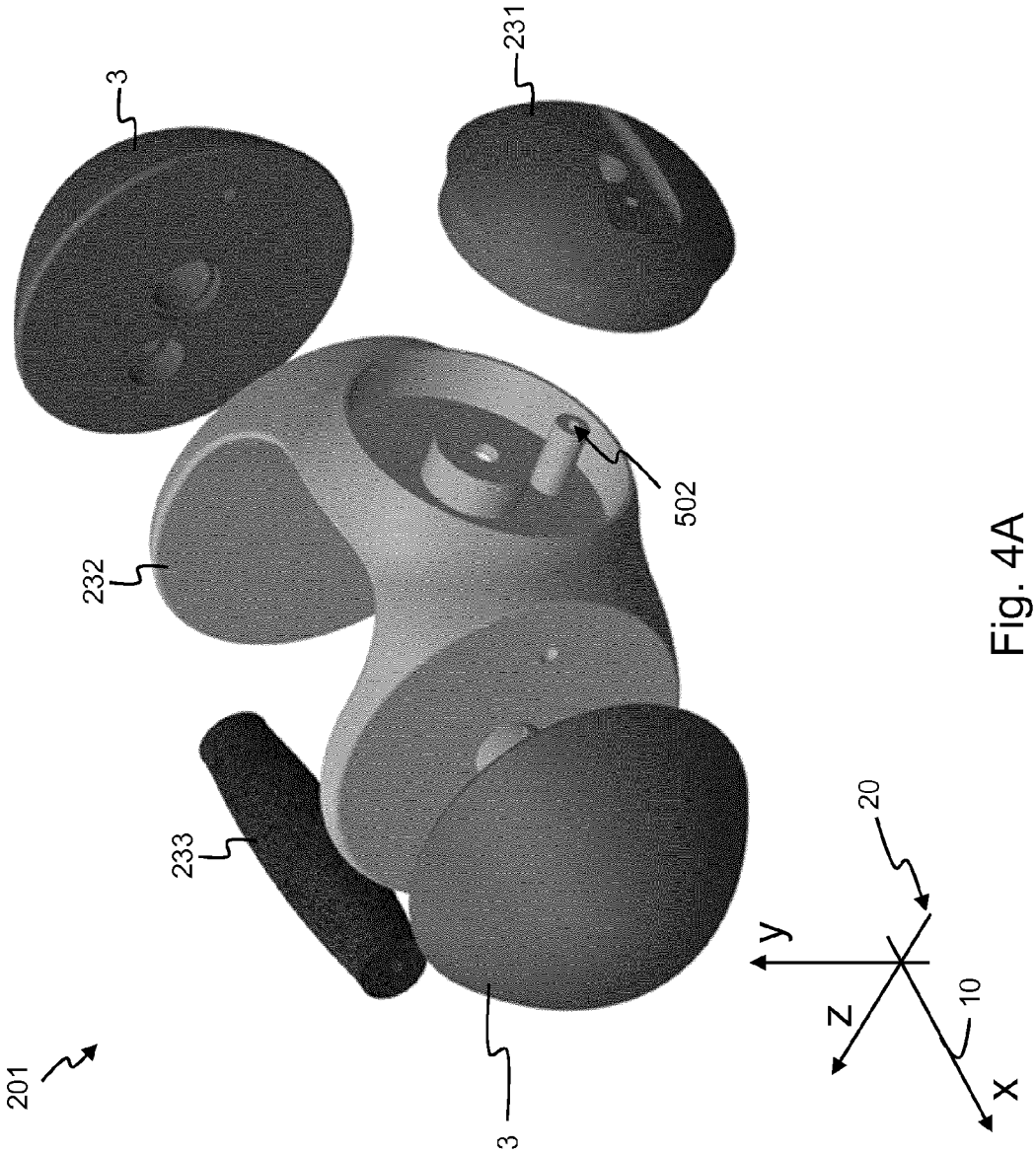


Fig. 4A

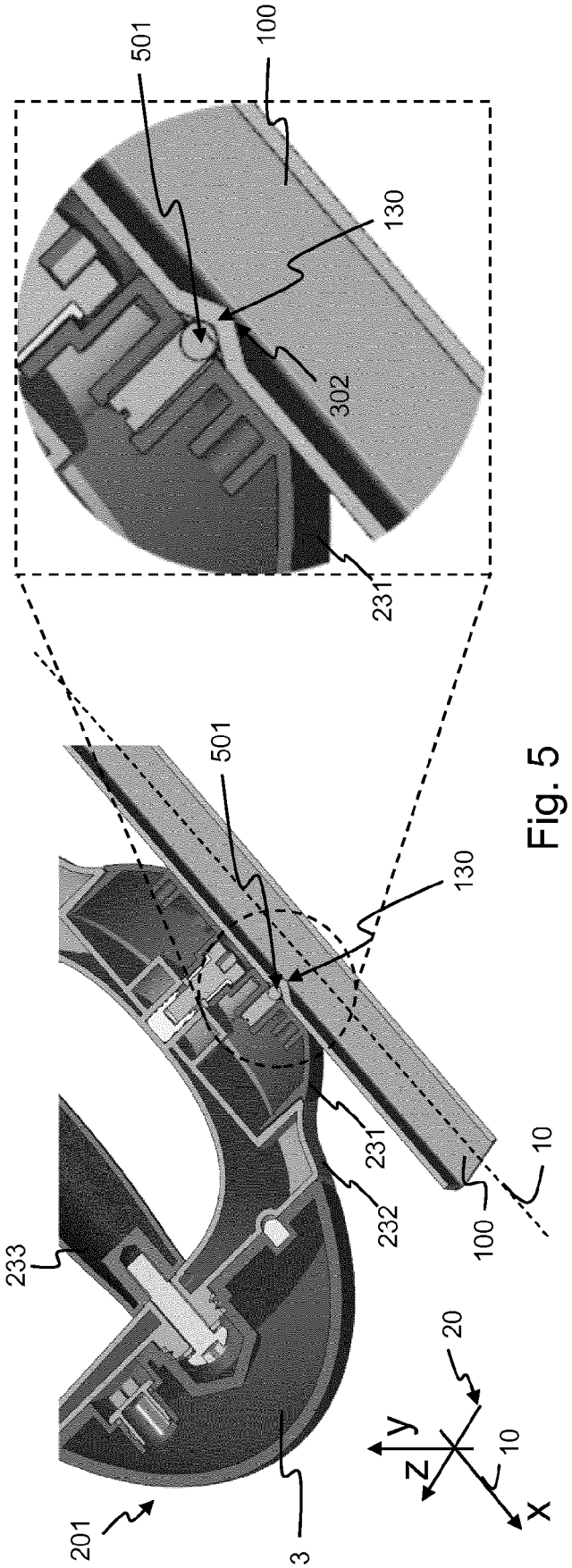

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Fig. 5

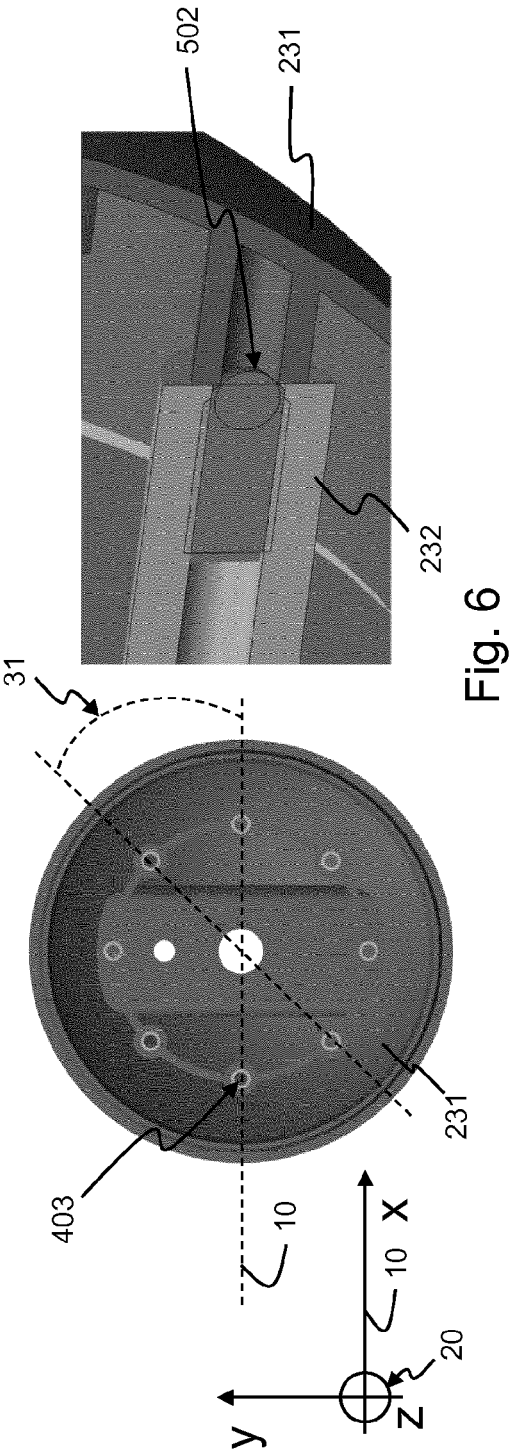
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Fig. 6

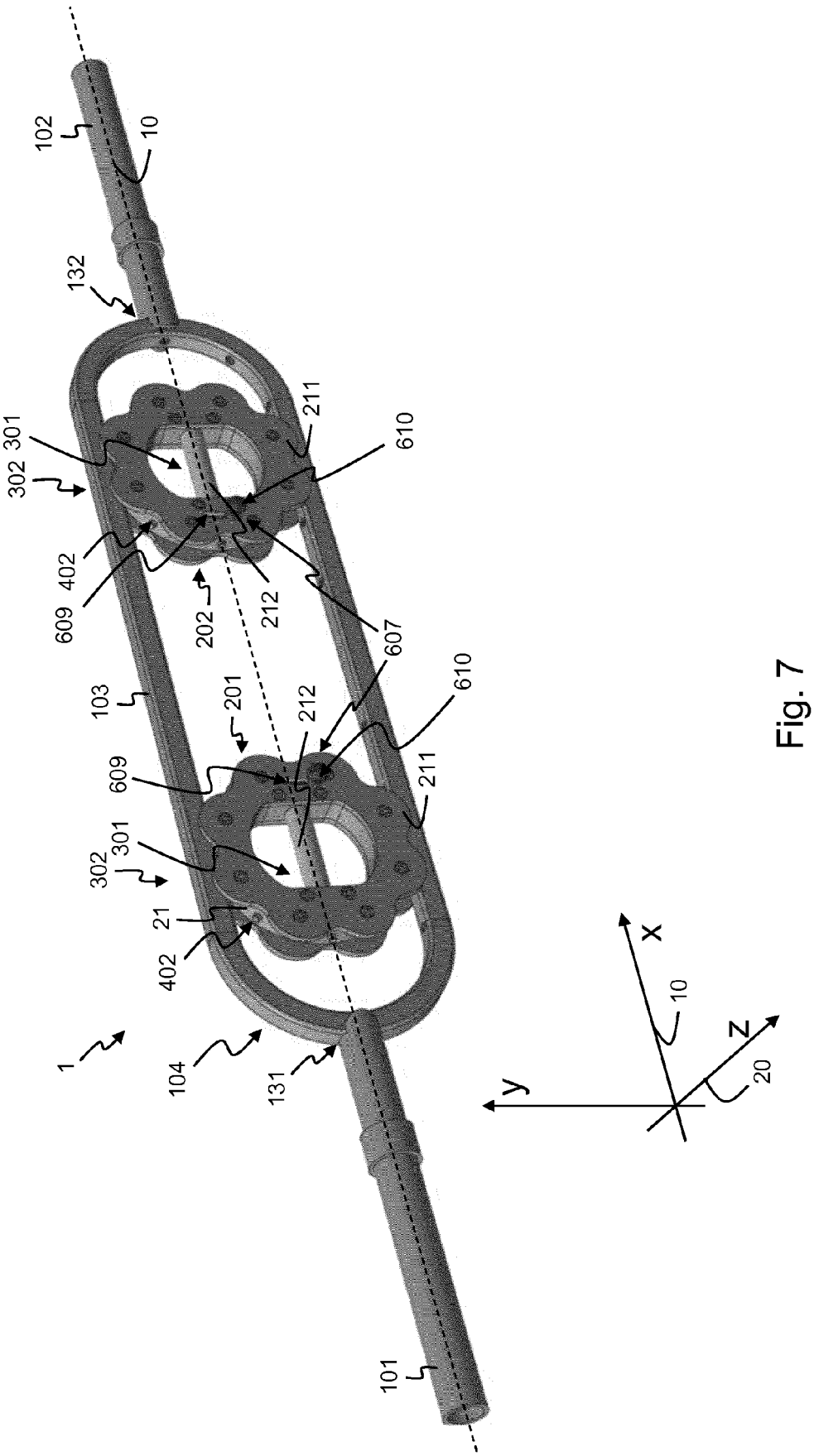
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Fig. 7

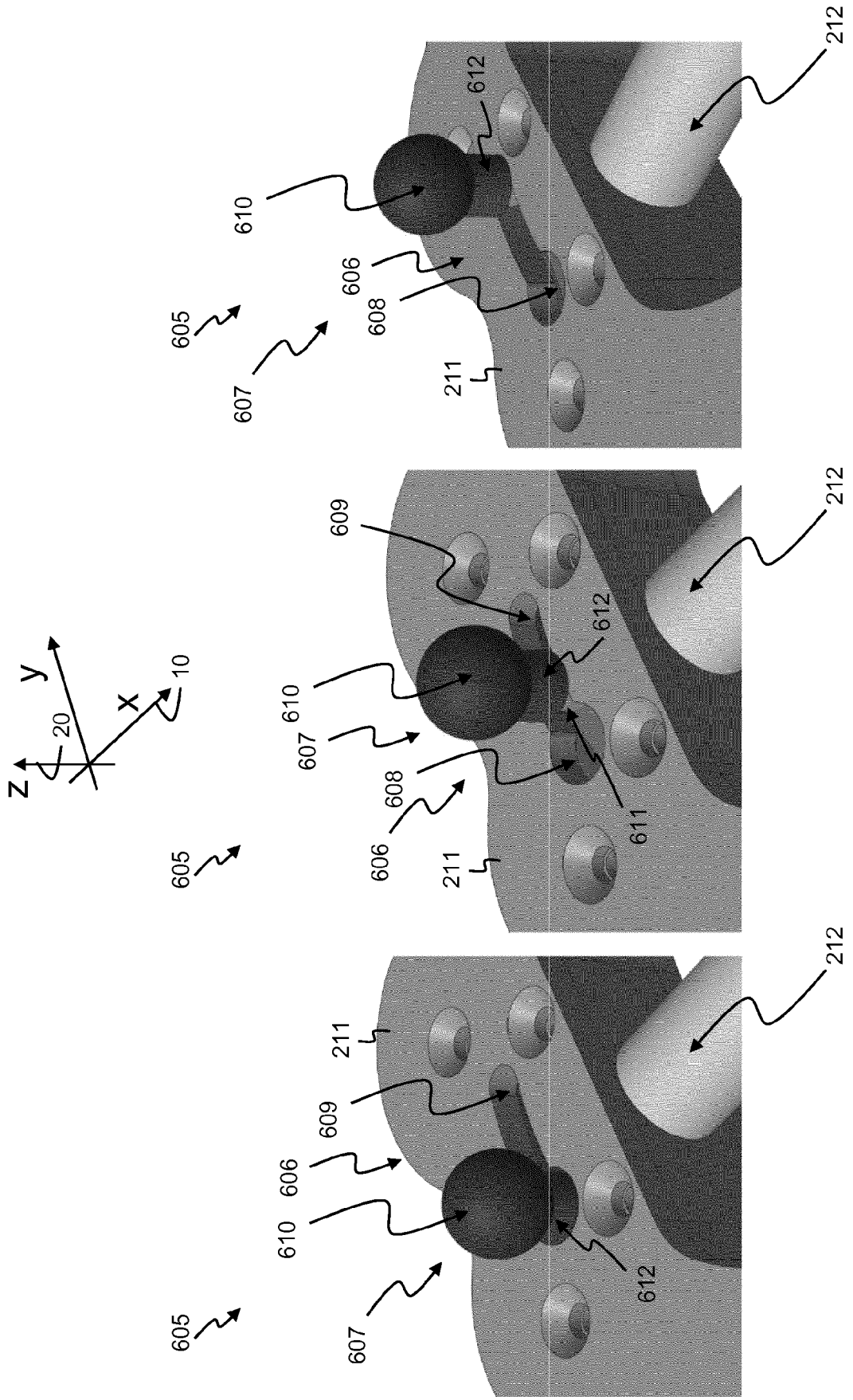

Fig. 8A

Fig. 8B

Fig. 8C

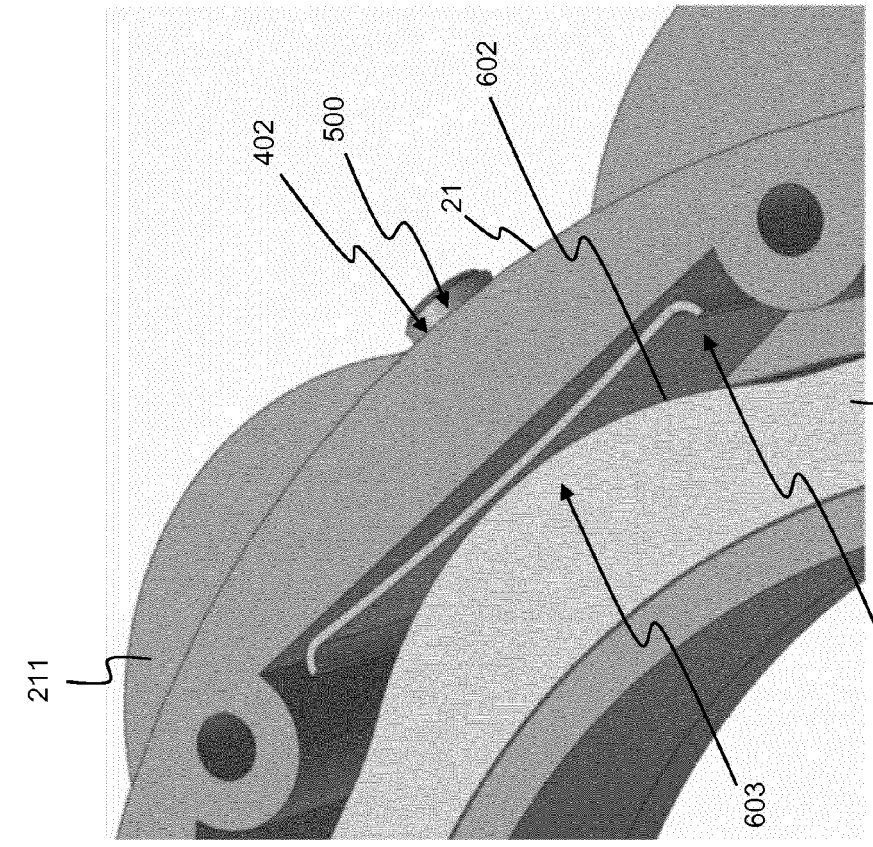
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Fig. 9B

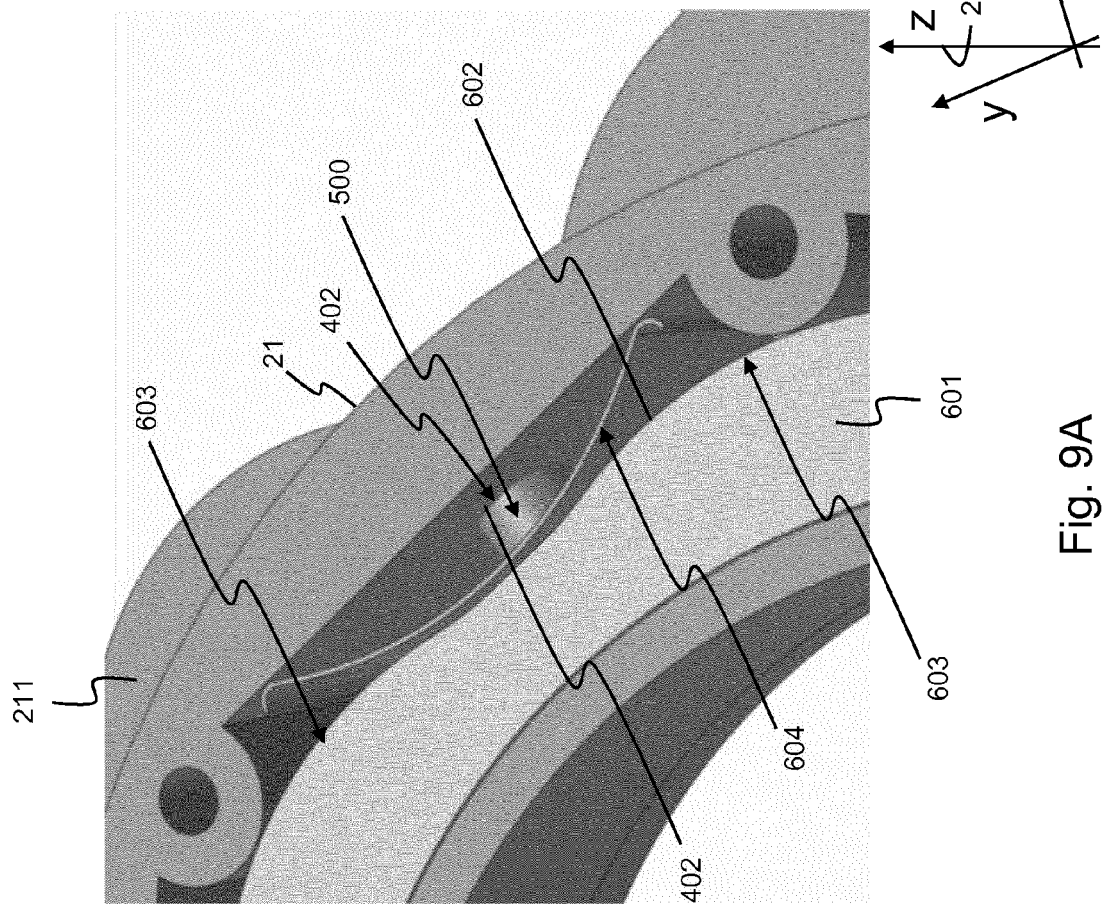
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Fig. 9A

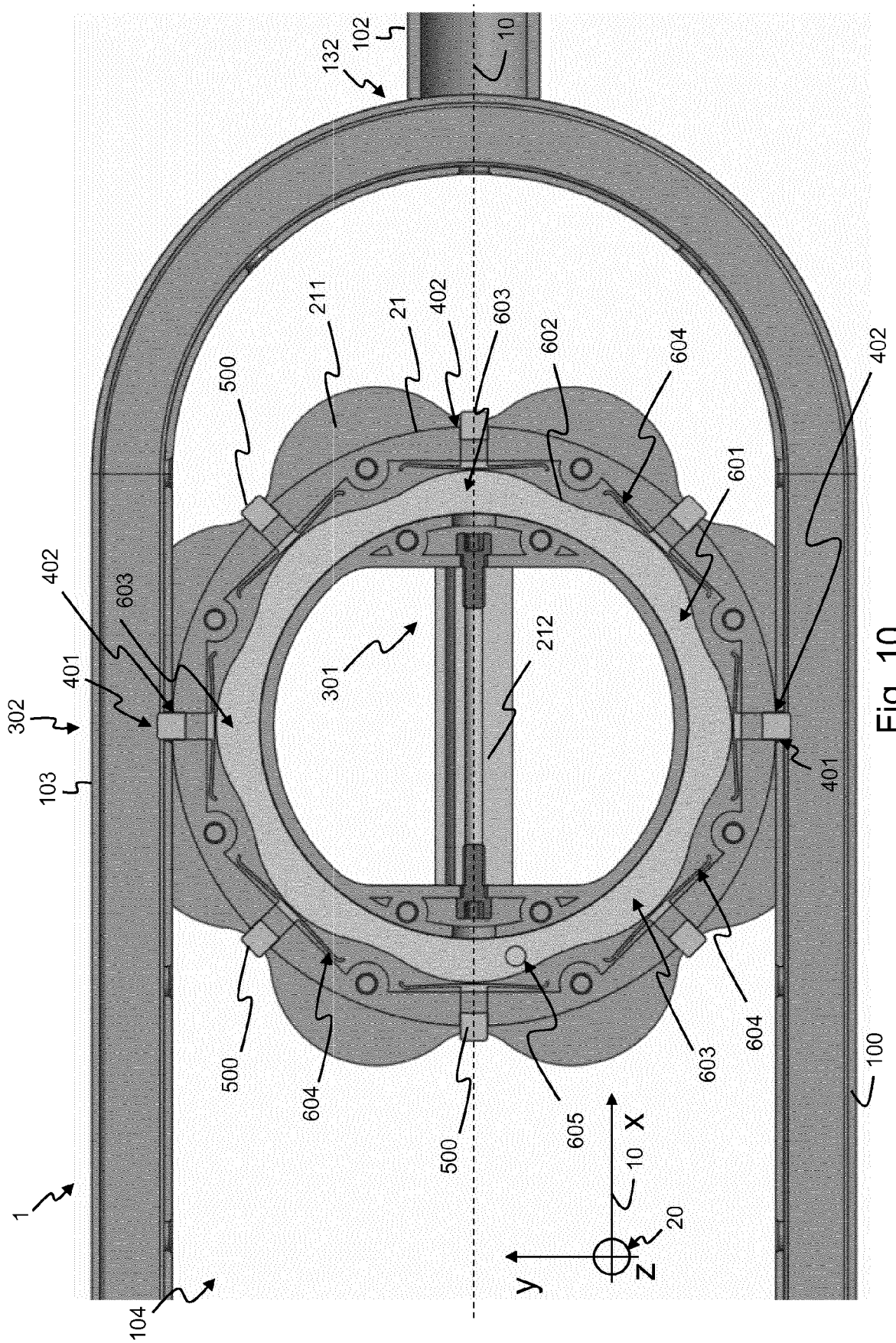
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Fig. 10

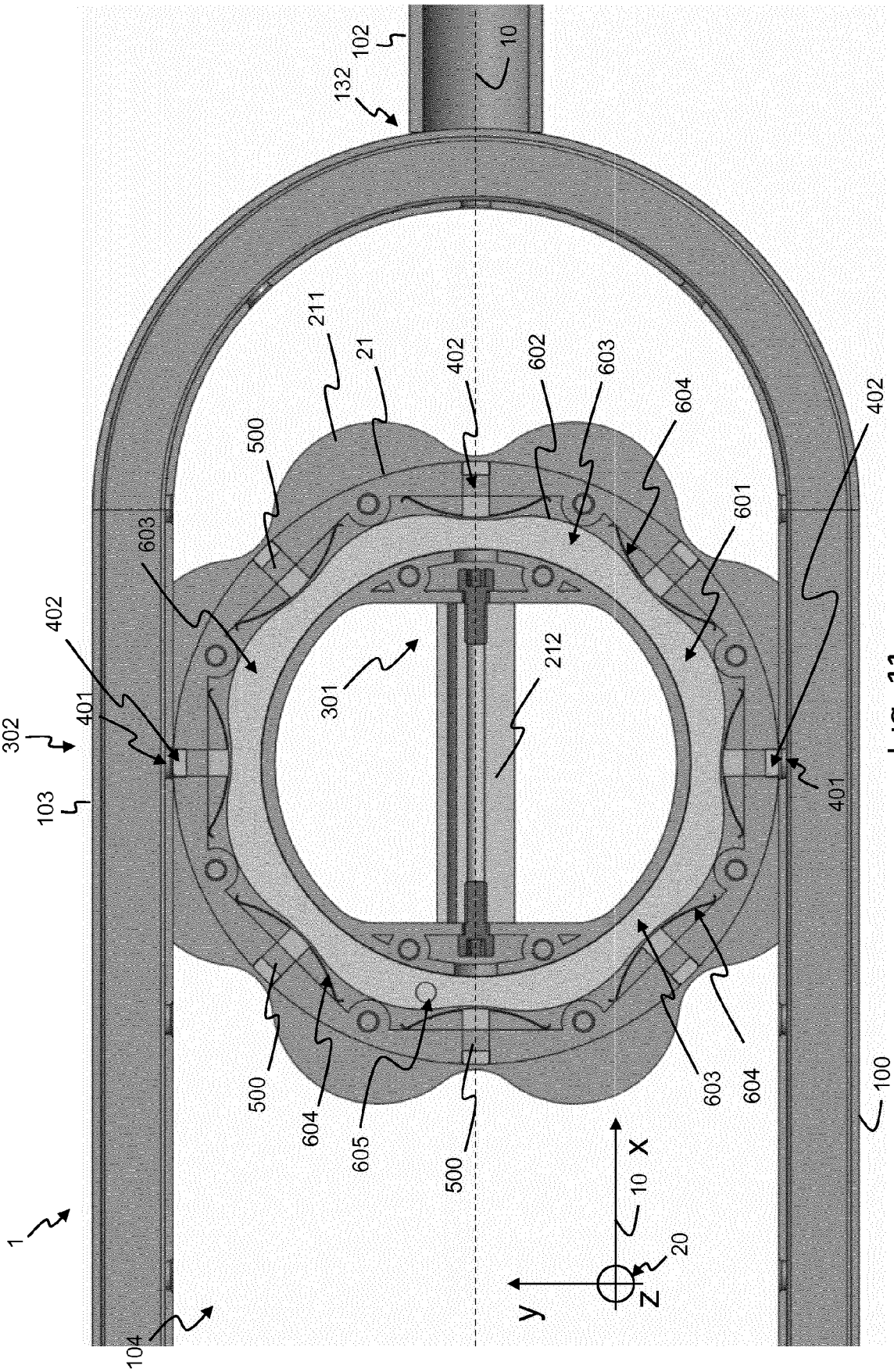
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Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 8436

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	DD 223 926 A1 (SPORT UND ERHOLUNGSZENTRUM BER [DD]) 26 June 1985 (1985-06-26) * the whole document *	1-15	INV. A63B21/072 A63B21/00
X	US 7 056 268 B2 (EMICK DANIEL W [US]) 6 June 2006 (2006-06-06) * column 5, line 28 - column 6, line 29; figures *	1-3, 11-15	
X	US 4 585 229 A (BRASHER TALLIE J [US]) 29 April 1986 (1986-04-29) * column 3, line 21 - line 56; figures *	1-15	
Y	WO 2007/020315 A1 (CABEZA DELGADO ALBERTO [ES]) 22 February 2007 (2007-02-22) * abstract; figures *	1-15	
Y	US 4 618 143 A (TWARDOSZ BRIAN [US]) 21 October 1986 (1986-10-21) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 November 2018	Squeri, Michele

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23-11-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DD 223926 A1	26-06-1985	NONE	
US 7056268 B2	06-06-2006	NONE	
US 4585229 A	29-04-1986	NONE	
WO 2007020315 A1	22-02-2007	ES 1060946 U	01-12-2005
		WO 2007020315 A1	22-02-2007
US 4618143 A	21-10-1986	NONE	

EPO FORM P0459

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