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(54) An exercise device

(57) An exercise device (100,300) comprises a lifting bar (40) having an axis and an axial end portion (60), and at least one weight section (120) mounted to the end portion (60) of the lifting bar, and having an axial end face (280). At least one and preferably a plurality of resilient projections (160, 310) project from the axial end face (280) of the at least one weight section (120) and have a distal end surface (200,320) defining an axially outermost end surface of the exercise device (100). The projections in particular are disposed and extend intermittently around the periphery of the axial end face (280), and define a castellated axially outermost end surface of the exercise device (100). The projections are integrally moulded with and as part of the outer skin (140).The projections (160, 310) projecting from the end of the dumbbell (100,300) protect the end of the dumbbell (100,300) from impact and absorb any impact energy reducing damage to the dumbbell, and in particular loosening of the mounting of the weight sections (120), when dropped on its end on the floor.

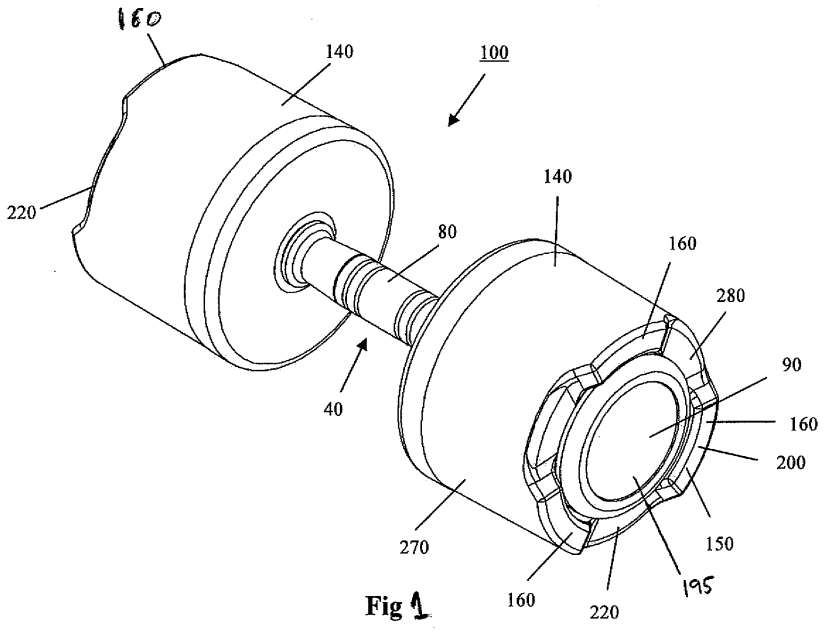

Fig 1

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Description

[0001] The present invention relates to an exercise device and in particular to a dumbbell for weight lifting and other fitness activities.

[0002] Conventional dumbbells comprise a bar and weights mounted on the ends of the bar. The dumbbell is lifted by the handle bar in order to train specific muscles groups, and/or increase muscle mass. The weights are generally permanently fixed to the bar in a dumbbell, for example by welding or may even be cast onto the handle. In one typical arrangement an end plate abutting against an end surface of the weight is fitted onto and secured to the bar to secure and retain the weight section in place on the end of the bar.

[0003] A problem associated with conventional dumbbells or barbells arises when they are dropped to the floor after use. The impact of the weight heads on the ground, particularly if the weight heads do not impact the ground simultaneously or are dropped on their axial ends and any end plates, causes a loosening of the fixing means used to secure the weight heads to the handle. Over time, repeated dropping can lead to the weight heads becoming noticeably loose, or even falling off the handle, resulting in a risk of injury to the user. The increase in the number of gym members, and therefore the increasing frequency with which such weights are used, significantly accelerates this process, which greatly reduces the life cycle of the dumbbells. In addition, and especially when the dumbbells utilise end plates to fix the weights, when the dumbbell is dropped on its axial end face the end plate and relative point loading of the axial end plate on the floor can cause impact damage to the floor or other items (for example mats) upon which the dumbbell is dropped or knocked.

[0004] Chinese utility model application number CN2409998 discloses a dumbbell with a rubber layer provided over the end to prevent damage to the ground r people. Similarly Chinese utility model application number CN2510101 discloses a dumbbell with an elastic protective end cap to reduce damage to the floor. Chinese utility model application number CN2695046 discloses a dumbbell with a end cap including a protective cover again presumably to prevent damage to the floor when the dumbbell is dropped on its end. While all of these arrangements provide some protection they can be improved.

[0005] There is therefore also a need for an improved dumbbell which is able to better withstand frequent use, and in particular withstand repeated impact from dropping, and reduces the likelihood of damage to the floor or other equipment.

[0006] In particular the prior proposals can be improved in terms of the protection they provide, and also in terms of manufacturability. In particular it has been found that it is difficult to secure such separate and discreet end caps or resilient portions on end or portions of the weight and that such separate portions are prone to falling off in use. In addition it has been found in accordance with the invention that the impact protection provided by such additional solid continuous layered arrangements can be improved by adopting an alternative arrangement.

[0007] The present invention therefore aims to provide a dumbbell which obviates or mitigates the above described problems and/or which provides improvements generally.

[0008] According to the present invention, there is therefore provided an exercise device, as defined in the accompanying claims.

[0009] In an embodiment of one aspect of the invention there is provided an exercise device comprising a lifting bar having an axis and an axial end portion. At least one weight section having an axial end face is mounted to the end portion of the lifting bar. The exercise device is preferably a dumbbell or barbell. At least one resilient projection projects from the axial end face of the at least one weight section, preferably projecting axially beyond the end of the bar, and has a distal end surface which defines an axially outermost end surface of the exercise device. The weight section may include a single peripheral rim projection disposed around the axial end face of the at least one weight section. More specifically the at least one resilient projection comprises a plurality of resilient projections. The projections are preferably disposed and extend intermittently around the periphery of the end face and define a castellated form.

[0010] The projection will thereby hit the ground or other objects first before the remainder of the dumbbell if the dumbbell is dropped on its axial end, thereby protecting the remainder of the dumbbell and floor from impact and absorbing the impact energy so reducing damage to the dumbbell and floor or other object against which it may impact. Specifically, compression of the projections during impact of the dumbbell with the ground acts to absorb the impact energy and increase deceleration time during impact, thereby providing a "softer" impact. This softer impact reduces jarring of the fixings between the weight section and the handle during impact, thereby mitigating the risk of loosening of the weight heads, mitigating damage to the inner weight section, and reducing damage to the dumbbell generally, and to other equipment. The castellated arrangement of the projections, with space between the projections allows them to deform more under impact so improving the energy absorption.

[0011] The projections preferably project substantially perpendicularly from the end face of the weight section

[0012] The exercise device may further comprise at least one end plate for securing the at least one weight section to the end portion of the bar. The projections preferably project from the end face to beyond the outer face of the end plate. The projections are preferably disposed radially outwardly of an outer periphery of the end plate. The end plate may be permanently secured to the lifting bar.

[0013] The weight section may be substantially permanently attached to the lifting bar.

[0014] The at least one inner weight section may comprise a cast metal weight. Preferably the exercise device comprises at least two weight sections, with the lifting bar has two opposing end portions, and weight sections mounted to each of the opposing end portions of the bar.

[0015] Preferably the exercise device comprises a resilient outer skin at least partially surrounding the at least one weight section, and preferably the plurality of projections comprise an integral part of the outer skin. The outer skin may be moulded about the weight section, and the plurality of shock absorbing projections may be integrally moulded with the outer skin. The resilient projections and/or the outer skin are preferably formed from polyurethane or rubber.

[0016] Integrally forming the projections with the outer skin enables the projections to the formed in the same manufacturing step as the skin, thereby simplifying manufacture. In addition, the integral projections are thus securely connected to the outer skin, as compared for example to the use of an adhesive to secure the projections as separate elements. This is an important aspect and may but used separately to providing a plurality of projections and in arrangements with a continuous single rim projection.

[0017] Accordingly in another aspect of the invention there is provided an exercise device comprising a lifting bar having an axis and an axial end portion; at least one weight section mounted to the end portion of the lifting bar, and having an axial end face; a resilient outer skin at least partially surrounding the at least one weight section and moulded about the weight section; and at least one resilient projection projecting from the axial end face of the at least one weight section and having a distal end surface defining an axially outermost end surface of the exercise device. The at least one resilient projection is formed from the outer skin and is integrally moulded with the outer skin.

[0018] In accordance with this aspect the weight section may include a single peripheral rim projection disposed around the axial end face of the at least one weight section. More preferably however the at least one resilient projection comprises a plurality of resilient projections. The projections are preferably disposed and extend intermittently around the periphery of the end face and define a castellated form.

[0019] This further aspect of the inventions may also be used in combination with any of the other features of the other aspect of the invention described above.

[0020] The present invention will now be described by way of example only, and with reference to the following illustrated figures in which :-

Figure 1 is a perspective view of a dumbbell according to an embodiment of the invention;

Figure 2 is a cross-sectional view through the dumbbell of Figure 1;

Figure 3a is a cross sectional view of an uncompressed projection according to an embodiment of the invention;

Figure 3b shows the projection of Figure 3a in a compressed state during impact;

Figure 4 is a perspective view of a dumbbell according to an alternate embodiment of the invention; and

Figure 5 is a cross-sectional view through the dumbbell of Figure 4.

[0021] Referring to Figures 1 and 2, a dumbbell 100 according to a first embodiment of the invention comprises first and second weight sections 120 mounted to opposing ends of a lifting bar 40 having a central axis. The bar 40 comprises a handle portion 80, configured to enable a user to grip the bar 40 to lift the dumbbell 100. The bar 40 is preferably formed from steel, and the handle portion 80 is provided with a knurled surface, to improve grip.

[0022] The weight sections 120 have a central axis and are preferably substantially cylindrical in shape. The weight sections 120 each include a circumferential surface 270 extending around the circumference of the weight section 120, and a substantially axial end surfaces 280 facing outwards at opposing axial ends of the dumbbell 100. Each weight section 120 comprises an inner weight section 212, formed from cast iron, although any other suitable material may be used.

[0023] As shown in more detail in figure 2 the weight sections 120 are preferably mounted and secured to the opposing end portions 60 of the bar coaxially with an axis of the bar 40. An inner bore 111 is formed in the inner weight section 212. The inner bore 111 is configured to receive the end mounting portion 60 to mount the weight section 120 to the bar 40. The inner bore 111 is dimensioned to provide an interference fit with the end portion 60, to prevent rattle between the end portion 60 and the inner weight section 212. The inner weight section 212 may be cast about a collar 123 which is subsequently internally machined to provide the inner bore 111 to provide an interference fit with the end portion 60 of the bar. Alternatively the inner bore 111 may be directly formed in the inner weight section 212 during the casting processing or may be machined after casting.

[0024] Each weight section 120 further comprises an end plate assembly 90. The end plate assembly 90 abuts against the outer axial end surface 280 of the weight section 120, while a portion of the opposing inner axial end surface engages and is urged by the end plate assembly 90 against a flange section 210 formed at the end of the handle portion 80. The end plate assembly 90 is secured to the end portion 60, to thereby secure the weight section 120 to the end portion 60 of the bar 40. Specifically, each end plate assembly 90 is secured to the end portion 60 by a screw 190 which co-operates with an internal thread formed within the end portion 60 of the bar 40. The screw 190 is not generally removed, with the screw 190, end plate assembly 90 and weight section 120 being sub-

stantially permanently fixed to the bar 40. Alternatively the end plate assembly 90 may be secured to the end portion 60 by any other suitable means. In other embodiments the weight section 120 may be preferably substantially permanently secured to the end sections of the bar 40 by any other means. For example the end plate assembly 90, or indeed weight section 120 may be simply welded to the end section of the bar 40. The screw 190 may also be retained using thread locking compound. The screw 190 or other attachment may be covered by a cover 195, for example adhesively attached over the end of the end plate assembly 90.

[0025] An outer skin 140 of polyurethane or rubber material is formed about the inner weight section 120. Specifically, the outer skin 140 is preferably moulded about the inner weight section. The end plate 90 may be recessed into and interlocked with the outer skin 140 to fix it in position and limit rotation relative to the weight section 120.

[0026] As cast iron typically comprises a low quality surface finish, the outer skin 140 provides the weight section 120 with an improved visual appearance. In addition, the resilient and compressible material properties of the polyurethane act to some degree protect the inner weight section 120 from damage, and to provide limited impact absorption. In addition, coating the inner weight section 212 with an outer skin 140 protects the cast iron from corrosion, and mechanical damage.

[0027] The outer skin 140 furthermore comprises integrally formed spaced projections 160 positioned around the periphery of the outer axial end face 280 of each weight sections 120. The projections 160 comprise discrete individual resilient projection elements, and blocks of resilient material, extending from the outer axial end face 280 of the outer weight section 120. The projections 160 extend from the outer face 280 substantially perpendicular to the outer face 280, and the outer surface of the end plate assembly 90, to a depth B (see figure 3a) greater than the depth of the end plate assembly 90, as indicated by dimension A in figure 2, with the raised distal end surface portions 200 of the projections 160 comprising the axial outermost extent of the dumbbell 100, and projecting beyond the end of the bar 40 and remainder of the dumbbell 100. The projections 160 are intermittently spaced and extend circumferentially around the periphery outer axial end face 280, and about the end plate assembly 90, and define a castellated form comprising raised distal end surface portions 200 formed by the projections 160 and recessed portions 220 defined between the projections 160. In particular the projections 160 are disposed radially outwardly of the radial periphery of the end plate assembly 90. Preferably three projections 160 are provided on each weight section 120, although two, or more than three projections could be provided. As such, the end plate assembly 90, and remainder of the dumbbell 100 when viewed in cross section is recessed behind the projections 160, with the projections 160 also surrounding and so protecting the end plate assembly 90, as well as defining the outer periphery of the end of the dumbbell 100.

[0028] Accordingly and advantageously with this arrangement of projections 160 when the dumbbell 100 is dropped on its end, the projections 160 contact the ground first, and in particular before the end plate assembly 90 and remainder of the dumbbell 100, and preferably prevent contact of the end plate assembly 90 and remainder of the dumbbell 100 with the ground altogether. In addition the shape and resilient material properties of the projections 16 are such that they act as shock absorbers, to provide the dumbbell 100 with improved impact absorption properties. Specifically the projections 160 comprise discrete elements having lateral walls separated from each other, and have distal upper end surfaces 200, the projections 160 can deform and flex under such impact I loading as shown in figures 3a and 3b. Figure 3a shows a projection 160 prior to impact loading I in the uncompressed position in which the projection 160 is at its full height and thickness B. During impact I the projection 160 is compressed to a reduced thickness C, as shown in Figure 3b, in which the thickness of the projection 160 decreases while its width increases as it is compressed. The compression of the projection 160 absorbs a portion of the impact energy. As such, the impact of the weight section 120 on the ground is cushioned by the compression, deformation and flexing of the projections 160. In contrast a solid outer skin layer is not able to be compressed as easily under impact since the continuous surface restricts and constrains the adjacent parts of the skin and is less able to absorb such impact energy. Providing individual discrete projections 160, rather than for example a continuous band extending around the periphery of the outer face 280 therefore enables the projections 160 to compress and function as shock absorbing members, and provide improved impact energy absorption.

[0029] The shock absorption provided by the projections 160 also reduces 'jarring' and stresses generated in the mounting and securement of the weight section 120 and end plate 90 to the bar 40. In addition the projections 160 also effectively protect the end plate assemblies 90 from impacting the ground which can directly weaken the attachment of the end plate 90 to the bar 40. As a result possible weakening and loosening of the mounting of the weight sections 120 following such repeated impact of the end of the dumbbell is reduced.

[0030] The projections 160, and shock absorption provided by them also reduce any point loading on the floor or against other objects when the end of the dumbbell 100 is dropped on the floor or knocked against other objects. In particular the projections 160, since they project beyond the end of the dumbbell protect and generally prevent other more solid parts of the dumbbell, for example, the end plate assembly 90 and end of the bar 40 from hitting the floor or other objects.

[0031] In addition, by providing individual discrete projections 160, rather than for example providing a com-

plete thickened axial end face 280 layer or continuous band extending around the periphery of the outer face 280, a significant material saving is achieved by the recessed portions 220 defined between the projections 160. The recessed portions 220 also enable a user to place their hands under the weight section 120 when the dumbbell 100 is placed on its end, thereby enabling further alternative lifting positions for the dumbbell 100.

[0032] The outer skin 140, and integral projections 160, are preferably formed about the inner weight section 212 by a moulding operation using a mould (not shown) into which the inner weight section 212 is placed with the mould surrounding the inner weight section 212. The mould defines a mould cavity between the inner weight section 212 and an inner mould surface corresponding to the outer skin 140. A material, such as polyurethane, is then injected into the mould cavity, where it forms about the inner weight section 212. In this way an outer skin 140 having the plurality of projections 160 is formed about and moulded onto the inner weight section 212.

[0033] The mould preferably comprises two mould sections, or mould halves. The two mould halves may be further fitted into an outer mould section to hold them together during moulding. The mould halves each comprise an inner surface having a configuration including recesses shaped to define the projections 160. The mould halves are split so that they can thereby be separated and the mould split open to allow the inner weight section 212 with moulded outer skin 140 with the projections 160 to be removed. This two part mould arrangement enables the mould to be easily removed from the weight section 120 after moulding by separating the two mould sections, which would not be possible with a one piece mould due to the projections 160 extending into the mould walls.

[0034] While the projections 160 preferably comprise part of and are integral with the outer skin 140, they may in other embodiments comprise a separate element(s), and blocks of resilient material separately attached or moulded to the weight section 120 and/or outer skin 140 either as individual projections 160 or as a group interconnected by a web of material extending between them.

[0035] Figures 4 and 5 show a dumbbell 300 according to an alternate embodiment of the invention. This dumbbell 300 and embodiment is generally similar to the first embodiment and dumbbell 100 described above. Like reference numerals will therefore be used for like features and only the main differences will now be described.

[0036] In particular in this alternate embodiment, the dumbbell 300 includes a single axial end rim projection 310 projecting from the axial end face 280 of the dumbbell 300 instead of the plurality of projections 160. The rim projection 310,simialry to the plurality of projection 160 of the previous embodiments is disposed around the outer periphery of the axial end face 280 and radially outwardly of the end plate assembly 90 The rim projection 310 comprises a block of resilient material, extending from the outer axial end face 280 of the outer weight section 120, and is preferably an integral part of the moulded outer skin, although could be provided as a separate resilient element mounted on the axial end face 280 of the dumbbell 300. The rim projection 310 extends from the outer face 280 substantially perpendicular to the outer face 280, and the outer surface of the end plate assembly 90, to a depth greater than the depth of the end plate assembly 90, as indicated by dimension A in figure 5, with a raised distal end surface portion 320 of the rim projection 310 comprising the axial outermost extent of the dumbbell 300, and projecting beyond the end of the bar 40 and remainder of the dumbbell 300. The rim projection 310 thereby defies and encloses a depressed recess in the axial end face 280 of the dumbbell 300 surrounding the end plate 90 and within which the end plate 90 is located. As such, the end plate assembly 90, and remainder of the dumbbell 300 when viewed in cross section is recessed behind the rim projection 310, with the rim projection 310 surrounding and so protecting the end plate assembly 90, as well as defining the outer periphery of the end of the dumbbell 300.

[0037] As with the previous embodiment and dumbbell 100, in this embodiment and dumbbell 300 when the dumbbell 300 is dropped on its end, the rim projection 310 contacts the ground first, and in particular before the end plate assembly 90 and remainder of the dumbbell 300, and preferably prevents contact of the end plate assembly 90 and remainder of the dumbbell 300 with the ground altogether. In addition while the rim projection 310 cannot as easily deform under impact loading as is the case with the discrete projections 160, the rim projection 310 can still deform, in particular more so than a solid end plate 90 or solid layer of resilient material over the entire axial end face. As such the rim projection 310 still acts to some degree as shock absorbers, to provide the dumbbell 300 with improved impact absorption properties. The rim projection 310, and shock absorption provided also reduce any point loading on the floor or against other objects when the end of the dumbbell 100 is dropped on the floor or knocked against other objects. In particular the projection of the rim projection 310 beyond the end of the dumbbell protect and generally prevent other more solid parts of the dumbbell, for example, the end plate assembly 90 and end of the bar 40 from hitting the floor or other objects.

[0038] It will be appreciated that in further embodiments, various modifications to this specific arrangement described as above and shown in drawings may be made. For example, while the fixing means is described as being an end plate, any suitable means of securing a weight section 120 to a bar 40 may be utilised.

[0039] In further embodiments projections and/or a relief pattern may also be provided in the circumferential surface 270 of the outer skin 140, as described in our copending application number 0911848.0 (reference P354925GB; POSGB) entitled "An Exercise Weight for Mounting to a Lifting Bar" the features of which are incorporated herein by reference.

[0040] It will also be appreciated that while the weight sections 120 are generally cylindrical having a circular axial end surface, in other embodiments they may have other shapes while still having a generally axial end surface and central axis. Furthermore the weight sections 120, bar 40, and handle 80 upon which the weight sections are mounted does not need to be coaxial with the central axis of the weight sections 120.

Claims

1. An exercise device (100) comprising:

a lifting bar (40) having an axis and an axial end portion (60); and
at least one weight section (120) mounted to the end portion (60) of the lifting bar (40), and having an axial end face (280);
characterised in that the device (100) further comprises a plurality of resilient projections (160) projecting from the axial end face (280) of the at least one weight section (120), the plurality of resilient projections (160) disposed and extending intermittently around the periphery of the axial end face (280), each projection (160) having a distal end surface (200) defining a castellated axially outermost end surface of the exercise device (100).

2. The exercise device (100) of claim 1 wherein the plurality of resilient projections (160) are disposed around the axial end face (280) of the at least one weight section (120).

3. The exercise device (100) of any preceding claim wherein the plurality of resilient projections (160) project axially beyond the end of the bar (40), and preferably project substantially perpendicularly from the end face (280) of the weight section (120).

4. The exercise device (100) of any preceding claim further comprising at least one end plate (90) for securing the at least one weight section (120) to the end portion of the bar (40), and the plurality of resilient projections (160) project from the end face to beyond (A) the outer face of the end plate (90).

5. The exercise device (100) of claim 4 wherein the plurality of resilient projections (160) are disposed radially outwardly of an outer periphery of the end plate (90).

6. The exercise device (100) of claims 4 or 5 wherein the end plate (90) and/or weight section (120) is permanently secured to the lifting bar (40).

7. The exercise device (100) of any preceding claim further comprising a resilient outer skin (140) at least partially surrounding the at least one weight section (120).

8. The exercise device (100) of claim 7 wherein the plurality of resilient projections (160) comprise an integral part of the outer skin (140).

9. The exercise device (100) of claim 8 wherein outer skin (140) is moulded about the weight section (120), and the plurality of resilient projections (160) are integrally moulded with the outer skin (140).

10. The exercise device (100) of any of claims 7 to 9, wherein the outer skin (140) is formed from polyurethane or rubber.

11. The exercise device (100) of any preceding claim, wherein the plurality of resilient projections (160) are formed from polyurethane or rubber.

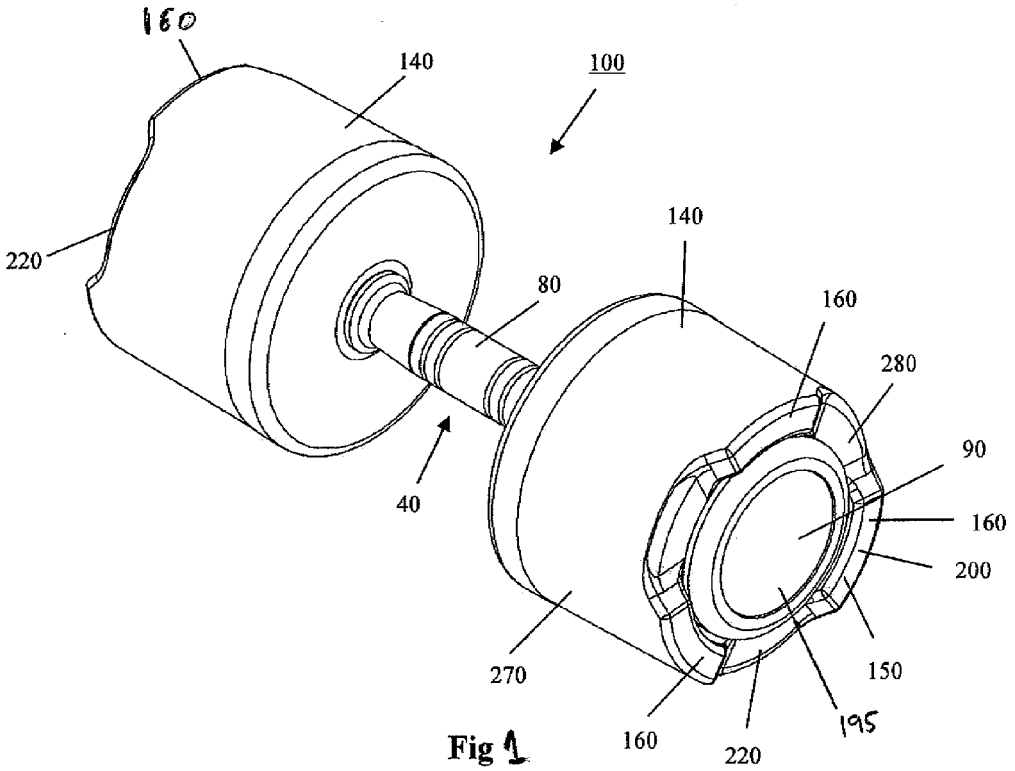
12. The exercise device (100) of any preceding claim wherein the at least one weight section (120) comprises a cast metal weight (212).

13. The exercise device (100) of any preceding claim wherein the lifting bar (40) has two opposing end portions, and weight sections (120) mounted to each of the opposing end portions of the bar (40).

14. The exercise device (100) of any preceding claim wherein the exercise device (100) is a dumbbell.

15. An exercise device (100,300) comprising:

a lifting bar (40) having an axis and an axial end portion (60);
at least one weight section (120) mounted to the end portion (60) of the lifting bar (40), and having an axial end face (280);
a resilient outer skin (140) at least partially surrounding the at least one weight section (120) and moulded about the weight section (120); and
at least one resilient projection (160,310) projecting from the axial end face of the at least one weight section (120) and having a distal end surface (320) defining an axially outermost end surface of the exercise device (100,300);
characterised in that the at least one resilient projection (160,310) is formed from the outer skin (140) and is integrally moulded with the outer skin (140).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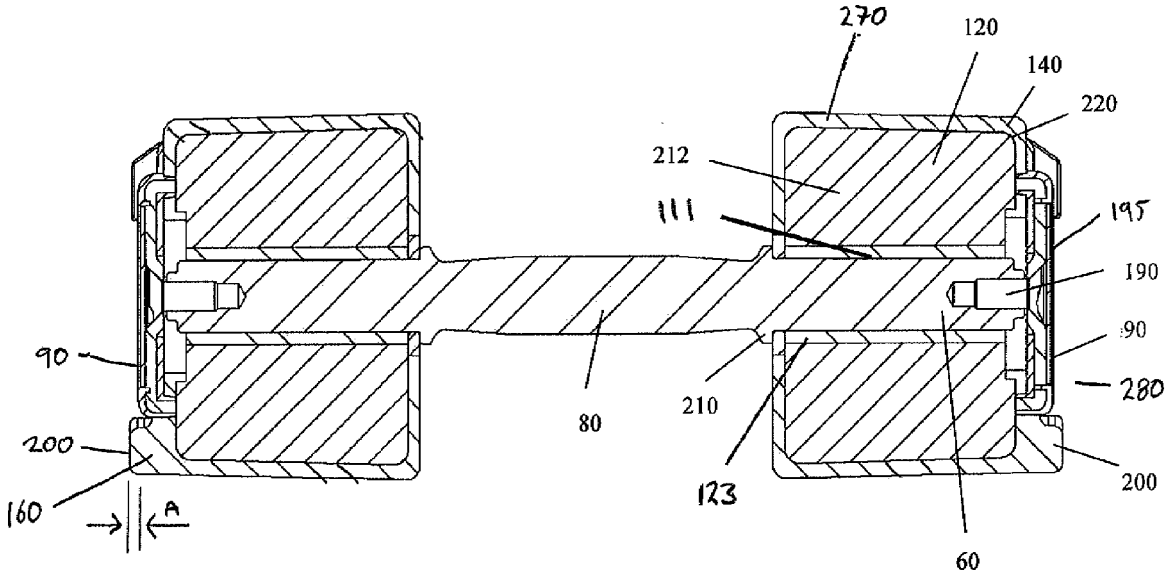
195

Fig 1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60

Fig 2

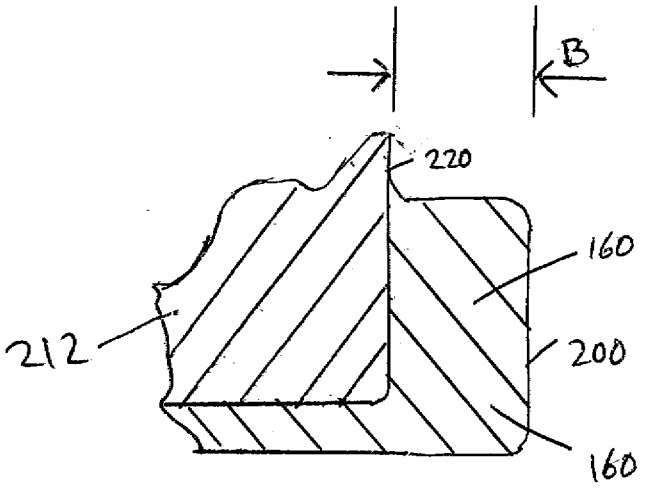


Fig 3a

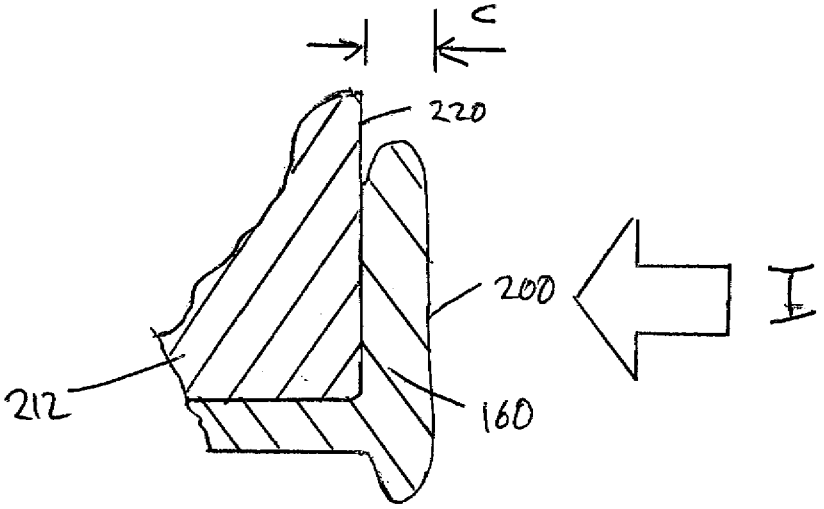
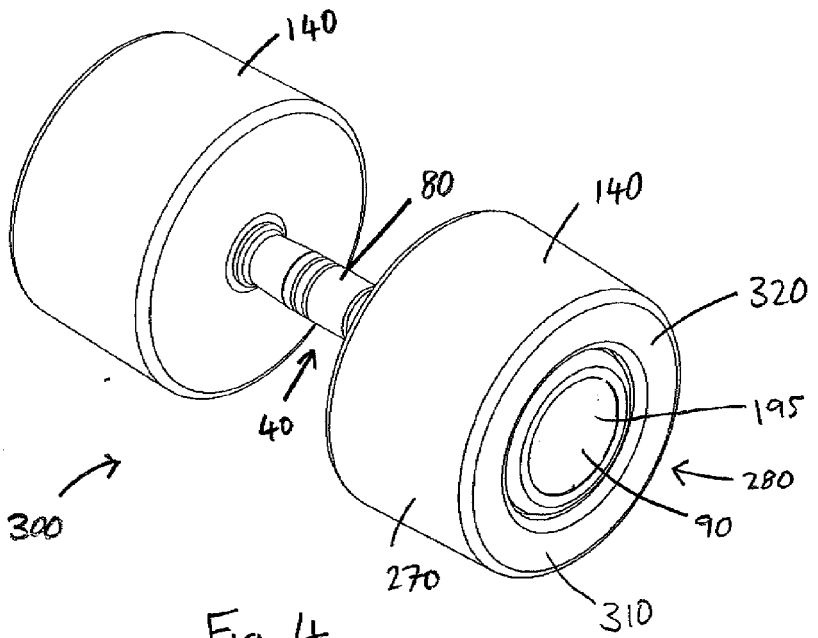


Fig 3b


140
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280
90
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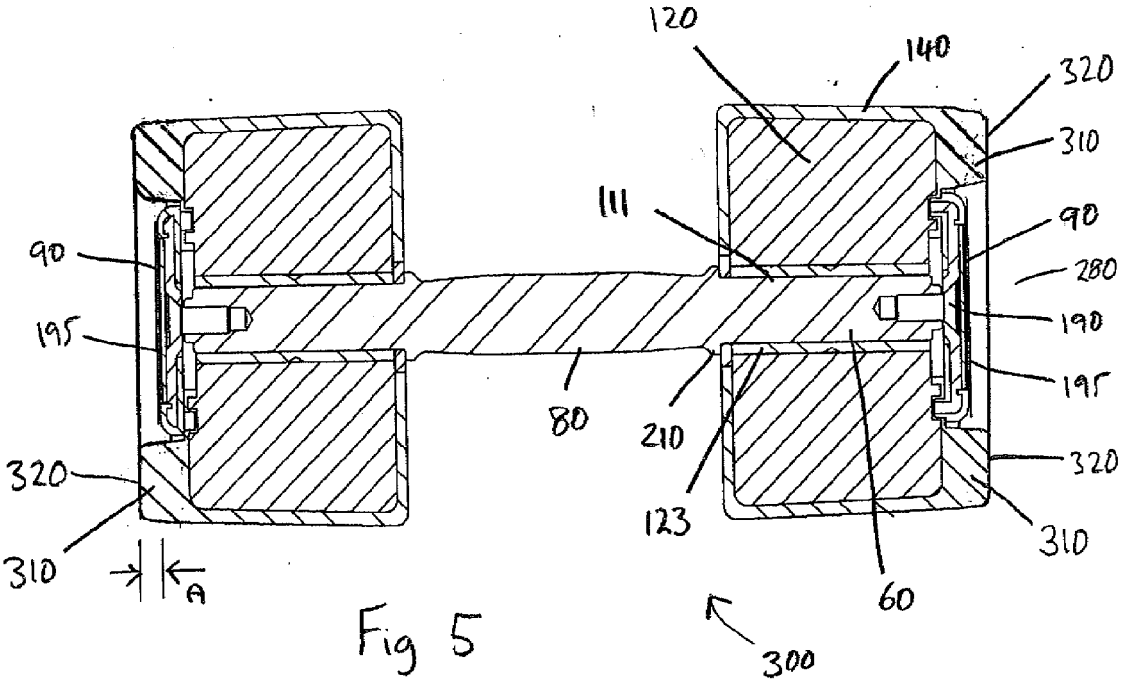
270
310

Fig 4


120
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90
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190
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80
210
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60
300

Fig 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 2409998 **[0004]**
- CN 2510101 **[0004]**
- CN 2695046 **[0004]**