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GRIP ASSIST DEVICE FOR ATHLETIC TRAINING WEIGHTS AND METHODS RELATED THERETO

Abstract

A grip assist device configured to be securely adhered to and removed from a grip bar of an athletic training weight. The grip assist device has a flexible grip wrap that can be attached to and detached from the grip bar. The grip wrap has a plurality of peaks and finger depressions on its exterior surface, a non-slip feature on its interior surface, and one or more sensors that can sense various forces on and motions of the gripper to provide useful feedback information to a user during a training session with the training weight. The sensor(s) can pair with a computer software application that analyzes the data sent from the sensor and provides one or more direct and/or derived measurements from the torque and/or range-of-motion measurements to the user.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims the benefit of U.S. Provisional Application No. 63/553,888 filed Feb. 15, 2024, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION
[0002] The invention generally relates to grips adapted for use with athletic training weights, and more particularly to a grip assist device that is equipped with one or more sensors and adapted to be wrapped around a grip bar of an athletic training weight, and to methods related thereto.
BRIEF SUMMARY OF THE INVENTION
[0003] The intent of this section of the specification is to briefly indicate the nature and substance of the invention, as opposed to an exhaustive statement of all subject matter and aspects of the invention. Therefore, while this section identifies subject matter recited in the claims, additional subject matter and aspects relating to the invention are set forth in other sections of the specification, particularly the detailed description, as well as any drawings.
[0004] The present invention provides, but is not limited to, grip assist devices configured to be securely adhered to and removable from an athletic training weight, such as the grip bar of a dumbbell.
[0005] According to a nonlimiting aspect, a grip assist device includes a grip wrap having a partial tubular shape that defines an interior surface, an exterior surface, and opposing longitudinal edges separated by a longitudinal gap. The grip wrap is formed of a flexible material and adapted to surround a grip bar of an athletic training weight. A plurality of peaks and finger depressions are disposed on the exterior surface diametrically opposite the longitudinal gap, a non-slip feature is disposed on the interior surface, and a sensor is embedded in the grip wrap and configured to sensor at least one of torque, motion, and range of motion of the grip wrap.
[0006] According to another nonlimiting aspect, an athletic training weight includes a weight head disposed at the end of a grip bar, and a grip assist device as described above.
[0007] Technical aspects of a grip assist device as described above preferably include the ability to improve the grip on an athletic training weight and the ability to monitor the dynamic motion and/or forces during use of an athletic training weight to provide feedback to the user. The grip assist device preferably achieves such benefits in part through the utilization of the peaks and finger depressions on its exterior surface and the non-slip feature(s) on its interior surface, which effectively increase the surface areas of the exterior and interior surfaces to increase friction in a manner that promotes a better grip and thereby better workout results.
[0008] These and other aspects, arrangements, features, and/or technical effects will become apparent upon detailed inspection of the figures and the following description.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0009] FIG. **1** is a diagrammatic illustration of a grip assist device mounted in an operative position around a grip bar of a dumbbell according to a nonlimiting embodiment of the invention.
[0010] FIGS. **2** and **3** are perspective views of two embodiments of the grip assist device of FIG. **1**.
[0011] FIG. **4** is an end view of the embodiment of the grip assist device depicted in FIG. **3**.
[0012] FIG. **5** is a detailed view of an exterior surface region of the grip assist device depicted in FIG. **3**.
DETAILED DESCRIPTION OF THE INVENTION
[0013] The intended purpose of the following detailed description of the invention and the

phraseology and terminology employed therein is to describe what is shown in the drawings, which include relate to one or more nonlimiting embodiments of the invention, and to describe certain but not all aspects of the embodiment(s) to which the drawings relate. The following detailed description also identifies certain but not all alternatives of the embodiment(s). As nonlimiting examples, the invention encompasses additional or alternative embodiments in which one or more features or aspects shown and/or described as part of a particular embodiment could be eliminated, and also encompasses additional or alternative embodiments that combine two or more features or aspects shown and/or described as part of different embodiments. Therefore, the appended claims, and not the detailed description, are intended to particularly point out subject matter regarded to be aspects of the invention, including certain but not necessarily all of the aspects and alternatives described in the detailed description.

[0014] To facilitate the description provided below of the embodiment(s) represented in the drawings, relative terms, including but not limited to, “proximal,” “distal,” “anterior,” “posterior,” “vertical,” “horizontal,” “lateral,” “front,” “rear,” “side,” “forward,” “rearward,” “top,” “bottom,” “upper,” “lower,” “above,” “below,” “right,” “left,” etc., may be used in reference to the orientation of the grip assist device during its use and/or as represented in the drawings. All such relative terms are useful to describe the illustrated embodiment(s) but should not be otherwise interpreted as limiting the scope of the invention.

[0015] As used herein the terms “a” and “an” to introduce a feature are used as open-ended, inclusive terms to refer to at least one, or one or more of the features, and are not limited to only one such feature unless otherwise expressly indicated. Similarly, use of the term “the” in reference to a feature previously introduced using the term “a” or “an” does not thereafter limit the feature to only a single instance of such feature unless otherwise expressly indicated.

[0016] Although the invention will be described hereinafter in reference to a grip assist device **10** shown in the drawings as configured for use with a dumbbell, it will be appreciated that the teachings of the invention are also generally applicable to other types of uses and applications, such as, but not limited to, being adapted for and/or used with barbell and kettlebells, and for being used as a grip assistance device for gripping any other type of object that has bar with an outer circumference that can be readily grasped in the human hand.

[0017] FIGS. **1** through **4** show embodiments of a grip assist device **10** comprising a grip wrap **12** made of a flexible material. The grip wrap **12** has a partial tubular shape, in that the wrap **12** has a tubular shape that is interrupted by a single longitudinal gap **14** that extends along the entire axial length of the wrap **12** to define two opposing longitudinal edges **16** that are spaced apart by the gap **14**. FIGS. **1** and **2** represent embodiments in which the edges **16** as equipped with optional closure elements **17**, such as complementary hook-and-loop elements, by which the edges **16** can be secured to each other to secure the grip wrap **12** around a grip bar **52** of an athletic training weight **50**, such as a dumbbell or barbell that has two weight heads **54** as represented in FIG. **1**. FIGS. **3** and **4** represent an embodiment in which the edges **16** lack any closure elements, and instead the grip wrap **12** is secured around the grip bar **52** of the training weight **50** by the elastic nature of the grip wrap **12** and/or by optional non-slip features **28** defined on an interior surface **18** of the grip wrap **12** as discussed below. The interior surface **18** of the grip wrap **12** may be otherwise relatively smooth and uninterrupted, whereas finger depressions **22** and peaks **24** are defined in an exterior surface **20** of the grip wrap **12**. In the drawings, the finger depressions **22** and peaks **24** are shown as disposed on the exterior surface **20** diametrically opposite the longitudinal gap **14**.

[0018] The drawings further represent the grip assist device **10** as comprising an optional implanted sensor **26** embedded in the grip wrap **12** between the interior and exterior surfaces **18** and **20** of the wrap **12**. Discussed in more detail below, the sensor **26** may be a radio frequency identification (RFID) device, a Bluetooth-enabled device, or another suitable electronic device capable of monitoring one or more parameters of interest during a weightlifting session and wirelessly transmitting data to a digital computer capable of receiving and digitally processing data obtained

by the sensor **26**.

[0019] The grip wrap **12** may be particularly configured for compatibility with the hands of males or females, optionally for lefthand or righthand dumbbells, and sized to fit around grip bars **52** of various diameters, for example, diameters of about 1.25 to 1.5 inch (about 3 to 4 cm) and lengths of about 4 to 5 inches (about 10 to 13 cm) However, the grip assist device **10** can be configured for essentially any other dimensions, and the grip assist device **10** is not limited to dimensions provided or discussed herein.

[0020] The grip wrap **12** is represented in FIGS. **2** and **3** as comprising four of the finger depressions **22** in its exterior surface **20** that are defined by and between peaks **24** that are axially spaced apart from each other suitable distances so that the finger depressions **22** are sized to comfortably receive the fingers of an adult human hand. The finger depressions **22** may be sized equally or sized differently. For example, the finger depressions **22** may be sized and positioned to receive, in order, the forefinger, middle finger, ring finger, and pinky finger of a human hand. For this purpose, the peaks **24** may be spaced about 0.75 to about 1.25 inch (about 2 to about 3 cm) apart and the finger depressions **22** may have a depth (in the radial direction) of about 0.18 to about 0.19 inch (about 4.5 to about 4.8 mm). As evident from FIGS. **1**, **2**, and **3**, the finger depressions **22** and peaks **24** are only disposed on a central axial portion of the grip wrap **12** and do not longitudinally extend to the longitudinal ends of the grip wrap **12**. As particularly evident from FIG. **4**, the finger depressions **22** and peaks **24** do not circumferentially extend to either of the longitudinal edges **16** of the grip wrap **12**, and preferably extend around not more than half the circumference of the wrap **12** as shown in FIG. **4**. In this way, the portion of the grip wrap **12** engaged by a user's palm (the lower half of the wrap **12** in FIG. **4**) can be relatively smooth, whereas the finger depressions **22** disposed on the diametrically opposite portion of the grip wrap **12** (the upper half of the wrap **12** in FIG. **4**) can be engaged by a user's fingers.

[0021] As previously noted, the interior surface **18** of the grip wrap **12** may have one or more non-slip features **28** to help maintain the grip assist device **10** in a fixed position on the grip bar **52** when being gripped by a user. For example, the interior surface **18** of the grip wrap **12** may have ridges and/or grooves arranged in rows or in a crisscross pattern, a padded surface, nano-suction features, or other non-slip features that increase the friction between the wrap **12** and the grip bar **52** so that the grip assist device **10** does not slip on the grip bar **52** when the user is gripping and lifting the training weight **50**.

[0022] The grip wrap **12** is preferably made of a flexible material, such as a synthetic rubber, examples of which include silicone rubber and neoprene rubber, and may optionally be provided as a closed-cell foam material. The grip wrap **12** is sufficiently resiliently deformable so that the wrap **12** can be readily installed on the grip bar **52** by passing the grip bar **52** through the gap **14**. Optionally, the flexible material may be sufficiently flexible and elastic to have an at-rest shape that is not tubular, such as curved or flat, when not applied around the grip bar **52**, in which case the closure elements **17** are preferably present to ensure that the grip wrap **12** remains wrapped around the grip bar **52**.

[0023] The exterior surface **20** of the grip wrap **12** preferably has a friction-enhancing and/or moisture-wicking capability. In the embodiments shown in the drawings, both of these capabilities are provided by a tread pattern defined in the exterior surface **20**. In the nonlimiting examples shown in FIGS. **2**, **3**, **4**, and **5**, such a tread pattern preferably comprises raised surface features that define a pattern of hexagonal-shaped elevated structures **30**, each of which is surrounded by a cavity or recess, represented as a narrow trough or trench **32**. The hexagonal-shaped elevated structures **30** of the tread pattern increase friction against the hand of a user in a manner that promotes a better grip, and the trenches **32** are sized to be effective at wicking sweat away from the elevated structures **30** and into the trenches **32**. Alternatively or in addition, the exterior surface **20** may be covered with a moisture-wicking material, such as foam rubber or similar substance. Though the elevated structures **30** are represented as hexagonal-shaped, other shapes are possible.

In practice, elevated structures **30** having a hexagonal shape with a maximum width dimension of about 0.24 to about 0.25 inch (about 6.0 to about 6.4 mm) surrounded by trenches **32** having a width of about 0.02 to about 0.05 inch (about 0.5 to about 1.3 mm) and a depth of about 0.06 inch (about 1.5 mm) have been determined to be effective, though slightly larger or smaller elevated structures **30** and trenches **32** could be used.

[0024] As shown in FIGS. **1** and **2**, the closure elements **17** are disposed along the longitudinal edges **16** of the wrap **12**, one element **17** being disposed on the interior surface **18** and the other disposed on the exterior surface **20**. The two longitudinal edges **16** of the wrap **12** are configured to close with the closure elements **17** at the bottom of the bar **52** (as represented in FIG. **1**) where the user's palm would touch the bar **52**. Other types of closure elements **17** could be used as alternatives to hook-and-loop elements, such as snaps, hook fasteners, laces, or other fasteners. As represented in FIGS. **3** and **4**, the closure elements **17** may be omitted entirely if, for example, the grip wrap **12** is made of a sufficiently rigid material and/or the non-slip features **28** are in the form of nano-sized (i.e., 1-1000 nm) diameter suction cups disposed on the interior surface **18** of the grip wrap **12**. In this configuration, the wrap **12** can be securable to the bar **52** without needing any other closure mechanism.

[0025] The sensor **26** is represented in FIGS. **1** and **4** as located adjacent one of the longitudinal edges **16** so that when the grip assist device **10** is operatively mounted around the grip bar **52**, the sensor **26** is located almost diametrically opposite one of the finger depressions **22**. For example, the opposing finger depression **22** may be adapted to receive the user's forefinger that the user positions on the top side of the grip bar **52**, such that the sensor **26** is located on the underside of the bar **52** diametrically opposite the user's forefinger. The sensor **26** is preferably embedded in the grip wrap **12** so that it is not visible or exposed at either of the interior and exterior surfaces **18** and **20** of the grip wrap **12**. The sensor **26** is preferably adapted to sense various forces on and motions of the gripper wrap **12** to provide useful feedback information to a user regarding aspects of how the user is using of the training weight **50**. As nonlimiting examples, the sensor **26** is configured to incorporate strain gauges, accelerometers, etc., that enable the sensor **26** to measure torque induced in the wrap **12** during a training session and/or motion and/or the range of motion of the grip wrap **12** during a training session, and thus also the training weight **50** itself. If an RFID or Bluetooth-enabled device, the grip assist device **10** further comprises a computer application ("APP") **40** that wirelessly communicates with the sensor **26** and analyzes the data sent from the sensor **26**, preferably for the purpose of providing one or more direct and/or derived measurements from the torque and range-of-motion measurements to the user. The APP **40** may be of a type that runs on a mobile computing device (e.g., a mobile "smart" phone with a digital computer processor and appropriate hardware and software) or any other type of digital computer capable of receiving and digitally processing the data obtained by the sensor **26**.

[0026] In addition to the configuration adapted for being mounted to and removed from various different dumbbells and/or barbells, the grip assist device **10** in other configurations may be incorporated directly as part of a set of athletic training weights. In such embodiments, the grip assist device **10** may be directly integrated as part of a grip bar of the weight(s). The grip assist device **10** preferably matches the length of the dumbbell's grip bar. For dumbbells with finger depressions manufactured directly into the grip bar, the sensor **26** may be located on the outer aspect of one of the weight heads (e.g., dumbbell heads), generally but not limited to the flat surface of the dumbbell rather than the curved surface which comes in contact with the surface at rest. For example, the sensor may be mounted into a depression in one of the weight heads with adhesive or another fastener. For barbells, the grip assist device **10** may be secured to the middle of the length of the grip bar and remain in that position during a training session. Weight plates may be added or removed on the ends in the usual manner. If the finger depressions **22** are formed into the surface of the grip bar during manufacturing, the grip assist device **10** may be disposed in the middle of the grip bar (not at the ends) so as to not affect adding or removing weight plates on the

ends of the grip bar. In this embodiment, the sensor **26** may be disposed in the hang grip, in the weight plates as described with the dumbbells, or in the end of the bar bell, for example, by mounting a cap with the sensor onto the end of the bar bell.

[0027] From the foregoing, it should be appreciated that aspects of the present invention include a grip wrap **12** that is designed for secure attachment to and detachment from a grip bar of an athletic training weight, such as a dumbbell grip bar or a barbell grip bar. Preferably, the grip wrap **12** is made of or includes a resilient or spongy material for easy and/or more comfortable gripping by a human hand. The grip wrap **12** may include finger depressions **22** on its exterior surface **20**. The grip wrap **12** is preferably made of sufficiently flexible material so that it can be firmly wrapped around and fastened to a dumbbell grip bar using closure elements **17**, such as a hook-and-loop elements. The grip wrap **12** is a component of the grip assist device **10** and is configured to envelop a grip bar to improve a user's grip on training weights and optimize lifting movements. The grip wrap **12** may be constructed from a flexible synthetic rubber, such as silicone rubber or neoprene rubber, preferably provided as a closed-cell foam material and optionally infused with antimicrobial materials to ensure optimal hygiene standards.

[0028] According to other aspects, an athletic training weight (e.g., a dumbbell or a barbell) is provided with the grip assist device **10** that can be premounted and secured to the grip bar of the athletic training weight. In yet other aspects, a set of athletic training weights, such as a set of dumbbells or one or more barbells and a plurality of mountable weights for the barbell(s), is provided with one or more grip assist devices **10** pre-mounted and secured to the grip bars of the athletic training weights. The grip assist device **10** may be integrated directly into the athletic training weights to provide improved functionality. For example, the length of the grip wrap **12** may be selected to match the length of the grip bar of the dumbbell grip bar (handle) or in a preselected position on the dumbbell grip bar to provide a seamless and comfortable grip for the user on the grip bar.

[0029] When operatively mounted to the grip bar of an athletic training weight, the grip assist device **10** functions as an extension of the user's arm, promoting a more natural and effective weightlifting motion. The device **10**, its sensor **26**, and a computer application that communicates with the sensor **26** can be used by a user to maximize the efficiency of weightlifting movements by the user during a training session.

[0030] As previously noted above, though the foregoing detailed description describes certain aspects of one or more particular embodiments of the invention, alternatives could be adopted by one skilled in the art. For example, the grip assist device **10** and its components could differ in appearance and construction from the embodiments described herein and shown in the drawings, functions of certain components of the grip assist device **10** could be performed by components of different construction but capable of a similar (though not necessarily equivalent) function, and various materials could be used in the fabrication of the grip assist device **10** and/or its components. As such, and again as was previously noted, it should be understood that the invention is not necessarily limited to any particular embodiment described herein or illustrated in the drawings.

Claims

1. A grip assist device configured to be securely adhered to and removed from a grip bar of an athletic training weight, the grip assist device comprising: a grip wrap having a partial tubular shape that defines an interior surface, an exterior surface, and opposing longitudinal edges separated by a longitudinal gap, the grip wrap being formed of a flexible material and adapted to surround the grip bar; a plurality of peaks and finger depressions disposed on the exterior surface diametrically opposite the longitudinal gap; a non-slip feature disposed on the interior surface; and a sensor embedded in the grip wrap and configured to sensor at least one of torque, motion, and

range of motion of the grip wrap.

2. The grip assist device of claim 1, further comprising closure elements disposed along the longitudinal edges to removably fasten the longitudinal edges to each other.

3. The grip assist device of claim 1, wherein the flexible material is a synthetic rubber in the form of a closed-cell foam material.

4. The grip assist device of claim 1, wherein the plurality of peaks and finger depressions extend around not more than half of a circumference of the grip wrap.

5. The grip assist device of claim 1, further comprising a tread pattern defined in the exterior surface, the tread pattern comprising raised surface features that increase friction to promote a better grip.

6. The grip assist device of claim 5, wherein the raised surface features are hexagonal-shaped elevated structures that are each surrounded by a trench, and the trenches are sized to be effective to wick sweat away from the elevated structures and into the trenches.

7. The grip assist device of claim 1, wherein the sensor is a radio frequency identification device or a Bluetooth-enabled device, the grip assist device further comprising equipped with an APP that wirelessly communicates with the sensor and analyzes data sent from the sensor.

8. An athletic training weight comprising: a grip bar; a weight head disposed at an end of the grip bar; and the grip assist device of claim 1 disposed on the grip bar so that the plurality of peaks and finger depressions provide finger grip locations on the grip bar.

9. The athletic training weight of claim 8, further comprising closure elements disposed along the longitudinal edges of the grip wrap to removably fasten the longitudinal edges to each other.

10. The athletic training weight of claim 8, wherein the flexible material of the grip wrap is a synthetic rubber in the form of a closed-cell foam material.

11. The athletic training weight of claim 8, wherein the plurality of peaks and finger depressions of the grip wrap extend around not more than half of a circumference of the grip wrap.

12. The athletic training weight of claim 8, further comprising a tread pattern defined in the exterior surface, the tread pattern comprising raised surface features that increase friction to promote a better grip.

13. The athletic training weight of claim 12, wherein the raised surface features are hexagonal-shaped elevated structures that are each surrounded by a trench, and the trenches are sized to be effective to wick sweat away from the elevated structures and into the trenches.

14. The athletic training weight of claim 8, wherein the sensor is a radio frequency identification device or a Bluetooth-enabled device, the grip assist device further comprising equipped with an APP that wirelessly communicates with the sensor and analyzes data sent from the sensor.