Abstract: An exercise device used to provide resistance to the contraction of a muscle during weight lifting. The exercise device consists of a handle with two weighted members connected on opposing ends of the handle. The weighted members are connected through a press fit manufacturing technique. Each opposing end of the handle has at least one channel about the periphery of the handle ends that is used to collect metal shavings generated during the press fit manufacturing process. By collecting the metal shavings, a connection that not only has a tight tolerance, but also has few imperfections at the interface between the flushed surfaces is created.
IMPROVED DUMBBELL HAVING SECURED ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATIONS

N/A

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

N/A

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to weight lifting equipment and more particularly pertains to devices used for weight lifting and weight training, such as barbells and dumbbells. The present invention also relates to weights for weight lifting equipment, and more particularly to a novel design for manufacturing and inserting a dumbbell handle into weighted heads, and efficiently and simultaneously attaining a secure assembly.

Description of Related Art

Due to increased concerns about overall health and appearance, strength training has become a popular method of increasing one's anaerobic endurance and building larger muscles. Strength training is defined as creating a resistance to the natural contraction of a muscle. One of the most popular forms of strength training is weight training, which uses the force of gravity to create a resistance against the natural contraction of muscles. Weighted objects are used to increase the magnitude of the force of gravity, thereby causing the muscle to work harder in performing a natural contracting movement.
Dumbbells and barbells with weights attached at opposing ends, also known as free weights, are one of the most common equipment types used in weight training and are detailed extensively throughout the prior art. In the current popular form, dumbbells are made by the attachment of weighted discs to opposing ends of the handle. The disks may be permanently attached, unitarily formed to the handle, or they may be attached by locking collars. The method of using locking collars in attaching weighted disks to a handle creates a dumbbell that is unnecessarily wide and difficult to balance.

One of the most critical factors in both designing and manufacturing a dumbbell is ensuring that a tight tolerance exists between the weighted discs and the handle. Without a tight tolerance, the weighted discs can wear out leading to a looser tolerance. As the tolerance becomes looser, the weights move laterally on the end of the handle and eventually rotate completely around the handle. The lateral movement and rotation of the weighted discs continues to worsen over time as the tolerance tightness decreases. Eventually the weights may even fall apart and injure the user. Even if the weighted discs are not an actual danger, they may cause apprehension or serve as a distraction to the user. In distracting the user attention and focus are taken away from the task of contracting the muscles to counteract the resistance of the weight, thus the user will not be able to obtain the full benefit from performing the weightlifting exercise.

As stated previously, weight lifting exercise equipment and particularly barbells and dumbbells are described extensively throughout the prior art. Specifically, U.S. Patent No. 5,484,367 to Martinez illustrates a toy barbell set with a polycarbonate material bar that simulates the bending characteristics of steel. A key extends from the bar, and the weights and locking collars have a corresponding hole formed therein. One
disadvantage of this invention, is that the barbell is meant for child use and not designed to support the amount of weight routinely used in an adult weightlifting exercise.

U.S. Patent No. 4,529,197 issued to Gogarty describes a dumbbell with longitudinal groves on opposing sides that extend towards the middle of the dumbbell. The grooves are each of different lengths allowing the dumbbell to receive a series of additional weighted discs until the final desired weight is achieved. The additional weighted discs are secured to the barbell through a locking collar. The disadvantage of the present invention is that it uses a locking collar, thus making the resulting weighted equipment that is wide and difficult to balance.

U.S. Patent No. 6,120,420 to Pearson et al. discloses a unitary exercise device with a light shell surrounding a denser core that are both attached at opposing ends of a handle. The use of a dense core in the weighted discs reduces the size of the overall exercise device. Furthermore, by monolithically incorporating the dense weighted disc as an extension of the handle, the problems associated with a tight tolerance between the weighted disc and handle is avoided. However, the disadvantage of this invention is by utilizing a dense core that is monolithically attached to the handle creates a device that is both expensive and timely to manufacture.

U.S. Patent No. 7,048,678 issued to Technical Knockout, Inc., the Applicant Company in the instant case, and is entitled Dumbbell Having Interlocking Components. This design relates to a handle having rectangular opposing ends which mate with an interior member or insert of a complementary geometric shape. The interior member receives the end of the handle, and the insert itself is secured within a central bore or void in the weight head.
The instant invention constitutes an improvement over the designs disclosed and claimed in the '678 Patent by employing an improved method of manufacturing a piece of exercise equipment with a tighter tolerance between the weight and the handle.

Consequently, there is a need for taking advantage of efficient product designs, manufacturing and assembly techniques in the production of safe and cost effective exercise equipment, particularly dumbbells and barbells. There is also a need for a dumbbell and barbell design that inherently secures the weight to the handle with and extremely tight tolerances. This connection means must retains its structural integrity and maintain a tight tolerance throughout prolonged and extensive use. Finally, there is a continued need for exercise devices that do not require locking collars.

BRIEF SUMMARY OF THE INVENTION

The present invention provides improved designs for manufacturing and assembling superior dumbbell exercise weights and in particular to an improved connection between the weights and handle. The designs eliminate unnecessary components, utilize press-fit manufacturing techniques for structurally sound products, provide a superior safe, secure and cost effective exercise device. The dumbbell design's improved connection greatly eliminates the lateral movement and rotation of the weights around the handle, thereby improving the structural integrity and increasing the lifetime of the product.

The present invention is an improved and inexpensive to manufacture exercise device with secure, extremely tight tolerance, non-rotating weights, that are attached to opposing ends of a central handle. The opposing ends of the handle have a cylindrical
geometric shape that extends into the outer non-rotating weights. The handle can be of any geometric shape, rectangular, hexagonal, cylindrical, etc. The ends, in a primary embodiment, can be cylindrical, but in other embodiments can be rectangular or other geometric cross-sectional shapes.

The key inventive contribution relates to a series of generally parallel lateral grooves in opposing ends of the handle. These grooves receive the metal shavings that are generated during the press-fit manufacturing and assembly techniques, as hereinafter described.

The opposing ends of the metal handle are press-fit into steel inserts housed within, or integrally formed in, the weight heads. Because of the extremely tight tolerances and product specifications, metal shavings are produced as the handle end is forced (press-fit) into the complementary geometrically shaped aperture or void within the weight head or steel insert with the weight head. As the end of the handle is forced into the receiving void, the relatively thin metal shavings are created and pushed into the series of lateral grooves located on the ends of the handle. Because the shavings are removed from the press-fit surfaces (by falling into the grooves) a superior assembly is achieved. Without the presence of grooves to collect the metal shavings, irregular and pitted surfaces are created along the walls of the void as the metal shavings are force into the void along with the end of the handle. An irregular and pitted void wall surface make it impossible to create a perfectly flush fit of the handle against the wall of the void.

Overtime, as the dumbbell is operated, the inner void surface becomes even more irregular and pitted as the existing marks continue to grow as the handle moves within the
void. As the void surface becomes more irregular, the tightness of the tolerance between the handle and the receiving void decreases.

Without the grooves or channels of the instant invention, the shavings also remain between the outer surface of the handle and the wall of the void as an imdesired foreign object. The metal shavings act as spacers and prevent a surface-to-surface flush fit between the outer surface of the handle ends and the walls of the weight receiving aperture.

Accordingly, it is a primary object of the present invention to provide an improved exercise device which can withstand vigorous usage without wearing out the weights and causing them to move laterally and rotate around the end of the handle of the exercise equipment.

It is an additional object of the present invention to provide weights, dumbbells and barbells which eliminate unnecessary components, are inexpensive and easy to manufacture.

It is yet another object of the present invention to provide an improved exercise weight by providing a handle having ends with a series of grooves or channels which receive deleterious metal shavings produced in press-fit manufacturing and assembly processes, and produce a product of great structural integrity, extremely tight tolerance, and yet is cost effective and operationally efficient.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.
BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Figure 1 is a perspective view of a fully assembled preferred embodiment of the invention.

Figure 2 is a perspective and exploded view of the components that make up the attached weight member.

Figure 3 is a side view of the handle of the instant invention.

Figure 4 is a perspective view of the handle of the instant invention.

DESCRIPTION OF THE INVENTION

Figure 1 illustrates a perspective view of a fully assembled preferred embodiment of the instant invention. The preferred embodiment is a dumbbell 10. The dumbbell consists of a handle 11 with a left and right weighted member 12 and 13 attached on opposing longitudinal ends of the handle 11. The handle 11 can be constructed out of but is not limited to steel. The handle 11 can be of handle can be of any cross-sectional geometric shape, such as rectangular, cylindrical, hexagonal, or the like as long as a normal human hand can wrap around the entire outer surface of the handle 11. In the shown embodiment, the handle is hexagonally shaped. This hexagonal shape aids in the operation of the overall exercise device 10 as the handle contains more sides and thus is gripped more easily.

The left and right weighted members 12 and 13 can be of any shape that is compact and safe, including a cube, a cuboid, or a triangular prism. In the shown embodiment, the weight members 12 and 13 are cylindrical shape, so that the exercise
dumbbell 10 does not have any pointed edges which can harm the user or damage the floor if the device 10 is dropped. The weighted members 12 and 13 typically have a larger radius than the handle 11, so that when the device 10 rests upon the floor, the handle 11 is raised. This in turn allows a user to easily pick up the exercise dumbbell 10.

The weighted members 12 and 13 can be designed larger in order to increase the weight of each member 12 and 13 and in turn increase the overall weight of the exercise device 11.

Figure 2 shows a perspective exploded view of the entire exercise device 10 in relation to the components that make up the right weighted member 13. The end of the handle 11 consists of a connecting section 19 that is of a cylindrical shape. The connecting section 19 extends into a void 23 within either a unitary metal weighted head, or as shown in the present embodiment a insert head 14. The insert 14 is covered with a rubber layer 24 on the outer surface, to ensure that if the exercise device is dropped, damage is neither done to the user or the floor.

The void 14 is of a complementary shape to the connecting section 19 so as to be able to receive the end of the handle 19. The connecting section 19 is of a larger diameter than the receiving void 23. As a result, during the manufacturing of the exercise device 10, the connecting section 19 of the handle must be press-fit, or forced, into the void 14 of the insert head 14.

A washer 15 rests flush between the insert head 14 and a screw 16. The thread of the screw 16 projects through the washer 15, through the void in the insert head 23 and into an aperture 25 located at the end of the connecting section 19 of the handle 11. As the screw 16 is tightened, a force is placed on the washer displacing it towards the insert
head 23. Subsequently, a force is applied that causes the insert head 23 to displace towards the connecting section 19 of the handle 11. The screw 16 thus serves as a means of further seeming the insert head 14 and subsequent entire weighted member 13 to the handle 11. A rubber filler 17 surrounds the head of the screw 16 in the cavity within the insert head 14 and provides protection to the head of the screw 16. A final cap piece 18 is glued to the outside of the insert head 14 to limit access to the screw 16 and insert head 14 while also providing aesthetic appeal to the exercise device 10.

Figure 3 shows a planar side view and Figure 4 shows a side perspective view of the handle 11 including the connecting sections 19. The connecting sections 19 are located on opposing ends of the handle 11 and as mentioned previously are pushed into receiving voids located within the attached weighted members. Each connecting section 19 has a unique design that includes a series of lateral or peripheral grooves or recessed channels 20 that can extend around the entire diameter of the outer surface of the connecting section 19. The peripheral grooves or channels can be discontinuous as well.

Further, the recessed channels can be nonsymmetrical and can have different angular relationships to the longitudinal axis of the central handle. In the embodiment of the invention shown, the connecting section 19 contains three grooves 20. The grooves 20 are shown as generally parallel and equally spaced, although this can be varied without limitation.

A stopper flange 21 is positioned between each connecting section 19 and the shaft 22 of the handle. The stopper flange 21 creates a surface that is perpendicular to the surface of the connecting section 19. This perpendicular surface lies flush with the side
surface of the attached weight member, and serves to stop the continued movement of the connecting section 19 into the receiving void of the attached weight member.

The unique connector section 19 design is advantageous when used with the press-fit manufacturing technique, where as mentioned previously, the connecting section of the handle is forced into a void with a smaller diameter. As the connecting section 19 is pushed into the void metal shavings or shards break away from the side surface of the void, because the diameter of the handle ends are slightly larger than the central voids or apertures of the weights. As mentioned previously, it is necessary to eliminate or remove the metal shavings, as they cut, scratch or deface the metal surfaces. In scratching the metal surfaces of both the void walls and the connecting section 19, uneven surfaces are created, thus ensuring that a completely flush connection is not achievable. The metal shavings also act as spacers thus even further preventing a complete surface-to-surface flush fit and assembly of the handle ends and the weight receiving apertures.

The grooves 20 in the connecting section 19 collect the metal shavings that are generated as the connecting section 19 is forced into the receiving aperture that connects the handle to the attached weight members. In collecting the metal shavings, the grooves serve to move the metal shavings away from the cutting section surface and the wall surface of the aperture. By moving the metal shavings away from the outer surfaces, the above mentioned problems are avoided. The specific and extremely tight tolerances of the respective metal components, achieves an extremely tight and secure fit, once the shavings are removed. Totally flush metal-on-metal contact is maintained, and a superior structural integrity is attained. The friction fit is essentially perfect, in the sense that all foreign objects or impediments are removed. Furthermore, since the connection does not
contain any imperfections, it is does degrade and less tighten over time as the imperfections which become amplified with repeated use are not present.

The press fit manufacturing technique is advantageous in that it provides a quick and cost effective means of attaching a weighted member to a handle for creating exercise equipment. This method is much less expensive than forming a single piece consisting of a handle with monolithically attached weight head members. Furthermore, due to the unique design of the present invention, a superior connection is created between the attached weight members and the handle, overcoming the previous problems created by the press fit manufacturing method. The connection is superior in that it has a tight tolerance and creates a surface to surface flush connection that is devoid of imperfections. In turn, the overall lifetime of the exercise device is increased.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious modifications will occur to a person skilled in the art.
CLAIMS

What is claimed is:

1. An improved dumbbell exercise device having an integrally secure assembly, tight tolerance, and at least one non-rotating weight, comprising:
   a central handle with opposing ends, wherein each said end has a geometric shape;
   said central handle further including groove means for securing one or more weights to said handle;
   each said weight having an interior aperture for receiving said handle end, said interior aperture providing tight tolerance with said handle end, said aperture having a circumference and being of a complementary shape to said geometric shape of said opposing ends of said central handle;
   said central handle being press fit within said one or more weights;
   wherein undesired material shavings are created from said press fit process, said groove means receiving said material shavings and providing an extremely secure surface to surface assembly of said handle and said one or more weights.

2. The exercise device of claim 1, wherein said handle ends further include a central bore at least part way through each said end:
   said central bore including thread means;
b Bolt means for further securing said one or more weights to said central handle;

said bolt means including threads which are complementary to said central bore threads;

3. The exercise device of claim 1, wherein said central handle further includes flange means for providing an abutting interface to said one or more weights, said flange means further limiting the placement of said central handle end within said one or more weights.

4. The exercise device of claim 2, wherein said one or more weight means has an exterior aperture;

    said device further comprising a washer with a predetermined circumference, said exterior aperture receiving said washer and said bolt means;

    said bolt means protruding through said one or more weights and engaging said central bore threads.

5. The exercise device of claim 1, wherein said groove means further comprises a plurality of grooves, said grooves placed about the periphery of said ends of said central handle.

6. The exercise device of claim 5, wherein said central handle opposing ends are generally cylindrical in geometric shape;
said grooves further being generally parallel and equally spaced about said ends of said central handle;

said grooves further being generally continuous about said ends of said central handle.

7. The exercise device of claim 5, wherein said central handle opposing ends are generally rectangular in geometric shape;

said grooves further being generally parallel and equally spaced about said ends of said central handle;

said grooves further being generally continuous about said ends of said central handle.

8. The exercise device of claim 1, wherein said central handle opposing ends and said weight interior apertures are metal.

9. The exercise device of claim 1, further comprising an end cap including at least one nipple to be placed over an outer surface of said one or more weights, wherein said outer surface includes at least one void complementary to each said nipple.

10. The exercise device of claim 3 further comprising a bonding agent, said bonding agent being placed about said central handle opposing ends, said bonding agent further securing said one or more weights to said central handle.
11. An improved dumbbell exercise device having an integrally secure assembly, tight tolerance, and a pair of non-rotating weights, comprising:

   a central handle with opposing ends, wherein each said end has a geometric shape;

   said central handle further including a plurality of external grooves spaced about said opposing ends for seeming said weights to said central handle;

   each said weight having an interior aperture for receiving said handle end, said interior aperture providing tight tolerance with said handle end, said aperture having a circumference and being of a complementary shape to said geometric shape of said opposing ends of said central handle;

   said central handle being press fit within said pair of weights;

   said plurality of grooves securely fit entirely within said weight interior aperture;

   wherein undesired material shavings are created from said press fit process, said plurality of grooves receiving said material shavings and providing an extremely secure surface to surface assembly of said handle and said pair of weights.

12. The exercise device of claim 11, wherein said central handle opposing ends further include a central bore at least part way through each said end;

   said central bore including thread means;

   bolt means for further securing said one or more weights to said central handle;
said bolt means including threads which are complementary to said central bore threads;
said central bore receiving said bolt means in threaded engagement.

13. The exercise device of claim 11, wherein said central handle further includes a pair of peripheral flanges, said flanges providing an abutting interface to said pair of weights;
said central handle opposing ends extending outwardly from said peripheral flanges;
said pair of peripheral flanges further limiting the placement of said central handle opposing ends within said pair of weights.

14. The exercise device of claim 13, wherein said central handle opposing ends are generally cylindrical in geometric shape;
said grooves further being generally parallel and equally spaced about said ends of said central handle;
said grooves further being generally continuous about said ends of said central handle.

15. The exercise device of claim 14, wherein said central handle opposing ends and said weight interior apertures are metal.