

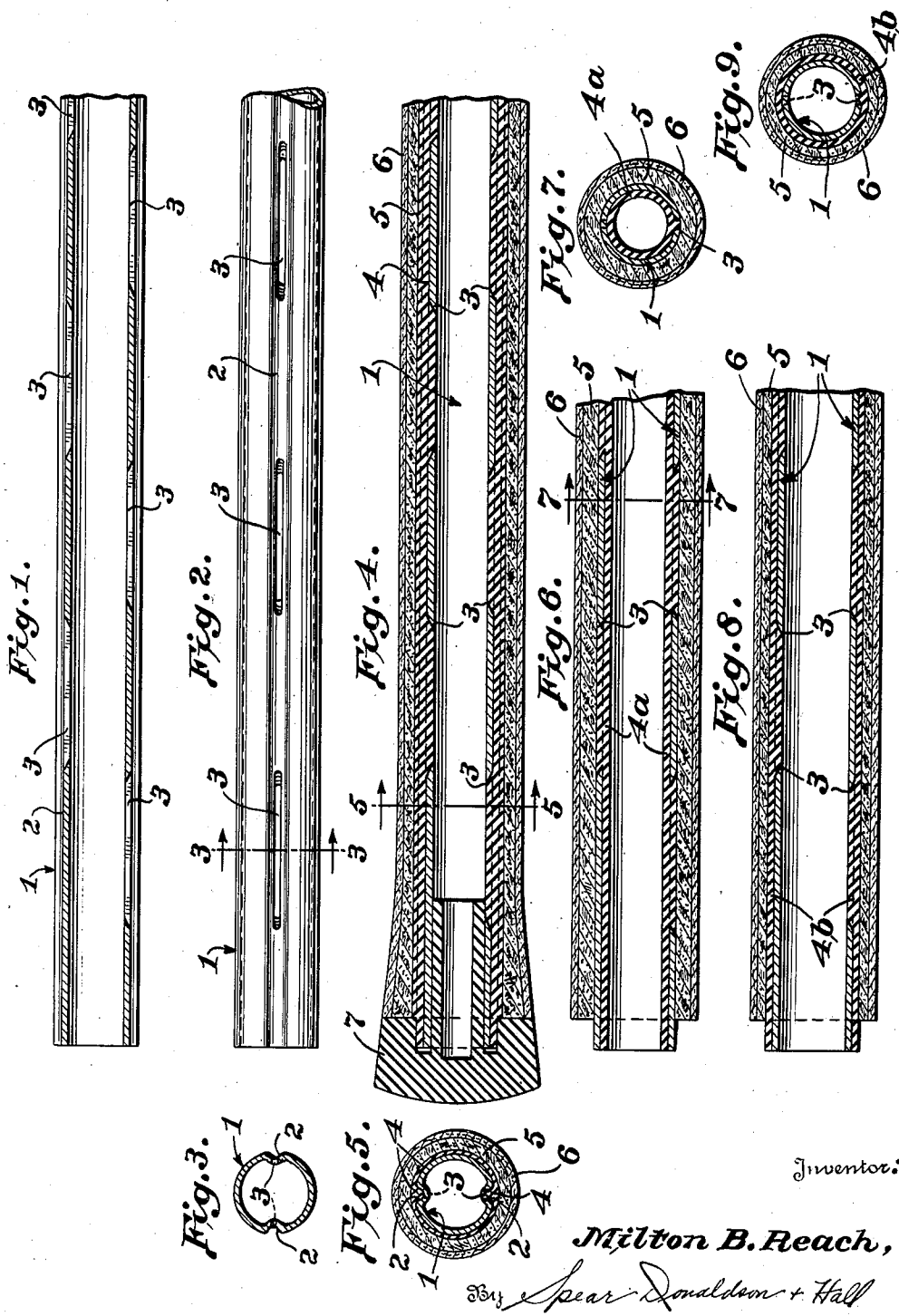
March 25, 1941.

M. B. REACH

2,236,414

ATHLETIC IMPLEMENTS

Filed Feb. 27, 1939



Inventor:

Milton B. Reach,

By *Spear, Donaldson & Hall*

Attorneys

UNITED STATES PATENT OFFICE

2,236,414

ATHLETIC IMPLEMENT

Milton B. Reach, Springfield, Mass.

Application February 27, 1939, Serial No. 258,788

13 Claims. (Cl. 273—80)

The invention relates to golf clubs or the like and more particularly to improvements in the construction of the shaft portion thereof employing a tubular metal shaft.

5 An object of the invention is to provide a construction of golf club shaft which is designed to provide for requisite torsion and control of torsion, particularly at the grip end of the shaft, while maintaining strength and serviceability, and without interfering with proper weight balance of the club.

10 Other objects will appear hereinafter, the invention consisting in the features, combination, and arrangement of parts and the procedural steps as hereinafter described, and as particularly pointed out in the claims.

In the drawing

15 Figure 1 is a longitudinal sectional view of a portion of a metal golf shaft constructed for carrying out the invention, taken substantially on line 1—1 of Fig. 3.

Fig. 2 is an elevation of the shaft portion.

Fig. 3 is a cross sectional view of the shaft substantially on the line 3—3 of Fig. 2.

20 Fig. 4 is a longitudinal sectional view of a completed grip portion of the shaft embodying the invention.

Fig. 5 is a cross-sectional view substantially on the line 5—5 of Fig. 4.

25 Fig. 6 is a longitudinal sectional view of a modified construction, and Fig. 7 is a section thereof substantially on the line 7—7 of Fig. 6.

Fig. 8 is a longitudinal sectional view of a further modification, and Fig. 9 is a section thereof substantially on the line 9—9 of Fig. 8.

30 Since the advent of the steel shaft, which has practically completely replaced the former hickory shaft, manufacturers and designers of golf clubs have sought to introduce into the steel shaft the torsional qualities of hickory. In all other respects the steel shaft has proven itself superior to hickory through its standardization and controllability of weight and stiffness.

35 For twenty-five years the problem of producing a satisfactory torsional quality in steel has not been solved because of the need of certain corollary attributes.

Weight is an important factor; strength is another important factor; proper controllability of torsion, another important factor.

40 A proper theory of golf club construction demands that the center of percussion be maintained as low on the shaft, that is, as near the head, as possible in order to obtain the maximum flow of power with a minimum of total weight

and to provide the least amount of jar under impact. It is therefore desirable to have the grip end of the club relatively light for its size, and as much weight as can be conveniently handled located in the head end of the club. Any torsional element that substantially increases the weight at the grip end of the club would not be popular because the virtue of the torsion would be more than offset by faulty balance.

Any torsioning device that affected the serviceability also would not be acceptable.

One of the most popular conceptions intended to produce torsion or resilient twisting ability has been through the medium of grooves in the shaft—another has been through the medium of slots and holes.

With respect to the former it may be definitely stated that any grooving operation that will actually produce torsion or twisting ability under torsional stress or torque cannot practically be applied to the present light weight construction of a steel golf shaft. And any arrangement of perforations applied to the present thin-wall golf shaft has weakened the shaft beyond its limit of playability.

25 The accumulative effects of the vibrations under impact and the distortions of impact focus at the weak points, and the shaft gives way.

Under the proposed novel assembly described herewith, a torsioning shaft has been produced that has successfully met the requirements of playability and service.

30 At the grip end of the club for a distance of 12 or 14 inches, approximately, I preferably form grooves 2 on opposite sides of the shaft 1 of substantially a U-shaped formation in cross-section. These grooves in themselves will not produce the requisite torsion or ability to twist. Along the base of each groove I preferably provide a series of slots 3 and a corresponding series of slots in the groove opposite on the opposite side, the slots desirably being out of registration with each other, that is, maintaining a staggered relationship. In this stage of manufacture, the shaft now has torsioning or twisting ability, but under the stresses of impact and the effects of vibration it has been found that the weakened parts tend to break down. To overcome this fault and provide the necessary attributes, I may preferably fit into the shaft a suitable mandrel which contacts its entire walls. I desirably then coat the outer walls of the shaft and the edges of the slots with a product known as thermoprene, which has the quality of bonding steel and rubber together in a vulcanizing process.

ess. I may then desirably lay in the grooves the required volume of raw rubber to completely fill the orifices and allow for some excess flow. Thereafter this part of the shaft is placed in a
5 suitable mold, heat is applied, and under this heat and pressure the rubber element flows and is cured and completely bonded within the grooves and slots, as seen in Figs. 4 and 5. The rubber strips, besides furnishing backing or
10 sustaining means for the grooved and slotted part of the shaft, also provide means by which the grip may be attached to the shaft. The excess rubber in the strips, in flowing in the molding operation, may form in a thin film around the shaft, as in
15 Figs. 4 and 5, since it is desirable to provide enough excess rubber packed in the groove to insure that all walls of the grooves and slots are thoroughly contacted by the rubber. This film of rubber may be buffed off after the molding, if
20 desired. Preferably, however, the thin film of rubber around the shaft is retained and provides a good anchorage for the adhesion of the molded cork foundation.

This rubber 4 acts as a barricade or baffle to the vibrations of the shaft causing them to dissipate under the hand, and being non-compressible, it sets up a proper resistance and control to any closures and distortions of the weakened part, so that under impact they may not be overstressed or strained and a proper degree of serviceability is attained.

A modification of the assembly may desirably be made as in Figs. 6 and 7 by cutting a suitable number of slots 3 preferably in a staggered relation through the walls of the shaft, a lining tube of rubber 4a placed within the shaft, a mandrel (not shown) supporting the lining tube, a mold placed on the outside of the shaft, the surfaces of the shaft having been previously
40 treated with thermoprene or the like, heat applied, the molding pressure forcing the rubber to flow over the inside of the shaft through the slots to the outside surface, bonding itself in the form of an inner lining 4a extending through the slots
45 and preventing harmful collapse of the slots under the stresses of impact.

The usual foundation 5, as of cork, and grip covering 6, as of leather, may be applied, as well as an end plug or cap 7 of any suitable construction, which is shown applied in Fig. 4.

I prefer the first described method, but do not limit myself to that particular form of assembly, the basic idea being to fill and support the torsioning elements or openings in the shaft with a
55 plastic, yielding, but relatively non-compressible material that will impose a proper restraint on the action of the torsioning elements or openings, and free them from the dangers of weakening under the forces of impact.

Another alternative way of making as indicated in Figs. 8 and 9 would be to form a grip 4b of a suitable rubber compound, slot or perforate the shaft to its required degree as at 3, fill the interior of the shaft with a removable steel mandrel, provide an excess volume of rubber in the grip mold in which the shaft would be inserted, and under pressure the excess rubber in the walls of the grip would be caused to flow inwardly
70 through the slots until it met the barricade of the mandrel, when it would under pressure completely fill the slots and bond itself thereto through a prior treatment of thermoprene.

While it is not desired to restrict the invention to thermoprene as the bonding material used

to bond the rubber to the metal shaft, this product has been found to be a desirable bonding material. Thermoprene may be described as a product of the general type of that produced by the reaction of rubber with an agent selected from the group consisting of sulfuric acid, sulfonic acids, and sulfonyl chlorides. The present invention, however, is not restricted to the use of this particular bonding material.

Alternatively or in addition to attaching the rubber or other non-compressible plastic substance to the shaft by means of a bonding material, such as thermoprene, the invention contemplates any suitable means or method for bonding the plastic or rubber material to the metal shaft, which may desirably be done by brass plating the surfaces of the metal and attaching the rubber material to the brass plating. Or the rubber material may be vulcanized to a brass strip and the brass may be attached to the steel wall of the groove by brazing or otherwise.

The invention also contemplates attaching the rubber or plastic material by a mechanical fit or interlock within the perforations in the metal shaft, without the use of bonding material. This may desirably be done according to the present invention by a mechanical molding job in which the several perforations or orifices in the shaft may be filled under pressure and a sufficiently close contact against the walls of the orifices maintained through a mechanical fit to substantially restrain and prevent any excess distortion of these orifices under the force of impact and torsion.

The yieldable reinforcing material may desirably be rubber or rubber compounds, or rubbery compositions especially adapted to absorb shock, although any suitable plastic material may be used.

The perforations are desirably of slotted form and may be cut in the bottom of the grooves, as in Figs. 1 to 5, by means of a cutter of any suitable diameter, say two inches, and in any suitable number, say four in each groove, on the opposite sides of the grip end of the shaft. Or, as in Figs. 6 to 9, the slots may be cut directly in the wall, without grooves.

It will be noticed that in the form of the invention shown in Figs. 1 to 5, the walls of the groove desirably flare outwardly and that the openings or slots are preferably of less width than the groove. In the form of the invention shown in Figs. 6 and 7, the inner portion 4a of rubber or other material serves to lock the reinforcing yieldable material in place acting as an internal key for this purpose.

In all forms of the invention slots or openings are provided in which rubber or other yieldable reinforcing material is disposed.

This rubber allows the twisting action of the shaft to take place. It prevents the slotted shaft from collapsing under the torsional strain, which, if the rubber strip were not used, would deform by the approach of the opposite edges of the slot towards each other. The rubber being non-compressible, will sustain the slotted part of the tube from collapsing. It will also have a resilient or
75 restoration of the shaft to its original condition after it has performed its torsional action.

The portions of the rubber member passing into and through the slots will serve as anchoring means for holding the rubber in place. These rubber strips besides furnishing backing or sus-

taining means for the slotted part of the shaft, also provide means by which the grip may be attached to the shaft.

It will be understood that where a feature, or features, shown in connection with one form are capable of use with another form of the invention, they are to be considered as disclosed in connection with said other form.

The invention is not limited to golf club shafts, but is applicable to the shaft or handle of any athletic implement, such, for example, as the tubular metal shaft or handle of a racquet for tennis or badminton or the like.

I claim:

1. A tubular athletic implement shaft of thin metal having openings in its wall communicating with the interior of the tube, said openings being spaced apart, and yieldable resilient reinforcing material extending into said openings, said yieldable resilient reinforcing material overlying and engaging the thin metal edges forming the openings and resiliently supporting the said edges against excessive distortion as the shaft twists or torsions in use.

2. An athletic implement shaft according to claim 1 in which said yieldable reinforcing material comprises rubber material, said rubber material being bonded to the metal of the shaft.

3. An athletic implement shaft of thin tubular metal grooved in a lengthwise direction thereof and having at intervals openings in the bottom wall of said groove communicating with the interior of the tube, and a strip of rubber or the like in the groove and extending into the openings and united with the shaft within the groove and openings.

4. An athletic implement shaft according to claim 3 in which the openings at the bottom of the groove are in the form of slots.

5. An athletic implement shaft according to claim 3 in which the grip is attached to the said rubber strip, or strips.

6. An athletic implement shaft according to claim 1 in which said yieldable reinforcing material comprises rubber material, a lining tube of rubber material within the shaft and integral with the rubber material in the openings, said rubber material being bonded to the portions of the metal shaft with which it contacts.

7. An athletic implement shaft according to claim 3 in which grooves are provided spaced around the shaft, the strips of rubber in the grooves and openings having a thin film of excess rubber integral with said strips and extending around the shaft.

8. An athletic implement shaft according to claim 1 in which said yieldable resilient reinforcing material comprises rubber material and is bonded to the metal edges of said openings, and rubber material extending over a surface portion

of the shaft adjoining said openings and bonded thereto and integral with the rubber material in the openings.

9. A tubular athletic implement shaft of thin metal grooved in a lengthwise direction thereof, and having an opening in the bottom wall of said groove communicating with the interior of the tube, and a quantity of yieldable resilient reinforcing material in said groove bonded to the walls thereof and extending into the opening, said yieldable resilient reinforcing material engaging the edges forming the opening and resiliently supporting the said edges against excessive distortion as the shaft twists or torsions in use.

10. A tubular athletic implement shaft of thin metal having openings through its wall and having a resilient filler of rubber like character moulded in said openings and reinforced in its position within said openings by a bonded union with the adjacent metal surfaces of the shaft, and providing a controlling cushion for the metal of the shaft against fatigue and breaking strain in the magnified torsioning or twisting of the shaft provided by said openings.

11. A tubular athletic implement shaft of metal having relatively thin walls with U shaped channels formed therein and extending lengthwise thereof, open slots cut through the bottom of the U channel in spaced relation and resilient material disposed in the channel in a bonded union with the walls thereof to prevent excess or harmful movement in the channel and open slots during the torsional winding and unwinding that takes place at impact and following impact.

12. A thin walled tubular metal athletic implement shaft having means comprising spaced apart openings through the thin metal wall of the shaft to increase torsional action under impact, and resilient means associated with said torsion increasing means to resiliently limit and control the torsional winding and unwinding action, said resilient controlling means comprising rubber material extending into said openings and in bonded relation with the metal surfaces forming and surrounding said openings.

13. A thin walled tubular metal athletic implement shaft having means comprising openings therein to increase torsional action under impact, said torsional means also comprising grooves extending lengthwise of the shaft and having said openings in the bottoms of the grooves, and resilient means associated with said torsion increasing means to resiliently limit and control the torsional winding and unwinding action, said resilient controlling means comprising rubber material disposed in said grooves and bonded to the metal surfaces thereof.

MILTON B. REACH.