MOUNTING STRUCTURE FOR REMOVABLE SURFBOARD FIN

Fig. 1.

Fig. 2.

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Filed June 17, 1968, Ser. No. 737,413

Int. Cl. A63e 13/00

U.S. Cl. 9—310

5 Claims

ABSTRACT OF THE DISCLOSURE

A mounting structure for tightly securing a skeg or fin to a surfboard includes a channelled mounting box bonded in the rearward portion of a surfboard. The sidewalls of the fin or skeg base section and sidewalls of the box are shaped with complementary tapering. The base of the fin is secured in the box by screws, which upon tightening, snugly wedge the sidewalls together to prevent wobbling or other relative movement between the fin and box that could interfere with surfing operations. The fin and box are formed with recesses during their fabrication by an injection molding process so that their walls will be uniformly cooled to thereby avoid shrinkage and warpage which could cause misalignment between the complementary tapered sidewalls.

The present invention relates to mounting structure for interchangeably mounting multiple surfboard fins one at a time to the surfboard and more specifically to a mounting box incorporated in a rearward portion of the surfboard for removably mounting the fins.

BACKGROUND OF THE INVENTION

Most conventionally manufactured surfboards have a skeg or fin molded or otherwise rigidly and permanently fixed to the rearward undersurface section of the surfboard. Although this typical type of arrangement is beneficial from the standpoint of maintaining the fin perfectly aligned and tightly united with the surfboard, it consumes excessive space during shipping, and is frequently cumbersome to handle even by the surfer himself. Also the particular single design of the permanent fin restricts the range of motions and operations that can be performed by the surfer.

Many of these above mentioned drawbacks and limitations were sought to be overcome by the concept of an easily removable surfboard fin described in our copending application Ser. No. 628,070 filed Apr. 3, 1967, entitled “Surfboard With Removable Skeg,” now U.S. Pat. No. 3,422,471.

In addition to being able to remove surfboard fins for the purpose of easy repair and packaging economy surfers often wish to experiment with various fin designs but are presently required to use numerous surfboards each having a particular fin. If quickly demountable interchangeable fins were available, the surfer could substitute different types of fins for best developing and enhancing skills, could experiment with new designs and approaches and could select the optimum fin design to accommodate variable surf and ocean conditions. The surfer could, for example, temporarily prefer a relatively large area deep draft fin for superior tracking and stability and then substitute for this, a smaller area more flexible fin for maneuverability and performing cutbacks.

An especially economical and rapid technique for fabricating surfboard fins is to injection mold them. Previous attempts have produced inferior results due in part because the mounting structure components are nonuniformly cooled. This results in material shrinkage and excessive stresses that engender warpage and misalignment. The stress bearing surfaces of the components intended to be snugly interfit are therefore mismatched and only a loose coupling can be achieved. When this situation arises there is a concomitant adverse result that the surfboard wobbles, experiences unpredictable behaviour and becomes difficult to maneuver.

BRIEF SUMMARY OF THE INVENTION

Briefly described the present invention contemplates a mounting box for permanent installation within a cavity formed in the rearward undersurface of a surfboard and an injection molded skeg or fin dimensioned for being removably mounted within an elongated channel formed in the box. The box has a top wall, a bottom wall arranged in flush alignment with the surfboard undersurface and spaced sidewalls which taper from the channel opening to the top wall located at an interior location of the surfboard body.

The fin is integrally formed with a base section having tapered sidewalls shaped so that when the fin base section is inserted within the channel, the box and base section can be wedged together to snugly interfit and prevent relative motion between the box and fin. The wedging action of the matched tapered sidewalls prevents relative motion between the fin and box that could otherwise interfere with the surfboard stability and maneuverability.

The base section sidewalls are formed with recessed areas which make the overall fin more lightweight and promote uniform cooling during fabrication by the injection molding process so that shrinkage and misalignment tendencies are minimized. In a similar manner the box may also be fabricated by an injection molding technique and incorporate in its sidewalls hollow areas to eliminate shrinkage and misalignment. The base section is sized so that when the fin and box are secured together by securing means, the base section is maintained in slightly spaced relationship from the box top wall when the base section sidewalls are wedged together.

The recessed areas formed in the base section sidewalls may be of rectangular shape and symmetrically arranged on each sidewall.

In accordance with one construction of the present invention the securing means may be characterized by internally threaded sockets mounted at the forward and rearward ends of the box top wall and corresponding screws insertable through openings in the base section, the screws having flat heads dimensioned to lie in flush alignment with the base section exterior bottom wall when the screws are fully tightened into their sockets.

BRIEF DESCRIPTION OF THE DRAWINGS

The numerous benefits and unique aspects of the present invention will be fully understood when the following detailed description is studied in conjunction with the drawings, in which:

FIG. 1 is a perspective view of the undersurface of a surfboard showing a fin locked in the mounting box.

FIG. 2 is a perspective, exploded view showing a fin and corresponding mounting box, a cavity formed in the surfboard for receiving the mounting box and a flexible peel-away strip used when the mounting box is being installed in the cavity.

FIG. 3 is a longitudinal sectional view showing the fin firmly locked in the mounting box and

FIG. 4 is a fragmentary lateral cross sectional view taken along line 4—4 of FIG. 3 showing the fin firmly wedged in the mounting box.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, a surfboard 10 is shown having a skeg or stabilizing fin 11 extending downwardly from the surfboard undersurface 12. Fin 11, as shall be fully explained, is removably secured within a mounting box 13 constructed to receive interchangeable fins of various geometrical shapes and sizes that have identical mounting bases.

Referring now to FIG. 2, fin 11 is integrally formed with an enlarged base section 14 having fore and aft ends 15 and 16 respectively of equivalent width. Extending through fore and aft ends 15 and 16 are screw openings 17 and 18 which intersect the fin center line and lie within the plane of fin 11. Securing means in the form of a pair of flathead stainless steel socket cap screws 19 and 20 are dimensioned for insertion into openings 17 and 18 respectively.

Base 14 has a top wall 21 and a bottom wall 22 designed to be in flush alignment with surfboard undersurface 12 when the fin 11 is fully installed for use. Top wall 21 is formed with a fore undercut zone 23 and an aft undercut zone 24 to provide necessary clearance for fastening elements as shall be explained. The sidewalls 25 (only one of which is shown) of base 14 are tapered from bottom wall 22 to top wall 21. sidewalks 25 are alternately formed with recessed areas 26 and ribs 27. This arrangement of recessed areas 26 and ribs 27 serves to eliminate material wastage, make fin 11 lightweight and in addition, promote uniform cooling of base section 14 when fin 11 is made by an injection mold process. Uniform cooling greatly minimizes shrinkage and misalignment tendencies of the fin sidewalks 25 which as shall be fully described must make a tight tapered fit with corresponding sidewalks of box 13.

A rectangular shaped flexible peel-away strip 28 is used for assisting the permanent installation of mounting box 13 into surfboard 10. The way in which it is used shall be described.

Mounting box 13 has fore and aft exterior end walls 29 and 30 and exterior sidewalls 31 and 32.Disposed centrally in mounting box 13 is an elongated channel 33 having interior sidewalks 34 (only one of which is shown) that are tapered so as to complement and match the tapering of base sidewalks 25. The exterior bottom surface 35 of box 13 is rectangular shaped and aligned to lie flush with the surfboard undersurface 12. Formed on the inner margin or border of bottom surface 35 is a ledge 36 which is of a rectangular size substantially equivalent with that of peel-away strip 28. The purpose of this shall be described. The exterior dimensions of mounting box 13 are substantially equivalent with those of cavity 37 which is shaped to receive and permanently mount box 13.

FIG. 3 shows mounting box 13 securely bonded within surfboard cavity 37 and fin 11 tightly locked within mounting box 13. A pair of enlarged sections or bosses 39 and 40 are formed adjacent the fore and aft ends of box top wall 38. Bosses 39 and 40 partially encase and anchor a pair of correspondingocket fasteners 41 and 42 that are internally threaded to threadedly receive screws 19 and 20. Bosses 39 and 40 are formed with passages 43 and 44 coaligning with screw openings 17 and 18 respectively so that when screws 19 and 20 are fully torqued into position their tips will not contact adjacent sections of box 13 or surfboard 10.

When fin 11 is tightly interlocked with mounting box 13 base top wall 21 is spaced by a slanted distance d from mounting box top wall 38. The purpose of maintaining spaced distance d is to assure sufficient space for the wedging action, as shown in FIG. 4, between fin tapered sidewalks 25 and complementary sidewalks 34 of mounting box 13.

As bolts 19 and 20 are torqued into their fully tightened positions under tension which may for example be in the order of 18,000 p.s.i., complementary tapered sidewalks 25 and 34 are wedged together in a tight fit. Because the sidewalks are perfectly matched for mutual flush engagement, no clearances or spacing exist between them and therefore wobbling and other relative movement between fin 11 and box 13 is prevented. Interlocking fin 11 and box 13 together to achieve this tight wedge fit may be accomplished by inserting a specially shaped tip of a key (not shown) into correspondingly shaped sockets formed in the flat heads of screws 19 and 20.

As shown in FIG. 4 ribs or partitions 45 and hollow areas 46 are alternately formed between the tapered sidewalks 25 and exterior sidewalks 31 and 32. As in the case of fin recessed areas 26 hollow areas 46 serve to minimize material wastage, make the overall mounting box as lightweight as possible consistent with adequate strength and promote uniform cooling to assure perfect alignment of tapered sides 25 and 34.

Referring again to FIG. 2 the mounting box 13 is firmly and permanently bonded within surfboard cavity 37 so that surfboard 10 and box 13 act as an integral unit. Previous attempts to shape fins and mounting boxes by injection molding techniques have resulted in imperfect contouring and misalignment with the added result that the sections intended to tightly interfit are mismatched. When this situation arises the clearances produce a loose fit that causes wobbling which greatly impairs surfboard maneuverability.

Perfect matching alignment between the tapered sidewalks of the mounting box and fin base is achieved by dimensioning the molds (not shown) to be used in the injection molding process such that the recessed areas and hollow areas are formed in the fin base and mounting box respectively. The recessed and hollow areas are arranged in patterns for causing the plastic material to cool substantially uniformly. As box 13 is being injection molded, the socket fasteners 41 and 42 are positioned so as to be partially encased and anchored within the box in a manner sufficient to prevent water leakage into the surfboard interior during surging.

When the mounting box is adequately cooled to its ultimate shape it is positioned in surfboard cavity 37 and firmly secured to adjacent surfboard material by any suitable bonding material. Box 13 is oriented within cavity 37 so that its bottom surface 35 is flush with surfboard undersurface 12. When the bond has set flexible strip 28, which may be constructed of polyethylene, is pressed onto ledge 36. Surfboard undersurface 12, box bottom surface 35, and strip 28 are then simultaneously coated with conventional coating material as many times as necessary. Leakage of the coating material down mounting box tapered sidewalks 34 and into channel 33 is blocked by strip 28. Strip 28 prevents coating material from becoming deposited on tapered sidewalks 34 where it could seriously interfere with the desired tight wedge fit. After the necessary additional coating is applied and the sanding and glossing operations are completed the strip 28 is easily peeled away leaving the mounting box 13 in condition to receive a fin 11.

Any way of example - fin 11 may be constructed from polypropylene or acrylonitrile butadiene styrene and the box 13 may be constructed from any suitable plastic material compatible with the surfboard material and bonding material intended to be used.

OPERATION

Keeping the above construction in mind it can be understood how many of the previously described disadvantages of prior art mounting structures for removably mounting a surfboard fin are overcome or substantially eliminated by the present invention.

Assuming that the surfer has arrived at a surfing location with surfboard 10 incorporating mounting box 13...
and a plurality of different types of fins 11, he is prepared to realize the benefits of the present invention. After selecting one of the fins he merely positions its base section 14 into box channel 33 and proceeds to torque screws 19 and 20 into their respective sockets 41 and 42 until tapered sidewalls 25 and 34 accomplish the predetermined optimum snug wedge fit. After experimenting with this first fin the surfer may desire to substitute a different type of fin. He then merely untightens screws 19 and 20, removes the first fin and replaces it with a second interchangeable fin having a base section 14 that is identical with that of the first fin as well as those of subsequent fins that the surfer might also like to experiment with.

It can be seen that the surfer may use a set of interchangeable fins to accommodate his various surfing desires and be assured that the tight wedge fit between the mounting box which is integrally united with the surfboard and the fin base will assure elimination of wobbling and other types of relative motion between mounting box 13 and fin 11 which could impair surfing maneuverability.

From the foregoing it will be evident that the present invention has provided mounting structure for a surfboard fin in which all of the various advantages are fully realized.

What is claimed is:

1. Structure for removably mounting a surfboard fin comprising:

(a) a mounting box positionable within a cavity in the undersurface of a surfboard, the box having a top wall, a bottom wall aligned flush with the surfboard undersurface and spaced sidewalls tapering towards the top wall that define an elongated channel;

(b) an injection-molded fin having a base section with tapered sidewalls shaped so that when the base section is inserted within the channel, the box and base section can be wedged together to snugly interfit and prevent relative motion between the box and fin, said base sidewalls having recessed areas to make the fin lightweight and promote substantially uniform cooling so shrinkage and misalignment tendencies are minimized; and

(c) securing means for securing the base section and box together, the base section being sized to be slightly spaced from the box top wall when the sidewalls are wedged together.

2. The structure according to claim 1, in which said recessed areas are of rectangular shape symmetrically formed in the base sidewalls.

3. The structure according to claim 1, wherein the box is injection-molded, the sidewalls thereof incorporating hollow areas, the hollow areas serving to make the box lightweight and promote substantially uniform cooling so shrinkage and misalignment tendencies are minimized.

4. The structure according to claim 1, wherein the securing means is characterized by first fastening elements mounted at the forward and rearward ends of the box top wall and second fastening elements arranged to cooperate with corresponding first fastening elements to secure the fin and box together.

5. The structure according to claim 4, wherein the first fastening elements are internally threaded sockets and the second fastener elements are screws insertable through openings in the base section, the screws having flat heads dimensioned to lie in flush alignment with the base section exterior bottom wall when the screws are fully tightened into their sockets.

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U.S. Cl. X.R.

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