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Ogden

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[54] **EXTRUDED DIVING BOARD**

[76] Inventor: **John F. Ogden,** 3005 Olive St., Columbus, Ohio 43204

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[58] **Field of Search** 272/66; 52/578, 579, 586

[56] **References Cited**

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Primary Examiner—Anton O. Oechsle
Assistant Examiner—Joseph R. Taylor
Attorney, Agent, or Firm—Wood, Herron & Evans

[57] **ABSTRACT**

A diving board formed of a plurality of extruded sections joined together in side by side relation. A plurality of tubes are contained within the extruded sections, the tubes having differing wall thicknesses to provide the desired springing characteristics to the board.

19 Claims, 7 Drawing Figures

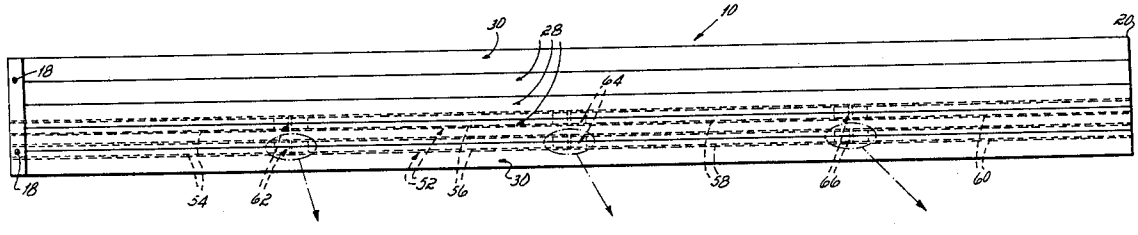


Fig. 1
Fig. 2
Fig. 3
Fig. 4
Fig. 5
Fig. 6

EXTRUDED DIVING BOARD

BACKGROUND OF THE INVENTION

This invention relates generally to diving boards and more particularly to extruded diving boards.

Many and varied diving board constructions have heretofore been devised with some boards being constructed of wood and others constructed of metal such as aluminum. Metal boards have gradually become preferred over wooden boards because of their springy characteristics, their strength, their durability and their weather resistance. In addition to the foregoing characteristics of metal diving boards, manufacturers have developed metal boards with varying spring characteristics along the length of the board with the board being stiffest near the board fulcrum and most flexible nearest its forward end.

Typically, metal diving boards are made by extrusion and, therefore, are not tapered. An untapered board, however, has a uniform stiffness along its length. In order to vary the stiffness or springing characteristics, metal board extrusions are machined to the desired tapered shape. Such machining, however, is both time consuming as well as being expensive.

While prior art diving boards with desirable spring characteristics have been developed, the design of boards with different springing characteristics is expensive because each experimental board must be machined and tried. If the resulting board does not have desirable springing characteristics, then it must be remachined or scrapped. Either approach is unsatisfactory.

OBJECTS OF THE INVENTION

The principal objective of the invention is to provide a diving board with good spring characteristics that can be manufactured economically by extrusion without requiring any machining.

A further objective of the invention is to provide a diving board that can be economically manufactured by extrusion without requiring machining wherein the spring characteristics of the board is controlled by inexpensive members in the board which can be purchased easily or manufactured by extrusion without machining.

BRIEF DESCRIPTION

The invention is predicated on the concept of utilizing a plurality of identically shaped non-tapered extrusions arranged in parallel side-by-side relation and shaped to provide a plurality of longitudinal bores in which tubular members having varying wall thicknesses are disposed to provide the desired spring characteristics without expensive machining.

In a preferred embodiment of the invention, the diving board is constructed from a plurality of elongated hollow members arranged in side-by-side abutting relation, each elongated member having an unchanged cross section along its length and is manufactured by extrusion. Additionally, two identical elongated hollow side members are preferably provided on either side of the centrally located hollow members, the side members also being made by extrusion with an unchanged cross section along their entire length.

The hollow members and the side members are shaped so that a bore is formed between each abutting

member that extends along the entire length of the diving board. A plurality of tubular members are disposed in each such bore in end-to-end relation. The tubular members in each bore located nearest the board fulcrum have the greatest wall thickness to thereby make the board stiffest near the fulcrum. The tubes in each bore on either side of the tube located at the fulcrum have a smaller wall thickness so that the board is more flexible at points located away from the board fulcrum. By varying the wall thickness of the tubes in each bore of the diving board, the spring characteristics of the board can be easily and economically varied and controlled.

An advantage of the invention resides in the ability to tailor a diving board very conveniently and inexpensively to differing types of needs. For example, a diving board principally used for comparatively lightweight junior high school age children can be fabricated of much lighted gage tubing, a diving board for heavier high schoolers of an intermediate gage tubing and a diving board for college and adults of still a heavier gage tubing. In this way, the single set of extrusions can be accommodated by proper selection of the tubing to different weights of divers.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing objects of the invention will become more clear from the following detailed description of a preferred embodiment of the invention taken in connection with the drawings which form a part of the original disclosure wherein:

FIG. **1** is a side view of the diving board;

FIG. **2** is a plan view of the diving board shown in FIG. **1** taken along lines **2—2** of FIG. **1**;

FIGS. **3–5** are enlarged cross sectional views of the encircled area of FIG. **2** and show typical spacer sleeves positioned between tubular members disposed in end-to-end relation along the length of a particular bore; and

FIG. **6** is a sectional view of the diving board taken along section lines **6—6** of FIG. **1**; and

FIG. **7** is a vertical sectional view through two adjacent hollow members showing an alternative arrangement for the abutting surfaces of adjacent hollow members.

DETAILED DESCRIPTION

Referring first to FIG. **1**, the diving board of the invention is shown generally at **10**. The diving board **10** is mounted above a swimming pool deck **12** by conventional supports **14** and **16**. In accordance with customary mounting procedure, the rear end of the diving board **10** is attached to the rear support **14** by bolts or other suitable connectors shown generally at **18** in FIG. **2**. The forward end of the diving board **10**, shown generally at **20**, extends beyond the pool edge, shown generally at **22**, so that a diver standing at the forwardmost end **20** will be above the water (not shown) in the pool.

In accordance with normal mounting procedure for diving boards, the board **10** rests on the forward support **16** which forms the fulcrum of the board. This fulcrum may be movable in a forward or rearward direction to permit adjustment of the spring characteristics of the board to suit the preference of individual divers.

While the foregoing description has described generally one form of board mounting, the diving board of

the invention may be utilized with other conventional mountings different from that shown in FIG. 1.

The diving board 10 of the invention has a uniform thickness along its entire length. That is, the diving board thickness as indicated by the arrows 24 is exactly equal to the thickness of the board as indicated by the arrows 26.

As viewed in FIGS. 2 and 6, the board 10 is constructed at its central portion of a plurality of elongated identical members 28 which, as will become more clear later, are hollow and have an unchanging cross section along the entire length of each member 28. In addition, the board 10 includes a pair of identical hollow side members 30 which also have an unchanging cross section along their entire length.

The elongated members 28 and the side members 30 are disposed in side-by-side abutting relation to form the diving board 10. While FIG. 2 shows a preferred embodiment with three elongated members 28 and two side members 30 which in total are approximately 20 inches wide, it will be recognized by those of skill in the art that the number and width of elongated members may be varied if a diving board of different width is desired or if elongated members of different widths are desired.

As viewed in FIG. 6, the cross section of each elongated member 28 is identical and, according to a preferred embodiment of the invention, the cross section shown for each member 28 is unchanging along the entire length thereof. The side members 30 also have a cross section identical to each other which is also unchanging along the entire length thereof. Therefore, since the cross section of the members 28 and 30 are unchanging along their entire length, these members 28 and 30 are easily manufactured by an extrusion process out of aluminum or other suitably strong extrudable material. For the preferred diving board, aluminum is extruded with a wall thickness of approximately one-eighth of an inch for each member 28, 30.

Each member 28 is identical to the other and includes a flat upper surface 32, a flat lower surface 34 parallel to the upper surface 32 and two side surfaces 36 each with a recessed portion 38 disposed between and joining the upper surface 32 and the lower surface 34. When the members 28 are arranged in side-by-side abutting relation as shown in FIG. 6, the upper surface 32 and the lower surface 34 of each member 28 is positioned to form a continuous upper surface and a continuous lower surface.

Each side member 30 has a flat upper surface 40 and a flat lower surface 42. Each flat upper surface 40, as shown in FIG. 6, is positioned in relation to the upper surface 32 of each member 28 so as to form a single continuous flat surface. Likewise, the lower surface 42 of each side member 30 is positioned to form a continuous flat surface with the lower surface 34 of each member 28.

Each side member 30 also has two side surfaces, namely, a substantially flat side 43 and a side shown generally at 44 with a recessed portion 46. The sides 43 and 44 are disposed between and join the upper surface 40 to the lower surface 42.

The recessed portion 38 of each side surface 36 and each surface 44 with recess 46 extends longitudinally along the entire length of each member 28, 30. Each of these recessed portions 38, 46 preferably has a cross sectional shape of a circular arc segment of 180°. The recess portions 38, 46 are joined to the upper surfaces 32, 40 by an abutting surface 48 and joined to the lower surfaces 34, 42 by an abutting surface 50. Preferably, the abutting surfaces 48 and 50 are flat surfaces so as to abut against an abutting surface 48 or 50 on an adjacent member 28 and/or 30. Alternatively, the abutting surfaces may be serrated as shown generally at 51 in FIG. 7 so as to assist in locking adjacent members 28 and/or 30 together. In another alternative approach the abutting surfaces may have an interlocking tongue and groove arrangement as shown generally at 53 in FIG. 7 to thereby also assist in locking adjacent members 28 and/or 30 together. It will be recognized by those skilled in this art that the abutting surfaces may be smooth as shown in FIG. 6, serrated or interlocking as shown in FIG. 7, or any combination of these three approaches as well as any other suitable approach to aid in positioning abutting members 28 and/or 30 in position as shown in FIG. 6.

When the members 28 and the side members 30 are disposed in side-by-side abutting relation as shown in FIG. 6, the abutting surfaces 48 and 50 of each side member 30 and each elongated member 28 abut against the abutting surface 48 and 50 of the adjacent member and the recessed portions 38, 46 form a bore having a circular cross section which extends along the entire length of the diving board 10, one such bore being shown generally at 52 in FIG. 2. While the preferred embodiment of the invention has members with recessed portions 38, 46 shaped to form a cylindrical bore 52 between each abutting member, it will be recognized by those of skill in the art that the cross sectional shape of the recessed surfaces 38, 46 may be different than that described and, for example, they may be shaped to form a bore having a square cross section or any other regular or irregular cross section that is unchanged along the length of the diving board.

In the preferred embodiment of the invention, as shown in FIG. 2, a plurality of tubular members 54, 56, 58 and 60 are disposed in end-to-end relation within each cylindrical bore 52 formed between side-by-side abutting members 28 and/or 30. Since the bore 52 has an unchanged cross section along its entire length, each tubular member 54, 56, 58 and 60 has an unchanging outer dimension which is substantially identical to the inner dimension of the bore 52 so that each tubular member 54, 56, 58 and 60 will fit snugly into a bore 52.

The wall thickness of each tubular member 54, 56, 58 and 60 is different from the thickness of the next adjacent tube in a given bore 52. For example, in the preferred form of the invention, the tubular member 54 has a wall thickness of 0.125 inches while the wall thickness of the tubular member 56 is 0.188 inches. The preferred wall thickness of the tubular member 58 is 0.125 inches and the preferred wall thickness of the tubular member 60 is 0.083 inches. Since the tubular members with thinner walls are more easily bent, the board 10 is most flexible in the region of the tubular members 60 and least flexible adjacent the tubular members 56. Thus by selecting the wall thickness of each tubular member, the flexibility characteristics of the board can be defined.

It should be noted that adjacent tubular members in different cylindrical bores 52, in the preferred embodiment, have the same wall thickness so that the stiffness will be substantially uniform across the width of the diving board. It will be recognized by those of skill in

the art, however, it may be desirable to have adjacent tubular members in different cylindrical bores have different wall thicknesses to thereby provide a varying stiffness characteristic across the width of the board which may affect the boards ability to resist twisting.

As indicated above, the cross section of each tubular member **54, 56, 58** and **60** is unchanging along its entire length. As such, the tubular members may be manufactured inexpensively by extrusion of a metal such as aluminum or other suitably strong extrudable material. Also, the tubular members can be purchased economically from tubing suppliers provided tubes with the desired inside and outside diameter can be obtained.

Referring again to FIG. **2**, spacer members, as shown generally at **62, 64** and **66** are provided between adjacent tubular members in a given bore **52.** The spacer member located generally at **62** is shown in greater detail in FIG. **3** and the spacer members **64** and **66** are shown in greater detail in FIGS. **4** and **5** respectively. The spacer member **62** of FIG. **3** is preferably made of solid aluminum machined to include a circular flange portion **70** which has an outer dimension substantially identical to the inner dimension of the bore **52.** This flange portion **70** is disposed between the adjacent ends of the tubular members **54** and **56.** Extending to the right of the flange portion **70** is a machined portion **72** which snugly interfits with the tubular member **56.** This portion **72** has an outer dimension substantially identical to though slightly smaller than the inner dimension of the tubular member **56.** Extending to the left of the flange **70** is another machined portion **74** which extends into the tubular member **54** and has an outer dimension substantially identical to though slightly smaller than the inner dimension of the tubular member **54.** As such, the spacer member **62** fits snugly into the end of tubular members **54** and **56** so as to strengthen the board at the point between the adjacent tubular members **54** and **56.**

FIGS. **4** and **5** show similar spacer members **64** and **66** disposed between adjacent tubular members **56, 58** and **58, 60** respectively. These spacers **64** and **66** each have a flange portion **80** and projecting portions **82** which project into the tubular members disposed on either side of the flange portion **80.** For the preferred embodiment the projecting portions **82** have dimensions to interfit snugly with the tubular members substantially as shown in FIGS. **4** and **5.**

The diving board assembly comprising members **28** and side members **30** is held together by a plurality of truss type through bolts shown generally at **84** in FIG. **1.** These bolts **84** are spaced along the length of the diving board. While a specific location for each through bolt **84** has been shown in FIG. **1**, it will be recognized by those of skill in the art that the specific location of these through bolts **84** may be modified, however, it is desirable to have at least one through bolt **84** passing through each tubular member disposed within a bore **52** to prevent shifting of the tubular members as the board bends during use.

As viewed in FIG. **6**, the truss type through bolt **84** passes completely through all the members **28** and **30.** The bolt **84** has a head **88** larger than the hole **90** in the side wall **43.** The head **88** is preferably slotted (not shown) to receive a screwdriver or the like so that the bolt **84** can be tightened. The head **88**, as will be recognized by those of skill in the art, may have other shapes which facilitate tightening of the bolt **84.**

The bolt **84** passes through aligned holes **92** in each recessed surface **38, 44** and holes **96** through each tubular member.

As best viewed in FIG. **6**, the bolt **84** is threaded at the end opposite the head **88** for engaging an interiorly threaded rivet-type nut **98** which includes a portion **99** that passes through a hole **100** in the end member **102.** The nut **98** also includes a slot (not shown) in its head to engage a screwdriver or the like to thereby permit tightening of the bolt **84.**

The foregoing description has been directed to a preferred embodiment of the invention especially including a plurality of elongated members arranged in side-by-side abutting relation between which a tubular bore, extending longitudinally along the length of the diving board is formed. A plurality of tubular members are disposed in each bore to vary the board flexibility at different positions along the board length. As indicated generally above, the cross sectional shape of each bore, while preferably being circular, may take on any other shape desired. Additionally, the number and the length of the tubular members disposed within each bore may be different from that described above and, in addition, the thickness of the walls of these tubular members may be different than the wall thicknesses specifically enumerated above.

In addition to the foregoing, the diving board of the invention may be made of a plurality of elongated hollow members **28** and the end members **30** may be replaced by members having a longitudinal cross section identical to the members **28.** In this manner, the diving board may be constructed of a plurality of identically shaped elongated members. Accordingly, the through bolt for this alternative embodiment would anchor against the recessed portion **38** of the outermost elongated members **28.** Alternatively, a tubular member having a semi-circular cross section may be disposed in the recess **38** of the member **28** located on each side of a diving board to thereby provide a vertical side wall between the upper surface **32** and the lower surface **34.** A through bolt would pass therethrough in a manner similar to that shown in FIG. **6** so as to secure all the members together to form the diving board.

It will be recognized by those of skill in the art that these and other modifications in form only may be made without departing from the spirit and scope of the invention as defined more particularly by the following claims.

What is claimed is:

1. A diving board comprising, in combination:

a plurality of identical elongated hollow members disposed in side-by-side abutting relation, said hollow members being shaped with an unchanging cross section along the length thereof and forming a bore between abutting members;

a plurality of elongated tubular members, each tubular member having an unchanging wall thickness along its length and an outer surface shaped to fit into any said bore, said tubular members being disposed in end-to-end relation within each said bore with the wall thickness of adjacent tubular members disposed in the same bore being different;

means for securing said hollow members and said tubular members together to form the diving board.

2. The diving board of claim **1** additionally including:

two identical elongated hollow side members disposed on either side of said hollow members in

abutting relation thereto, said side members being shaped with an unchanging cross section along the length thereof and forming a further bore between each side member and the hollow member against which said side member abuts, said additional bore having the same cross section as each other said bore, each said additional bore having a plurality of elongated tubular members disposed in end-to-end relation therein with the wall thickness of each adjacent tubular member in each said additional bore being different.

3. The diving board of claim 1 wherein each said hollow member includes an elongated flat upper surface, an elongated flat lower surface disposed in parallel spaced relation to said flat upper surface and a pair of sides disposed between said upper and said lower surface, each said side having an outwardly facing surface having in part a recess along its length which forms one half of one said bore.

4. The diving board of claim 1 wherein each said hollow member is formed of a continuous extrusion having a constant cross section along its length.

5. The diving board of claim 2 wherein each said side member includes an elongated flat upper surface, an elongated flat lower surface disposed in parallel spaced relation to said upper surface and a pair of sides disposed between said upper and said lower surface, one said end having an outwardly facing surface having in part a recess along its length which forms one half of one said bore.

6. The diving board of claim 2 wherein each said hollow member includes an elongated flat upper surface, an elongated flat lower surface disposed in parallel spaced relation to said flat upper surface and a pair of sides disposed between said upper and said lower surface, each said side having an outwardly facing surface having in part a recess along its length which forms one half of one said bore.

7. The diving board of claim 6 wherein each said side member includes an elongated flat upper surface, an elongated flat lower surface disposed in parallel spaced relation to said upper surface and a pair of sides disposed between said upper and said lower surface, one said side having an outwardly facing surface having in part a recess along its length which forms one half of one said bore.

8. The diving board of claim 2 wherein each said side member is formed of a continuous extrusion having a constant cross section along its length.

9. The diving board of claim 1 wherein said securing means comprises a plurality of tie rods each extending through all said hollow members and secured at its opposite end to prevent sideways movement of said hollow members.

10. The diving board of claim 1 wherein all said tubular members adjacent each other in different bores have the same thickness.

11. The diving board of claim 1 additionally including a spacer member disposed between each said tubular member in a bore, each said spacer including a centrally located portion to prevent end-to-end contact of adjacent tubular members in a bore and a portion extending from said centrally located portion into the tubular members contacting said centrally located portion, each said extending portion having an outer shape to interfit with the tubular members into which the extending portion projects.

12. The diving board of claim 1 additionally including a spacer member disposed between said tubular members in each bore to strengthen the joint between said tubular members in each bore.

13. A diving board comprising, in combination:

a plurality of identical elongated hollow members of unchanging cross section along the entire length of each said hollow member, each said hollow member including a flat upper surface, a flat lower surface disposed in parallel spaced relation to said upper surface and a pair of side surfaces disposed between said upper and said lower surfaces, each said side surface including two abutting surfaces and a recessed surface of constant radius disposed between said two abutting surfaces, said hollow members being disposed in side-by-side abutting relation with each said abutting surface on one said hollow member abutting against an abutting surface of an adjacent hollow member, said plurality of hollow members forming a continuous upper and a continuous lower surface and said recesses of abutting hollow members forming a cylindrical bore therebetween;

a pair of identical elongated hollow side members, each said side member including a flat upper surface and a flat lower surface disposed in parallel spaced relation to said flat upper surface and two side surfaces joining said upper and said lower flat surface, one said side surface being a continuous smooth surface and the other said side surface has two abutting surfaces and a recessed surface of said constant radius disposed between said two abutting surfaces, said side members being disposed in side-by-side relation to said hollow members so that said abutting surfaces of each said side members abut against an abutting surface of one said hollow member;

a plurality of elongated tubular members with a constant outer diameter disposed in end-to-end relation within each said cylindrical bore, the inner diameter of adjacent tubular members disposed in the same cylindrical bore being different;

means for securing said hollow members, said side members and said tubular members together to form a diving board.

14. The diving board of claim 13 wherein each said hollow member is formed of a continuous extrusion having a constant cross section along its entire length and each said side member is also formed of a continuous extrusion having a constant cross section along its entire length.

15. The diving board of claim 13 wherein all said tubular members adjacent each other in different cylindrical bores have the same inner diameter.

16. The diving board of claim 13 additionally including a spacer sleeve disposed between each said tubular member in each said cylindrical bore to strengthen the board at points between adjacent tubular members.

17. The diving board of claim 13 additionally including a spacer sleeve disposed between each said tubular member in a cylindrical bore, each said sleeve including a spacer portion to prevent end-to-end contact of adjacent tubular members in a cylindrical bore and a portion extending from said spacer portion into the tubular members contacting said spacer portion, each said extending portion having an outer diameter which

interfits with the inner diameter of the tubular member into which the extending portion projects.

18. A diving board comprising, in combination:

a plurality of identical elongated hollow members formed of a continuous extrusion of extrudable material having a uniform cross section along the length of each said member, each said hollow member including a flat upper surface, a flat lower surface disposed in parallel spaced relation to said upper surface and a pair of side surfaces disposed between said upper and said lower surface, each said side surface including two abutting surfaces and a recessed surface of constant radius disposed between said abutting surfaces, said hollow members being disposed in side-by-side abutting relation with each said abutting surface on one said hollow member abutting against an abutting surface of an adjacent hollow member, said plurality of hollow members forming a continuous upper and a continuous lower surface and said recessed surfaces of abutting hollow members forming a cylindrical bore having a constant diameter therebetween;

a plurality of elongated tubular members with a constant outer diameter substantially equal to the diameter of said cylindrical bore and disposed in end-to-end relation within each said cylindrical bore, the inner diameter of adjacent tubular members disposed in the same cylindrical bore being different;

means for securing said hollow members and said tubular members together to form a diving board.

19. The diving board of claim **18** wherein all said tubular members adjacent each other in different cylindrical bores have the same inner diameter.

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