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DIVING BOARD OF INTERLOCKED Z-SHAPED SECTIONS

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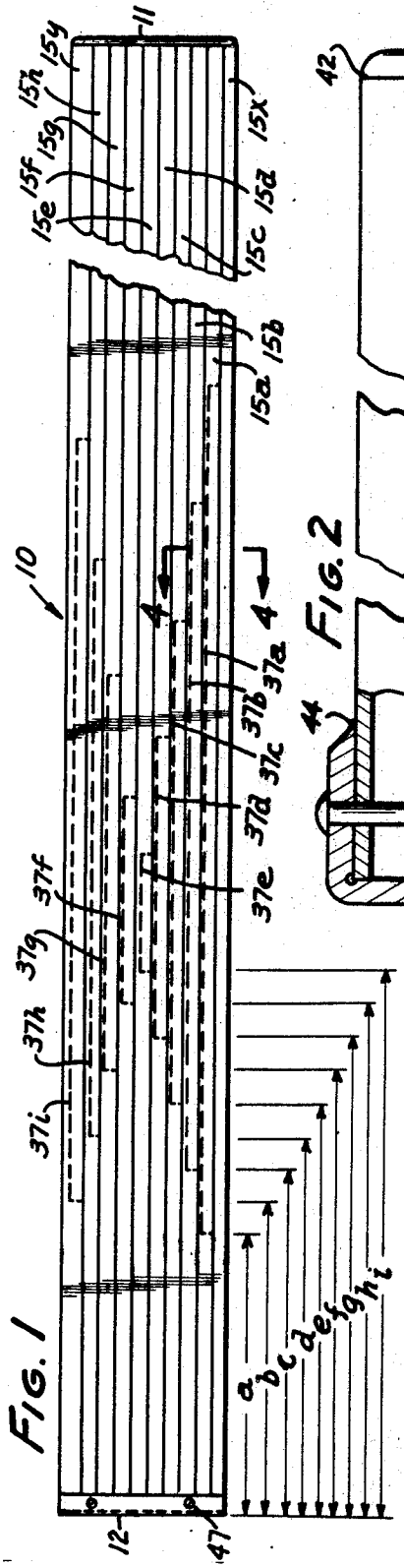


FIG. 1

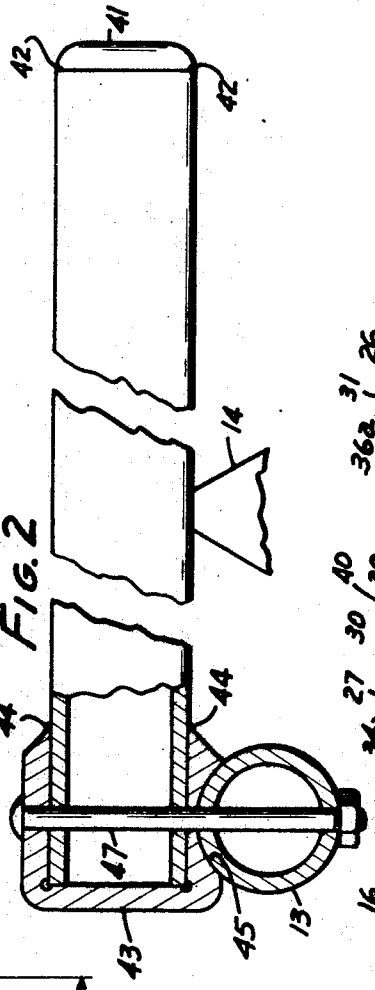


FIG. 2



FIG. 3

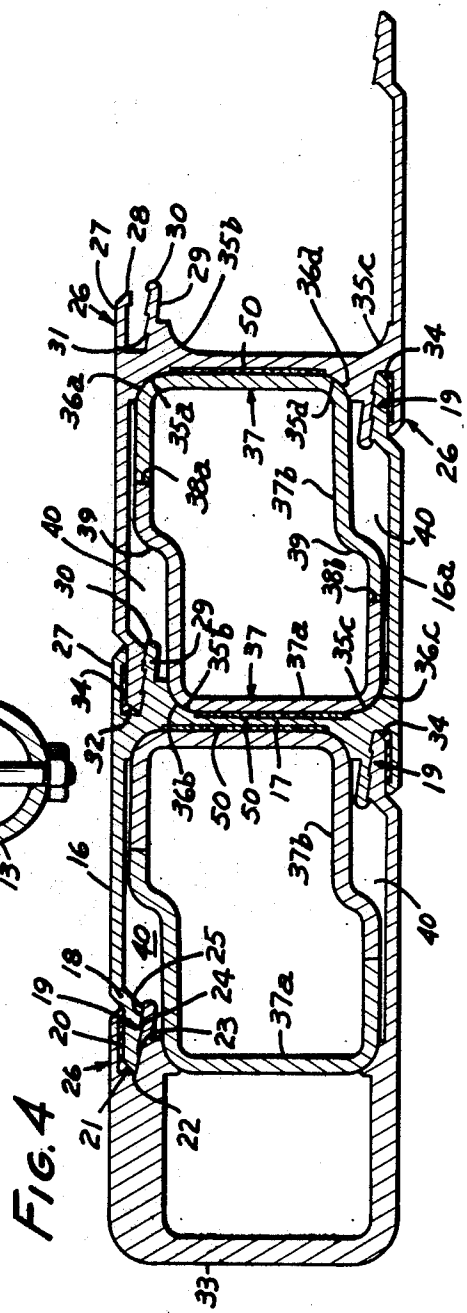


FIG. 4

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DIVING BOARD OF INTERLOCKED Z-SHAPED SECTIONS

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ABSTRACT OF THE DISCLOSURE

A diving board made up of longitudinally extending and interlocking channels placed side by side. The channels are formed in a Z-shape and interlock at the corners and ends of the Z. Stiffening members which may be hollow tubes are fitted between the adjacent webs of at least some of the Z-shaped members.

This invention relates to diving boards and has for its object to provide a metal structure which can easily be assembled. A related object is to provide such a diving board of light weight and high structural strength characterized by effective bending and springiness.

The invention is carried out by providing the skin of the diving board from a number of beams forming hollow sections placed side transversely across the board with the hollows extending along the longitudinal direction of the diving board. The upper and lower surfaces of the beams form the skins of the diving board; and webs extending from the upper to the lower skins act as shear members and retain the shape of the board. For the purpose of providing suitable stiffening with an attendant desirable degree of bending and resilience, stiffening members are placed within the hollows between the webs of the beams.

A feature of the construction resides in the construction of the beams in the general form of Z's, which I therefore designate as Z sections or beams. These Z sections are provided with interlocking means so that when a plurality of them are thus interlocked side by side, hollow longitudinal channels are formed between their webs. The Z beams or sections and their webs are preferably made with relatively little metal, so that they contribute relatively little to the structural strength of the diving board; and preferably the material of these Z sections is made of aluminum for lightness.

The principal contribution to strength and resilience is provided by the stiffeners within the hollow channels.

The foregoing and other features of the invention will be better understood from the following detailed description and the accompanying drawings of which:

FIG. 1 is a top view of a diving board constructed according to the invention;

FIG. 2 is a side elevation view of the diving board;

FIG. 3 is a front end view of the diving board; and

FIG. 4 is an enlarged cross section view taken at line 4—4 of FIG. 1.

Referring to the drawings, there is shown a diving board **10** which will ordinarily be of conventional dimensions, for example, from about ten feet to sixteen feet long, and about eighteen to twenty inches wide, of which the front end is shown at **11** and the rear end at **12**. According to conventional practice, the diving board is fastened at the rear end on a fixed support **13** and is rested on a fixed fulcrum **14** located at some distance in front of the rear support **13**, leaving the major length of the board forward of the fulcrum.

The outer skin of the board is comprised principally of a number of metallic sections **15** in the form of beams interlocked and extending side by side along the length

of the board. In FIG. 1, the board is shown with eight of these beams designated as **15***a* through **15***h*, respectively. Although these beams have vertical webs, they nevertheless resemble, in cross section, the letter Z; and hence referred to herein as Z beams or sections.

Referring to FIG. 4, each Z section or beam comprises an upper horizontal arm **16** and a lower horizontal arm **16***a* parallel to the arm **16** and joined by a vertical web **17**. The exposed surfaces of these arms **16** and **16***a* comprise the upper and lower skins respectively of the diving board. For the purpose of enabling each Z beam to be joined to the next, the extremity of each of the horizontal arms is provided with a portion **18** extending toward the center of the board and terminating in a laterally extending tongue or flange **19**. Each of the tongues **19** is formed with an outer horizontal surface **20** terminating in an inwardly slated surface **21** to the side extremity of the flange. The inner surface of each tongue **19** extends from the outer extremity **22** in the form of serrations or teeth **23** and **24** which join inwardly slanted surfaces **25**. The tongue is tapering in thickness, becoming thinner toward the lateral extremity.

At the opposite end of each of the tongues **19**, and located at the web **17** there are provided a pair of open jaws **26** formed by an outer lateral extension **27** terminating in an inwardly facing lip **28**, and by a spaced lateral extension **29** terminating at **30**, and provided with teeth or serrations **31**. The upper and lower jaws diverge away from each other toward their lateral extremities, thus having a taper in correspondence with the taper of the tongue. The dimensions of members **19** and **26** are such that the extremities **21**, **22** of the tongue of one beam pass between the upper and lower members **28** and **30** of the corresponding jaw of the next adjacent beam.

As the tongue enters the mating jaw the outer surface **20** engages the lip **28** and the teeth **23** and **24** engage the teeth **31**; it being understood that the teeth **31** of the jaw are formed and dimensioned to correspond with the teeth **23** and **24** of the flange. As the tongue moves almost all the way into the jaws, the increasing thickness of the tapered tongue causes it to engage and spread the inner and outer jaws apart until the teeth of the tongue and those of the jaw snap into engagement and thus lock with each other as shown in FIG. 4, at which point the extremity **32** of the tongue will have arrived nearly all the way within the jaw.

The beams **33** constituting the sides of the diving board, designated as **15***x* and **15***y* in FIG. 1, are formed with U-shaped cross-sections, one arm of each U being longer than the other. The metal of the U sections will ordinarily be made thicker than the metal of the Z sections. The shorter arm of the U is provided with a receptacle or jaw member **26** and the longer arm is provided with a tongue member **19**, constructed and adapted to engage with the respective tongue and receptacle members of the adjacent Z beams in the manner already described.

The construction formed with all the beams assembled and locked together, as described, comprises the outer skin of the diving board together with its longitudinally extending vertical reinforcing webs; and in order to prevent slippage or disengagement of the interlocked beam sections, the spaces **34** which will exist between the member **19** and **26** may be filled with a binder which can be a resin poured into the space, for example an epoxy resin, where it will solidify; furthermore, it is highly desirable to cement the mating serrations of the respective tongues and jaws to each other by a cementitious film which can be epoxy resin. The beams will thus be held together as a unitary structure.

The diving board skin just described, while being self-supporting, does not yet have the strength and resilience to make it a desirable diving board, assuming the sections to be made of aluminum of reasonably light weight. Such strength and resilience is provided by suitable stiffeners **37** placed within the hollow longitudinal channels formed by the outer skin and the webs of the interlocked beams. These stiffeners, the positions of which are indicated in FIG. 1 by the dotted lines, are themselves in the form of hollow channels conformed to fit these hollows of the beams. For the purpose of readily accomodating these stiffners, some of the internal surfaces within the Z beams are rounded at **35***a*, **35***b*, **35***c* and **35***d*; and corresponding surfaces of the U beams are likewise rounded. These rounded surfaces will accommodate fairly snugly the corresponding rounded surfaces **36***a*, **36***b*, **36***c* and **36***d* of the stiffeners **37**. Each stiffener is formed of a pair of plates **37***a* and **37***b* of metal, preferably steel, bent in the general shape of a U, as shown, and their ends are made to abut each other at **38***a* and **38***b*. The two members **37***a* and **37***b* are duplicates of each other, the U's into which they are formed being rounded to form the appropriate rounded surfaces **36***a* to **36***d*; and each U member has one arm longer than the other, the longer arm being formed with a outwardly extending portion **39** providing a substantial space **40** between the stiffener member and the outer skin.

These stiffeners can be made of desired lengths and placed in desired positions to provide the desired degree of bending and resilience for the diving board. In the diving board illustrated, all the hollows of the Z beams are shown with stiffeners, these stiffeners being represented as **37***a* to **37***i*. It is noted that some stiffeners are longer than others, the particular arrangement illustrated showing the shortest stiffener at the hollow of the innermost or central beam and becoming longer in the hollows of the beams further toward the sides of the board. Furthermore, the stiffeners will not ordinarily be made to extend the entire length of the diving board, but they should extend for some distance in front of the fulcrum to provide the proper stiffness at the area of the board in front of the fulcrum.

As an example of suitable positioning of stiffeners, the following dimensions represented by letters *a* to *i* in FIG. 1 are given as suitable for a sixteen foot diving board of twenty inch width.

Distance from rear of diving board to rear of stiffener:	Inches
a	33
b	37
c	41
d	45
e	49
f	53
g	57
h	61
i	65

Stiffener:	Length in inches
37*a*	101
37*b*	79
37*c*	57
37*d*	36
37*e*	14
37*f*	25
37*g*	46
37*h*	68
37*i*	90

It will be recognized that the choice of the length and positioning of the stiffeners will depend on such factors as length and width of the diving board, the degree of stiffening desired and the type of resilience desired, and on the thickness and material of the stiffeners as well as the diving board sections. For example, for shorter and narrower diving boards some of the hollows of the beams may be left unfilled by any stiffener.

When the stiffeners are placed in their desired positions, there will be void spaces **40** which will allow for relative movement between the beam material and the stiffeners. To hold the stiffeners in their position and keep them from shifting, they are preferably cemented in place by a film of adhesive substance such as epoxy resin at a spot or region **50** at about the center of the web.

Although the stiffeners are shown as being hollow, which is desirable, it should be understood that non-hollow stiffeners may be used instead, assuming they are of a desired degree of strength and resilience.

The front end of the diving board is covered by a tip plate **41** of metal such as aluminum which covers the open front ends of the hollows of the beams; and this is welded around the edges at **42** to the skin. The rear end of the diving board is covered by a butt plate **43** in the form of a sheet metal, preferably aluminum, formed in the shape of a U to overlie the back end of the board, as well as a portion of the top and a portion of the bottom of the skin, as shown, thus flux plate being welded to the skin all around its forward end as shown at **44**.

The bottom portion of the butt plate is rounded at **45** in a circular arc centered at the center of the hollow cylinder or pipe **13** which is its support on which the surface **45** rests. Suitable bolts **47** pass through the upper and lower arms and through the diving board and through the pipe as shown to hold the diving board in position and to prevent it from twisting laterally when in use. This pipe **46** will be held at each side in a suitable standard or standards (not shown) at the desired height from the deck of the swimming pool. Likewise the top of the fulcrum **14** will be established at the desired height.

In the construction of this diving board, the skin and the webs **17**, which act as shear webs, contribute relatively little to the structural strength of the diving board. In consequence, the thickness of the arms of the Z's forming the skin of the diving board, and also of the webs joining the arms, will ordinarily be made as thin as possible, as it is desired that the diving board shall be made as light in weight as possible. Ordinarily, these Z's will be made of aluminum or an aluminum base metal and the arms and webs will be made as thin as the metal can reasonably be extruded. For a Z beam made of aluminum, the thickness of the arms and webs of the Z's can each ordinarily be made as thin as about .060 inch, although this particular thickness is not essential. The principal structural strength and resilience of the diving board will result from the stiffeners which will be formed to the proper shape from sheet metal such as steel, which will be made thick enough to have the desired strength and resilience. The lengths of the stiffeners are selected to resist bending to the extent desired at the desired distance from the tip of the board. The use of the stiffeners of varying lengths and distances from the ends of the diving board have the advantage over a constant section in that they spread the deflection over a larger area than if they were absent, and the arrangement does not concentrate a high stress at the fulcrum. The greater thickness of the side members **33** of the diving board as compared with the thickness of the material of the Z sections gives the board a desired torsional stability.

The balanced Z sections, the stiffeners and the side sections all have their own shear webs; and this eliminates the shear on the interlocked joints of the adjacent beams arising from the bending of the diving board. The gaps between the stiffener and the upper and lower arms of the Z sections serve to prevent the stiffener from making an indentation in the top and bottom skin of the board when deflected. A feature of the Z resides in the fact that the interlocks of adjacent beams occurs in the region

of the webs, such that the proximity of the webs relieves stress on the interlocks. Furthermore this location of the interlocks resulting from the Z structure enables the stiffeners to be located between adjacent webs without interference with any interlocks.

Although some dimensions have been given in this specification, it should be understood that they are given only by way of example, and that diving boards may be made of many different sizes and dimensions of parts, and that dimensions other that those given in this specification may be used as desired.

It will be recognized that by my invention there is provided an effective and efficient lightweight, strong and resilient metallic diving board which is free from deterioration to which wooden boards may be subject. The invention is not limited to the particular construction and arrangement shown in the accompanying drawings and described in the specification, which are given by way of example rather than of limitation; and the invention is not limited except in accordance with the scope of the appended claims.

What is claimed is:

1. A diving board comprising longitudinally extending channels side by side, each channel comprising a resilient beam having a substantially Z-shaped cross-section comprising respective upper and lower arms joined together by a web, said arms being substantially parallel to each other and forming respective upper and lower skins of the board, one of the arms of each Z being formed in a tongue having serrations and the other arm of the Z being formed in a jaw having corresponding serrations, the serrations of the tongue of one beam being matched with the serrations of the jaw of the next adjacent beam, and stiffening members fitted between the webs of adjacent ones of at least some of the Z's.

2. A diving board according to claim **1** in which the tongue tapers toward the side extremity of the beam so that when it enters the jaw it spreads the upper and lower arms of the jaw apart, causing the serrations of the tongue to snap into engaging relationship with the serrations of the jaw.

3. A diving board according to claim **2** in which one of the arms of the jaws is provided with a lip which engages the tongue, providing a space adjacent the lip between the tongue and the jaw, and a binder occupies said space.

4. A diving board according to claim **1** in which the Z sections at the sides of the diving board are joined by U sections forming the respective sides, the upper and lower arms of each U section being provided with a respective jaw and a tongue adapted to engage respectively with the tongue and jaw of the adjacent Z section.

5. A diving board according to claim **1** in which said stiffening members are shorter than the length of the board and are placed at a region of the board at which the board will rest on a fulcrum.

6. A diving board according to claim **1** in which the stiffening members in the channels are non-uniform in length and are shorter than the length of the board.

7. A diving board comprising longitudinally extending channels side by side, each channel comprising a beam having a Z-shaped cross-section comprising respective upper and lower arms joined together by a web, the said arms being substantially parallel to each other and forming respective upper and lower skins of the board, one of the arms of each Z being formed in a tongue having serrations and the other arm of the Z being formed in a jaw having corresponding serrations, the serrations of the tongue of one beam being matched with the serrations of the jaw of the next adjacent beam, stiffening members fitted between the webs of adjacent ones of at least some of the Z's, said stiffening members

being in contact with the respective webs of adjacent Z's, and means located at the interiors of the Z's holding the stiffening members away from the arms of the Z's so that the stiffening members do not rub against the arms of the Z's during flexure of the board.

8. A diving board comprising longitudinally extending channels side by side, each channel comprising a beam having a Z-shaped cross-section comprising respective upper and lower arms joined together by a web, the said arms being substantially parallel to each other and forming respective upper and lower skins of the board, one of the arms of each Z being formed in a tongue having serrations and the other arm of the Z being formed in a jaw having corresponding serrations, the serrations of the tongue of one beam being matched with the serrations of the jaw of the next adjacent beam, said diving board being provided with a plate at its rear end having an arcuate portion extending transversely across the under side thereof for engagement with a corresponding arcuate surface of a fixed support, whereby radial movement of the board is avoided during use.

9. A diving board according to claim **1** in which the sides of the board are formed of respective U-beams of U-shaped cross section, one arm of each U being longer than the other arm, one of the U arms being formed in a tongue having serrations and the other U arm being formed in a jaw having corresponding serrations, the serrations of said jaw being engaged with the serrations of a tongue of the adjacent Z sections, and the tongue of the U having its serrations engaged with the serrations of the jaw of the adjacent Z section.

10. A diving board according to claim **9** in which the thickness of an arm of the U-beam located beyond the adjacent Z beam is greater than the thickness of the arms and web of the Z beam.

11. A diving board comprising longitudinally extending channels side by side, each channel comprising a beam having a Z-shaped cross-section comprising respective upper and lower arms joined together by a web, the said arms being substantially parallel to each other and perpendicular to the web and extending laterally in opposite directions from the web and forming respective upper and lower skins of the board, interlocking means on each of said arms, both at its outer extremity and also at the region of the web, for attachment to a corresponding interlocking means on the arm of an adjacent beam such that an interlocking means at the extremity of one arm is attached to an interlocking means at the web of the adjacent arm, and stiffening means fitted between the webs of adjacent ones of at least some of the Z's.

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