

April 17, 1962

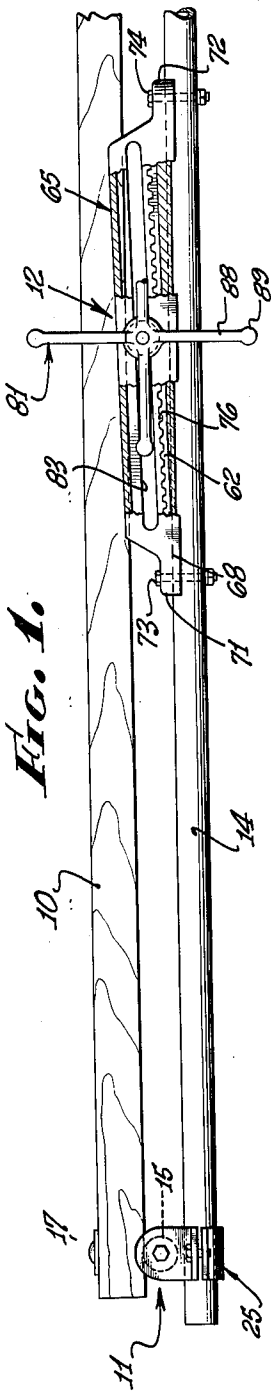
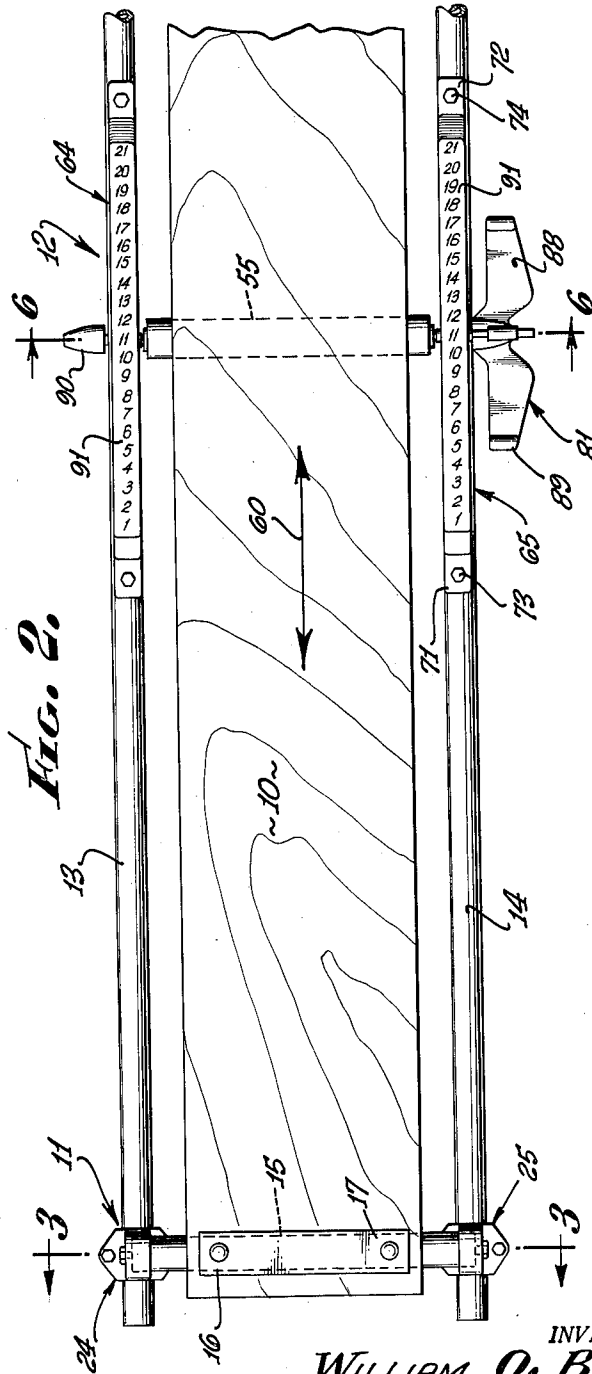
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3,030,108

DIVING BOARD STRUCTURE

Filed April 20, 1959

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 3.

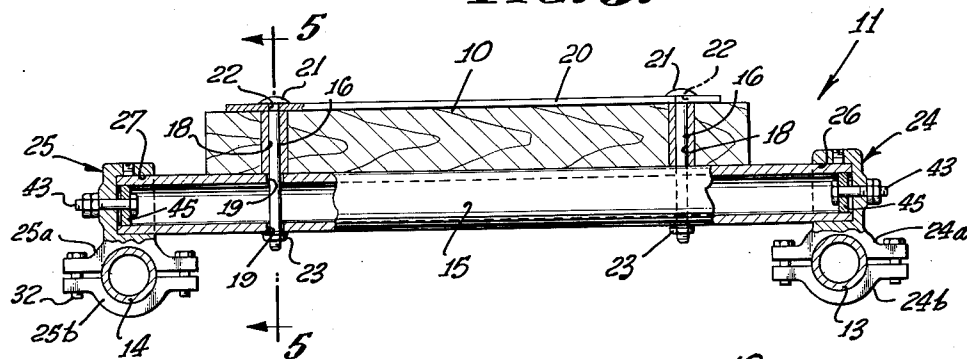


FIG. 4.

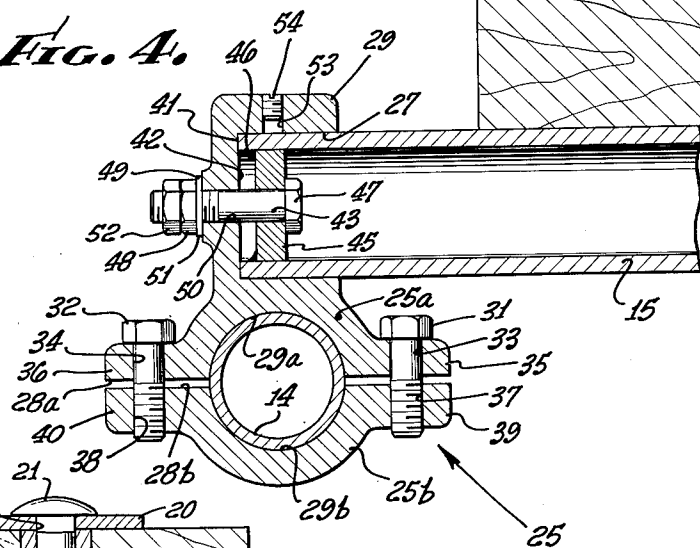
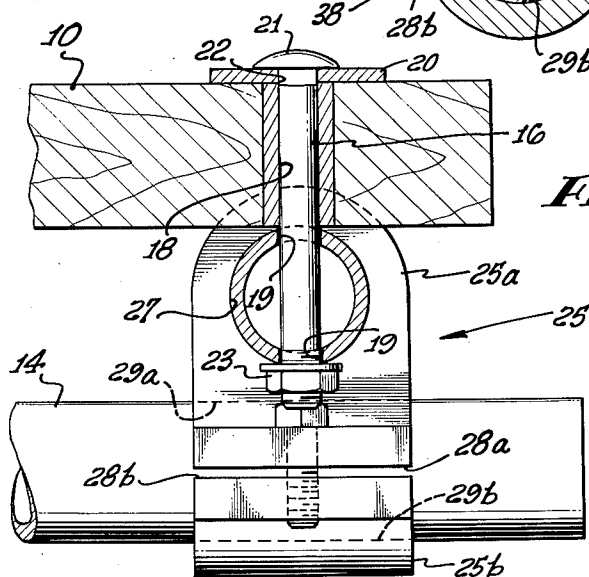


FIG. 5.



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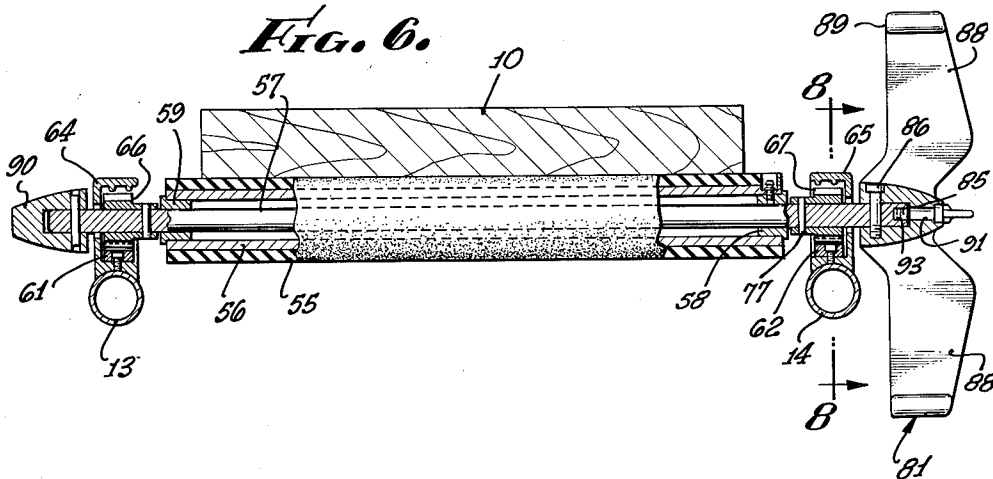
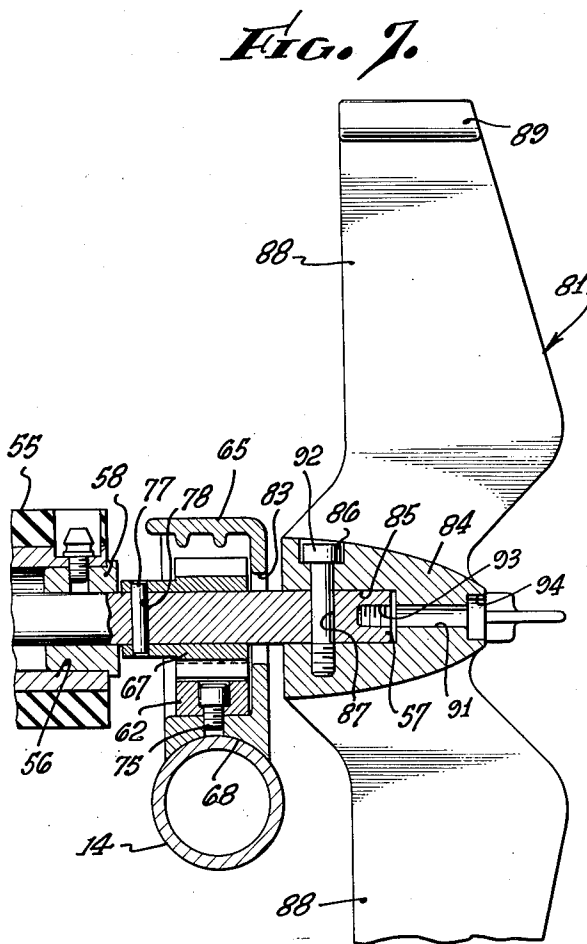
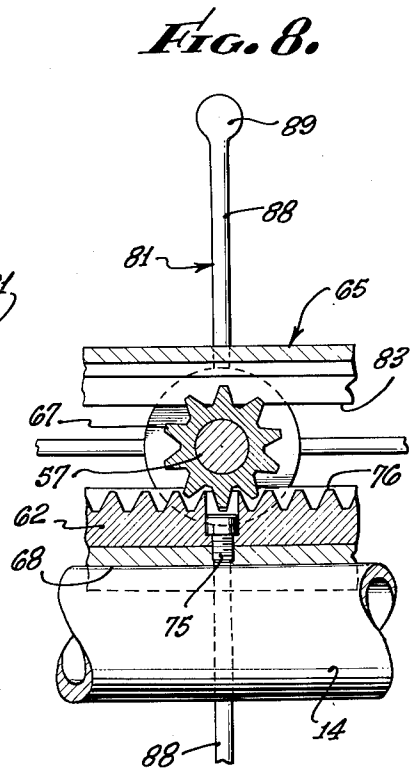
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3 Sheets-Sheet 3



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1

3,030,108

DIVING BOARD STRUCTURE

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Filed Apr. 20, 1959, Ser. No. 807,506
3 Claims. (Cl. 272-66)

This invention relates to swimming pool equipment, and particularly to a diving board structure.

A diving board structure includes three parts: an anchor to which one end of the board is affixed; a fulcrum beyond which the board is cantilevered and upon which the board rests; and, of course, the board proper.

The need for an adjustable fulcrum structure has previously been recognized. Thus, the relative position of the fulcrum along the board affects the flexibility of the board as well as its periodic characteristics. Even if divers could agree upon a standard, it would be to no avail since the diver's weight is also a variable. Hence, an adjustable fulcrum structure is used wherever the differences in divers' preferences deserve attention, as, for example, in competitions.

It is an object of this invention to provide a simplified adjustable fulcrum structure that is capable of quick pedal adjustment by the diver himself when he is on the board proper.

Substantial stresses are imposed upon diving boards. Bending stresses are substantial, also those due to contact with the fulcrum. But the serious problem has been the stresses at the anchor. Thus, the board is usually bolted to an anchor bar, and forces tend to shear the bolts or to rip the diving board from the bolts. Such failure is the inevitable cause of replacement and repair. An object of this invention is to correct this fault.

A companion object of this invention is to provide a diving board structure that incorporates an important new mode of operation. Thus, previous diving boards were restrained in their upward movement away from the fulcrum by the beam characteristics of the board alone. A stiff board might repeatedly clack against the fulcrum when the diver is attaining height; a more flexible board might operate differently. I have found that smooth, predictable operation can be obtained by providing an additional mode of movement of the diving board, namely, restrained angular movement about the anchor. By providing this mode of movement, the problem of failure at the anchor end is also solved.

Another object of this invention is to provide novel means for adjustably controlling the restraint against angular movement so that optimum operation is achieved.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawings accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

Referring to the drawings:

FIGURE 1 is a fragmentary side elevation of a diving board structure incorporating the present invention;

FIG. 2 is a top plan elevation thereof;

FIG. 3 is a sectional view of the anchor and taken along the plane indicated by line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary sectional view showing a portion of the apparatus of FIG. 3;

FIG. 5 is an enlarged fragmentary sectional view taken along the plane indicated by line 5—5 of FIG. 3;

FIG. 6 is an axial sectional view taken along the plane

2

indicated by line 6—6 of FIG. 2 and illustrating the adjustable fulcrum structure;

FIG. 7 is an enlarged fragmentary sectional view showing a portion of the apparatus of FIG. 6; and

FIG. 8 is an enlarged sectional view taken along the plane indicated by line 8—8 of FIG. 6.

In FIGS. 1 and 2, there is illustrated a diving board 10 supported by the aid of an anchor 11 and a fulcrum 12.

In a manner to be presently described, the anchor 11 and the fulcrum 12 are suspended by the aid of parallel bars 13 and 14 forming a part of a diving board frame.

The bars 13 and 14 are made of metal tubing of circular cross-section. Both the anchor 11 and the fulcrum 12 are especially adapted to attach directly to these circular bars. The bars 13 and 14 are spaced from each other in an amount greater than the width of the board 10, which is centered between them, as illustrated in FIG. 2, the board being supported only by the anchor 11 and the fulcrum 12.

Beneath one end of the board 10, a transverse pivot bar 15 (FIGS. 3, 4 and 5) is located. The pivot bar forms an anchor that has limited freedom of angular movement. For securing the board and bar 15 together, a plurality of carriage bolts 16 (FIGS. 3 and 5) are provided. In this instance, only two are shown at opposite sides of the board 10. Each bolt 16 extends downwardly through a sleeve-lined bore 18 in the board 10, and projects through aligned apertures 19 in the pivot bar 15. A reinforcing strap 20 is placed across the top of the board 10 and beneath the heads 21 of the bolts 16. Nuts 23, engaging the terminal projecting portions of the carriage bolts 16, clamp the pivot bar 15 to the board 10. The strap 20 has square apertures 22 fitting the square shank ends of the bolts 16 whereby the bolts are, in a conventional manner, held against turning as nuts 23 are positioned.

The ends of the pivot bar 15 extend beyond the sides of the board and are accommodated in brackets 24 and 25. The brackets 24 and 25 together provide opposed sockets 26 or 27 (FIG. 4) for the respective ends of the pivot bar 15. The brackets 24 and 25 are identical but oppositely oriented so that their sockets face inwardly.

The bracket 25, as illustrated clearly in FIGS. 4 and 5, is constructed of two parts 25a and 25b. The parts have surfaces 23a and 28b along each of which arcuate recesses 29a and 29b extend. The parts 28a and 28b are secured to the bar 14 by clamping the bar between them, the recesses 29a and 29b serving to seat the bar 14. Screws 31 and 32 are provided that pass through apertures 33 and 34 formed in flanges 35 and 36 located on opposite sides of the recess 29a of the bracket part 25a. The screws engage threaded apertures 37 and 38 formed in flanges 39 and 40, and correspondingly located opposite sides of the recess 29b of the opposite bracket part 25b. Upon tightening of the cap screws 31 and 32, firm frictional engagement is achieved. The recesses may be coated to protect the surface of the bar 14 and to establish firm engagement.

The axis of the socket 27 extends in a plane that is perpendicular to the axis defined by the recesses 29a—29b for the frame bar 14. The socket 27 is formed in an upwardly extended central body portion 29 of the part 25a.

The brackets 24 and 25 serve as a means for independent longitudinal adjustment of the ends of the pivot bar 15 along the frame 13, 14. By such adjustment, the board is aligned between the bars 13 and 14 and relative to the fulcrum 12.

The sockets 27 and 28 are cylindrically formed to receive the pivot bar 15 with at least running clearance. However, each end surface of the pivot bar 15, as at 41,

is intended frictionally to engage the bottom 42 of the corresponding socket 27.

For imposing this frictional engagement, each end of the pivot bar carries a screw or stud 43 that projects beyond the corresponding pivot bar end. The screw 43 passes through a hole 50 in the bottom of the socket and beyond an annular land 49 on the outer side of the body 29. The screw 43 is there engaged by a nut 48 that, by reaction against the land 49, draws the end of the pivot bar frictionally against the socket bottom 42. A washer 51 is interposed between the nut 48 and the land 49, and a lock nut 52 holds the parts in a desired adjusted position.

The screw 43 is secured to the pivot bar 15 by the aid of a plug or ported wall 45 recessed within the end of the pivot bar. The screw 43 is secured centrally of the plug 45 by having its head 47 engage about the central opening of the plug. A weld may be provided in order to maintain the plug and screw together.

The wall 45 is secured within the pivot bar 15 by the aid of an annular weld, as at 46, that serves to transfer the longitudinal thrust to the pivot bar proper. By recessing the land 45 within the bar 15, frictional engagement of the pivot bar 15 with the socket is confined to the end edge 41.

The forces of friction are, of course, difficult to control. The forces may redistribute themselves over an area due to vagaries of the contacting surfaces. To prevent any redistribution of friction forces from substantially affecting torque (which depends upon radius of action, and hence location of the force), the friction forces are confined to end edge 41 that is narrow relative to its radial location. Hence, even extreme redistributions of friction forces make only slight differences, and torque restraint is predictably a function of the total friction force alone.

The nut 48, acting upon the land 49, imposes an insignificant restraint since the lever arm is small.

It might appear that the bracket 25 tends to move angularly about the axis of the bar 14. This would be the case if significant movement were required to bring the pivot bar 15 into initial engagement with the socket bottom. But this is avoided due to appropriate sizing of the pivot bar 15. Thus, both end edges of the pivot bar 15 readily contact the socket bottom; only the force of engagement is varied.

Introduction of a slight amount of lubricant between the cylindrical exterior surface of the pivot bar 15 and the cylindrical wall socket 27 ensures against binding at this surface. Access for lubricant is provided by a radial recess 53 extending outwardly from the socket, and normally closed by a headless screw 54.

In practice, the board moves about the axis of the pivot bar 15 only a few degrees. Desired movement of the board is achieved, and destructive stresses on fastening means, as at bolts 16 and 17, are avoided.

It will be apparent that the brackets 24 can, without affecting their operation, be disposed upon bars having any orientation relative to the horizontal. It is only necessary that the mounting bars, such as 13, 14, lie in planes perpendicular to the axis of movement of the pivot bar 15.

In FIGS. 6, 7 and 8, the adjustable fulcrum structure is illustrated. A rubber sleeve 55 (FIG. 6) is contacted by the board 10, and is telescoped over a fulcrum roller 56. The fulcrum roller 56 is supported centrally of a longer fulcrum shaft 57 by the aid of sleeve bearings 58 and 59 of opposite ends of the roller 56.

In a manner to be described hereinafter, the shaft 57 is caused to move longitudinally of the board and in the direction of the arrow 60 (FIG. 2). The bearings 58 and 59 permit the roller 56 and its rubber sleeve 55 to track along the under side of the board 10 as the shaft is shifted longitudinally.

The shaft 57 is supported for longitudinal adjustment by the aid of racks 61 and 62 and pinions 66 and 67. 75

The racks 61 and 62 are mounted upon the bars 13 and 14 by the aid of elongate brackets 64 and 65 (see FIGS. 1 and 2). The brackets 64 and 65 are of channel cross-section throughout almost their entire lengths.

The brackets 64 and 65 are companion right and left hand parts oriented symmetrically with respect to each other along the bars 13 and 14 so that the openings of the channels face inwardly toward each other (FIG. 6). Since the brackets, racks and pinions are identical or symmetrical, reference will now be made to FIGS. 7 and 8, illustrating the bracket 65, rack 62, pinion 67 and bar 14.

The lower surface of the bracket 65 is cylindrically curved, as at 68, to fit the bar 14. This surface may be coated to ensure a good frictional engagement with the bar 14 and to protect the surface of the bar 14. Bolts 73 and 74 (FIGS. 1 and 2) pass through ends 71 and 72 of the bracket 65, whereby it is mounted upon the bar 14.

The rack 62 rests upon the lower wall inside the channel of the bracket 65. The teeth 76 of the rack are spaced sufficiently from the upper wall of the channel to permit entry of the pinion 67. The rack is secured to the bracket 65 by a series of longitudinally spaced screws 75 (FIG. 8) that are recessed beneath the operative portions of the rack teeth 76.

The pinion 67 has an inwardly extending hub opposed to the bearing 58 serving as a means for centralizing the fulcrum roller. A pin 77 passes radially through the hub and an opening 78 in the fulcrum shaft to couple the parts.

The rack 62 slopes upwardly as illustrated in exaggerated form in FIG. 1. Thus, the right hand portion of the rack 62 is at an elevation higher than the left hand portion thereof. The desired slight normal upward inclination of the board 10 is thus maintained despite movement of the fulcrum shaft 57, the slope of the rack 62 corresponding to the desired inclination.

To achieve the upward slope of the rack 62, the lower wall of the bracket upon which the rack rests is thicker at the forward end of the bracket than at the rearward end, a gradual taper being provided. This is the basic reason why two companion bracket parts are required instead of one. But this is not material hardship, and standard untapered racks can be used without shims.

For moving the fulcrum shaft 57 and the pinions 66 and 67 coupled thereto, a spinner 81 (FIGS. 6 and 7) is provided. The fulcrum shaft 57 projects through the bracket 65, an elongate access slot 83 being provided in the central vertical wall of the channel bracket (see also FIG. 1).

The spinner is attached to the projecting end of the shaft 57. For this purpose, the spinner 81 has a central hub 84 provided with a recess 85 in which the end of the shaft 57 is received. A removable screw 86 projects across the recess 85, and couples the spinner 81 to the shaft 57 by passing through a transverse opening 87 in the end of the shaft 57. A simple spring-locking pin could be provided in place of the screw 86, but the screw 86 has a special function, to be hereinafter described.

As the spinner 81 is rotated, the shaft 57 is rotated, as well as the pinions 66 and 67, by the aid of pins at each end, as at 77. The pinions 66 and 67 accordingly track upon the racks 61 and 62, and the fulcrum roller 56 is correspondingly moved.

The spinner 81 is easily rotated by the aid of the toes or foot of a diver without requiring a perilous stoop or awkward reach. For this purpose, the spinner 81 has a plurality of vanes 88 extending radially from the central hub 84. At the end of the vanes, rounded, enlarged portions 89 are formed for easy engagement by the foot of the diver.

The spinner 81 can be installed at either side of the board structure, the fulcrum shaft 57 similarly projecting beyond the opposite bracket 64. If desired, a spinner can be attached at both ends of the fulcrum shaft 57.

However, a hub 90 (FIG. 6) is, in this instance, attached to the fulcrum shaft 57 at the bracket 64.

As illustrated in FIG. 2, the upper portions of the attaching brackets 64 and 65 bear scale markings 91 so that the diver is provided with a ready reference as to the position of the fulcrum structure. In use, in diving competitions for example, the diver, by prior experiment, first mentally calibrates the board action relative to the scale markings. Thereafter, the diver simply dials to a selected position.

The force exerted upon the fulcrum structure by the action of diving has no component tending to move the fulcrum roller 56. Hence, the fulcrum roller maintains its position until altered by the spinner 81.

It is sometimes desirable that the fulcrum be maintained in adjusted position beyond the control of the spinner 81. This is easily accomplished by removal of the screw 86. The driving relationship between the spinner 81 and the shaft 57 is accordingly interrupted. The spinner 81 can be rotated upon the end of the shaft 57. To prevent the spinner from being removed, the screw 86 is conveniently inserted through an axial bore 91 in the hub 84 and into a threaded recess 93 at the very end of the shaft 57. When the screw is tightened in the recess 93, the head 92 of the screw opposes but does not clamp against the end surface 94 about the bore 91.

The anchor 11 and fulcrum 12 together provide desired action of the board 10. The position of the fulcrum, to achieve desired board action, depends to some extent upon the frictional restraint imposed upon the pivot bar 15.

The inventor claims:

1. An anchor for a diving board, comprising: a pivot bar having provisions intermediate its length for attachment to a diving board, said pivot bar having coaxial annular ends; a frame providing a pair of opposed annular substantially coaxial sockets receiving the ends of the pivot bar; and adjustable means providing an adjustable

yielding frictional engagement between the ends of the pivot bar and the sockets selectively to determine a restraint upon angular movement of the bar.

2. In a diving board standard: a frame including a pair of parallel bars each having correspondingly located portions of uniform cross-section; a bracket for each bar and having an aperture fitting the corresponding bar portion for slidable movement therealong; releasable means for clamping the brackets to the corresponding bars for preventing slidable movement; each bracket having a substantially cylindrical socket opening inwardly and toward the other bracket; a pivot bar having provisions intermediate its length for attachment to a diving board; said pivot bar having cylindrical ends received in the respective sockets and bottoming therein; said pivot bar ends and said brackets being capable of slight adjusting movement towards each other to ensure bottoming of the pivot bar ends in the bracket sockets; and adjustable means for applying a force between each pivot bar end and its corresponding socket and directed parallel to said axis for providing an adjustable yielding friction torque between the pivot bar and the corresponding socket.

3. The combination as set forth in claim 2 in which said adjustable means comprises, for each pivot bar end, a threaded element carried thereby and projecting through the socket, and a nut engaging the outer end of the threaded element and reacting against the corresponding bracket; said bar portions being cylindrical so as to allow slight angular movement of the brackets about the axes of the bars for ensuring bottoming of the pivot bar ends in the bracket sockets.

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