United States Patent [19]

Leonhart

[11] **3,837,298**

[45] **Sept. 24, 1974**

[54] **LEVELLING ASSEMBLY FOR WARPABLE PLAYING SURFACES**

[76] Inventor: **Xaver Leonhart,** 8381 Harburg b., near Pilsting, Lower Bavaria, Germany

[22] Filed: **July 23, 1973**

[21] Appl. No.: **381,566**

[30] **Foreign Application Priority Data**

July 24, 1972 Germany 2236284

[52] **U.S. Cl.** **108/161,** 273/6, 273/30

[51] **Int. Cl.** **A47b 25/00**

[58] **Field of Search** 108/161; 273/126, 6, 30; 248/188.2

[56] **References Cited**

UNITED STATES PATENTS

1,677,707	7/1928	Compton	273/6
2,479,477	8/1949	Cusano	248/188.2 X
2,493,620	1/1950	Cusano	273/126 R
3,724,007	4/1973	Kuss	248/188.2 X

Primary Examiner—Francis K. Zugel

Attorney, Agent, or Firm—Brady, O'Boyle & Gates

[57] **ABSTRACT**

A rigid T-shaped rail connected along the longitudinal center axis on the bottom of a playing surface panel has pairs of depending lugs on opposite sides and at opposite ends thereof. Bracket members are connected to the under surface of the panel laterally outwardly from the lugs on the rail, which brackets provide a vertically narrow lost-motion slot adjacent the bottom surface of the panel. An adjustable triangle mechanism is connected between the depending lugs and a slide member in the vertically narrow lost-motion slot wherein the hypotenuse of the triangle mechanism is constructed of a tensioning device that can be lengthened or shortened, such as a turn buckle, causing upward and downward forces to be transferred between the areas of the playing surface panel to which the rail and brackets are connected to render the panel planar and at the same time not rigidly connect these panel areas to each other, allowing for normal expansion and contraction laterally in the playing surface area without causing further warpage thereof.

10 Claims, 2 Drawing Figures

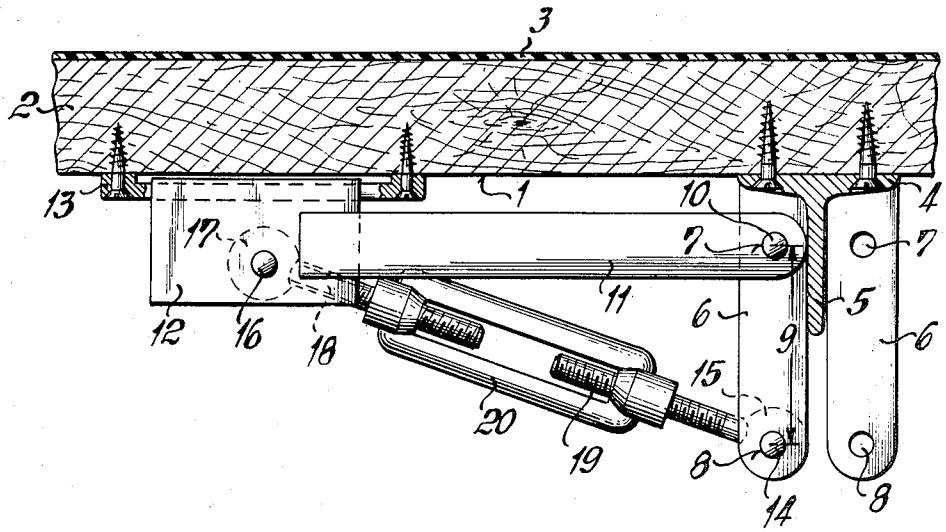


FIG. 1

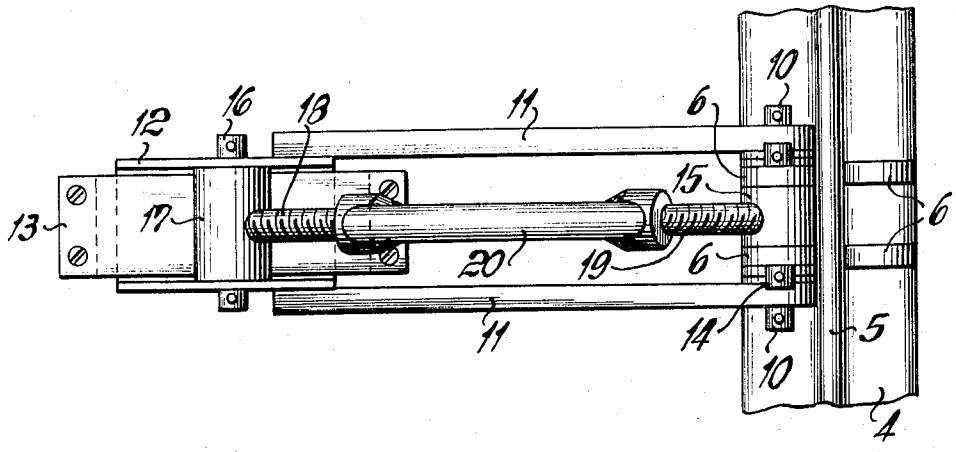
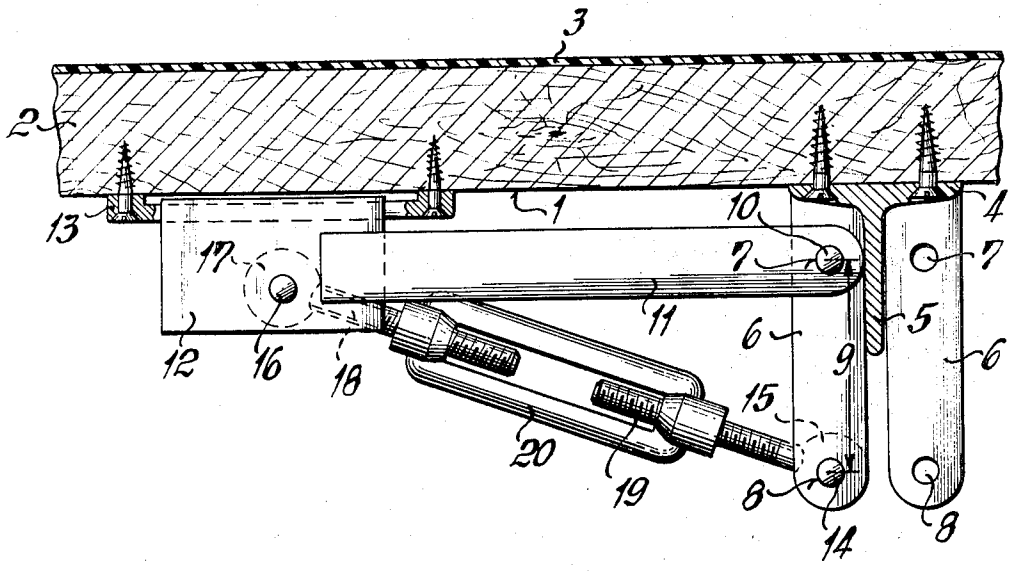

10
12
16
18
11
6
15
13
17
6
20
19
6
11
14
10
5
4

FIG. 2


3
2
1
4
13
10
17
7
7
11
6
5
12
16
18
9
6
15
20
19
8
14
8

LEVELLING ASSEMBLY FOR WARPABLE PLAYING SURFACES

BACKGROUND OF THE INVENTION

This invention relates to a tensioning assembly for leveling warpable playing surfaces of game apparatus and the like, such as wooden playing surfaces, which functions to restore the playing surfaces which have become warped and unusable for playing back into a planar surface. The assembly can also be utilized in the initial leveling set up of such a playing surface.

It is conventional in the art to prevent the warping of wooden surfaces by inserting a filling into a solid frame. However, an entirely planar playing surface cannot be obtained in this manner.

It is also known in the prior art to glue together a plurality of thin wood sheets alternatingly at right angles to one another to construct a relatively rigid playing surface. However, the expenses for such a plywood surface are very high, and does not provide assurance that the planar evenness of the surface will be preserved. In fact, experience has shown that such surfaces warp in time and become uneven and thus unusable for play in amusement games where a ball must roll accurately over the surface. This invention is directed to the problem of preventing, in a warpable or wooden playing surface panel of any desired type, the warping of such panel on the side serving as the playing surface by exerting mechanical forces from the outside or peripheral area on the underside of the panel to the interior areas of the panel without these forces being undesirably influenced by the expansion of the panel due to varying moisture or humidity conditions.

SUMMARY OF THE INVENTION

This problem is solved in accordance with the present invention by mounting to the underside of the warpable table type playing surface along the longitudinal center axis thereof, a sufficiently rigid torsion-proof T-rail preferably constructed of iron or steel, having at the two ends and on the two sides of this rail, respectively, two depending bearing lugs in which bearing points are disposed at varying spacings from the underside of the playing surface. One of the bearing points is pivotally connected via a guide arm member, with a slide member, and the other bearing point is pivotally connected with this slide member by way of a longitudinally adjustable tensioning device or turnbuckle. The slide is connected by a bridge or bracket member to the underside of a portion of the playing surface so as to be freely movable in its longitudinal direction, but at right angles to the playing plane or direction of game play on the playing surface with the bracket member allowing the slide member only a small amount of play at the underside of the playing surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The mode of operation of the tensioning assembly according to the invention is explained in detail in the specification hereinafter following by reference to the accompanying drawings, in which:

FIG. 1 is a bottom plan view showing the turnbuckle tensioning assembly according to this invention; and

FIG. 2 is a side elevation view of the assembly of FIG. 1 connected on a warpable playing field panel with the latter and the playing surface illustrated in cross-section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in greater detail, a relatively rigid distortion-free T-bracket or rail **4** is fixedly mounted by means of screws or the like along the entire length of the playing surface panel **2** and preferably positioned along the center line of symmetry on the underside **1** of panel **2.** The warpable playing surface to be straightened or which is to be prevented from warping is illustrated in the drawings in a fragmentary manner, as an illustrative example, as consisting of a wooden panel **2** with a hard synthetic resin sheet secured to the top surface thereof by glue or the like, which sheet constitutes the playing surface **3.** The playing surface panel **2, 3** may for instance constitute the playing surface or bed of a billiard game, table tennis game, table soccer game, table hockey game, etc.

The T-rail **4** is provided on both ends and on both sides of the downwardly projecting central leg or web **5** thereof with two pairs of mutually parallel and downwardly extending bearing blocks or lugs **6** integral with or rigidly connected to the rail **4.** The depending members or lugs **6** are each respectively provided with one upper bore **7** therethrough in the proximity of the underside of the panel **2** and the top or cross web of rail **4,** and a lower bore **8** through the lower free end thereof spaced by a distance indicated by reference numeral **9** from upper bore **7.** The distance **9** between bores **7** and **8** is not too small and is great enough so that the length of lugs **6** designated thereby functions as one side of an adjustable triangle mechanism.

A bolt or shaft **10** is disposed in the registered upper bores **7** of each pair of lugs **6** and a pair of spaced guide arm members **11** are freely pivotally connected on the ends of shaft **10** outwardly of the pair of lugs **6.** The free ends of both guide arm members **11** are connected to the spaced depending sides of a slide member **12** in the form of a U which is open at the bottom and the top web of which that connects the two depending sides is connected by a U-shaped guide bracket **13** in close proximity to the underside **1** of panel **2** with very little vertical play relative to the panel underside **1** and sufficient room is provided by bracket **13** for movement of members **12** and **11** relative to their longitudinal axis. Bracket **13** is connected to panel **2** by screws or the like as shown. Members **11** and **12** constitute another side of an adjustable triangle mechanism.

A pin **14** is connected through the lower registered bores **8** of each pair of the bearing lugs **6** with a bushing **15** being freely pivotally mounted on pin **14** between the pair of lugs **6.** In quite a similar manner, the U-shaped slide member **12** likewise carries a pin **16** extending through the opposite depending side walls thereof on which a bushing **17** is freely pivotally supported between the side walls. Both pivotal bushings **15** and **17** carry a radially disposed pin **18, 19,** respectively, with a left-hand thread and a right-hand thread, which can be made to approach and move away from each other by means of a turnbuckle screw coupling **20** of conventional construction. The turnbuckle elements **15, 17, 18, 19** and **20** constitute the third side or hypotenuse of an adjustable triangle mechanism in which the length of the hypotenuse is adjustable and movable relative to sides **11–12** and **6,** side **6** is stationary, and side

11–12 movable relative to side 6 and the hypotenuse. By rotating the turnbuckle to move threaded pins 18 and 19 closer to each other, the angle between sides or members 11 and 6 is decreased, while rotation of the turnbuckle 20 to move threaded pins 18 and 19 away from each other increases the angle between members 6 and 11 and by means of this action, respectively, one corner of the playing surface will permit itself to be bent in the downward or upward direction into the desired common plane to upwarp the playing surface, without there being any restriction on the free expansion of the playing surface, or without there being any change in the planar position of the playing surface corners provided by the turnbuckle 20 due to the working of the wood or other warpable material. By lengthening and shortening turnbuckle 20, upward and downward forces are transferred between the areas of the panel 2 to which bracket 13 and rail 4 are connected to render the panel planar, but these areas of the panel are not rigidly connected to each other in the lateral table direction thus allowing for normal expansion and contraction of the panel due to humidity and other environmental factors without causing further warpage of the panel. Lengthening the turnbuckle, for instance, causes upward forces to be transferred to rail 4 to level a sagging center of a playing surface panel, whereas shortening the turnbuckle produces a downwardly pull on rail 4 to remove a crown from the center of the playing surface panel.

It is to be understood that a similar turnbuckle tensioning assembly is connected to the pair of lugs 6 shown to the right in FIGS. 1 and 2 even though the duplicate mechanism is not shown.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

I claim:

1. An assembly for connection to the under surface of a warpable panel to adjust the same to a planar position, comprising a longitudinally extending rail member adapted for mounting to the under surface of the panel, at least one lug means connected to and depending from said rail and having a free end, said lug means having one pivotal bearing support means adjacent said rail and another pivot bearing support means adjacent the free end thereof, a slide member, a guide arm member connected to said slide member and pivotally connected to said one pivot bearing support means, a longitudinally adjustable arm member pivotally connected at opposite ends to said slide member and said another pivot bearing support means, and a bracket adapted for connection to the underside of the panel and having a lost motion guide means engaging said slide member whereby said slide means is freely movable in the longitudinal direction of said guide arm member.

2. An assembly as set forth in claim 1 in which said lost motion guide means is connected to said slide means to substantially restrain movement of said slide means in a direction at right angles to the panel and longitudinal axis of said guide arm member.

3. An assembly as set forth in claim 1 in which said rail is T-shaped in cross-section.

4. An assembly as set forth in claim 1 in which said rail is rigid and substantially torsion-free throughout the length thereof.

5. An assembly as set forth in claim 1 in which said lug means comprises a pair of spaced depending lugs, and said one pivot bearing support means and said another pivot bearing support means including registered apertures through said pair of spaced lug and individual pivot pin means engaged through said respective registered apertures.

6. An assembly as set forth in claim 1 in which said guide arm member extends laterally outwardly from said rail member.

7. An assembly as set forth in claim 1 in which said longitudinally adjustable arm member comprises a turnbuckle.

8. An assembly as set forth in claim 7 in which said guide arm member comprises a pair of spaced arms rigidly connected to said slide member, and said turnbuckle positioned between said pair of spaced arms.

9. Apparatus as set forth in claim 1 including another lug means on the opposite side of said rail from said first-mentioned lug means, and another guide arm member, slide member, longitudinally adjustable arm member and bracket connected thereto as set forth in claim 1.

10. An assembly as set forth in claim 9 in which the assemblies connected to the lug means on opposite sides of said rail are connected in opposition to each other and adjacent opposite ends of said rail.

* * * * *