United States Patent

[11] 3,577,694

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Continuation-in-part of application Ser. No. 534,371, Mar. 19, 1969, now abandoned, Continuation-in-part of application Ser. No. 724,799, Apr. 29, 1968, now abandoned. This application Aug. 18, 1969, Ser. No. 850,989

[54] FLOORING SYSTEMS
9 Claims, 8 Drawing Figs.

[52] U.S. Cl. 52/483, 52/489, 52/492, 52/509
[51] Int. Cl. E04b 5/00
[50] Field of Search 52/509, 512, 492, 489, 710

[56] References Cited

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Primary Examiner—John E. Murtagh
Attorney—Zachary T. Wobensmith, II

ABSTRACT: A flooring system utilizing standard pattern conventional tongue and groove wood floorboards, the boards being supported on transversely disposed spaced channels, metallic holding clips securing the boards in bearing engagement with the channels, the boards being free from any special slots for clip engagement, the clips engaging the boards in a driven penetrating relation below the tongues and grooves in a manner which does not interfere with the tight vertical engagement of the tongues and grooves nor cause splitting of the boards, the clips engaging the channels each having a body portion vertically disposed between the boards below the tongues and grooves and having at the upper margin of the body portion a horizontally extending toothed portion driven in fiber-penetrating engagement into the board along the edge at locations wholly below the lower margin of the tongue on the tongue side of the board, and optionally, for greatly increased holding power having a penetrating portion extending into the groove side of the board below the groove.

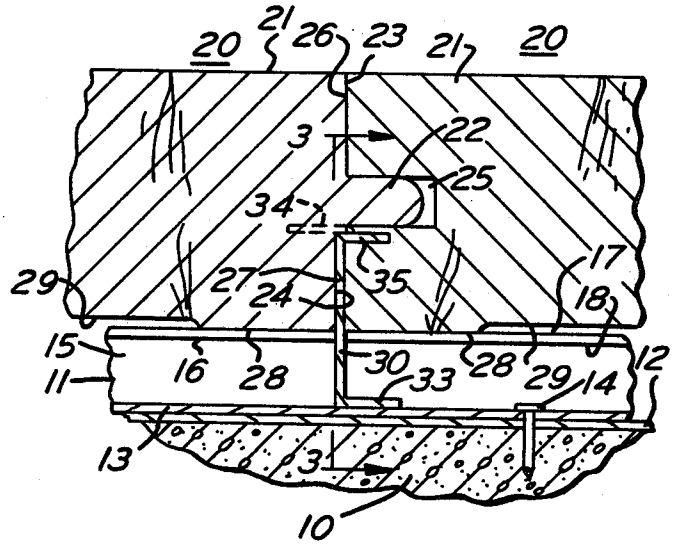


FIG. 1

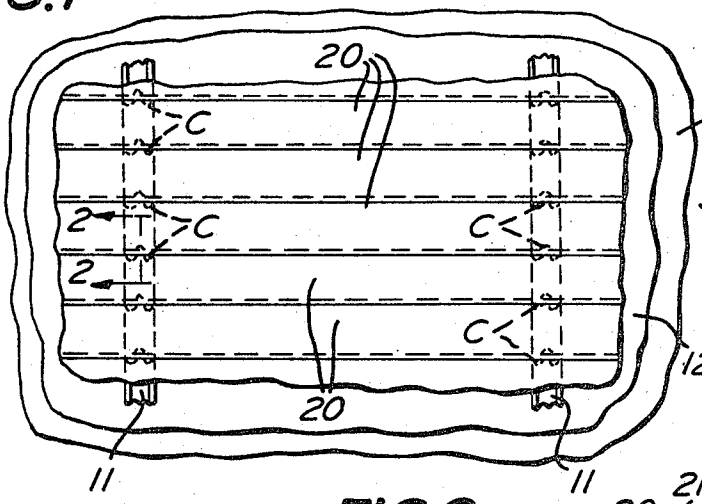


FIG. 8

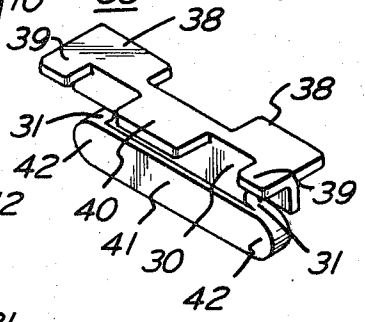


FIG. 2

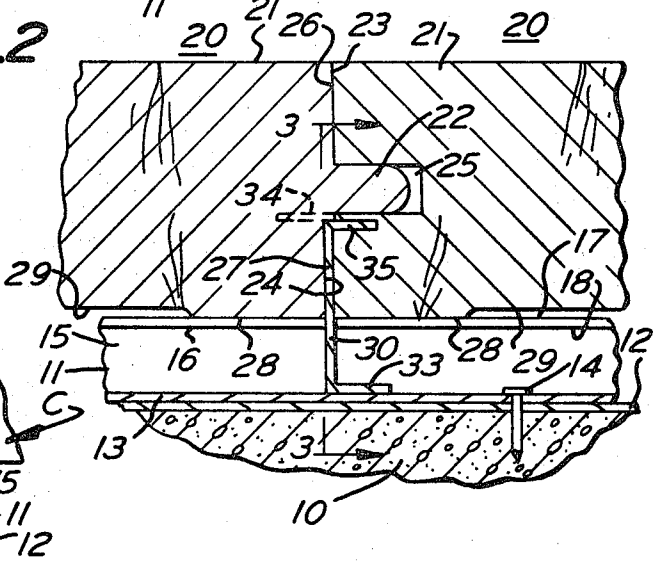


FIG. 3

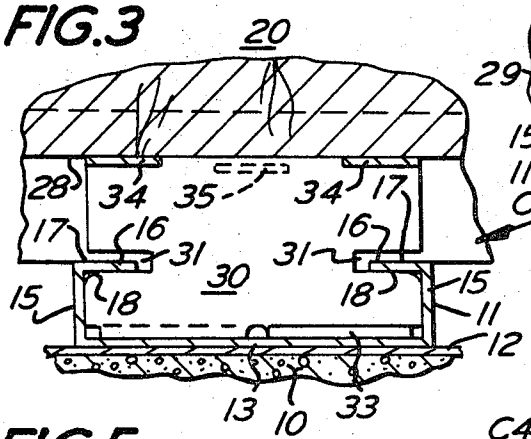


FIG. 5

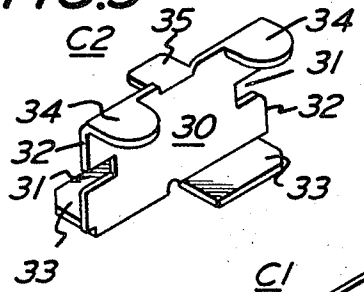


FIG. 7

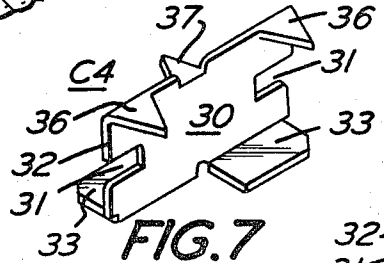


FIG. 6

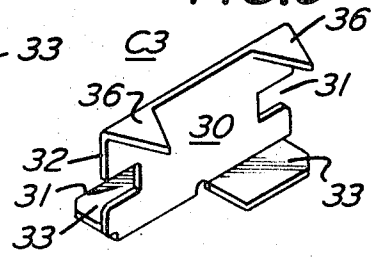
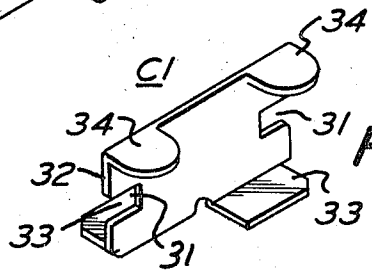


FIG. 4



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FLOORING SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of my prior applications for patent for Flooring Systems, filed Mar. 19, 1966, Ser. No. 534,371, and filed Apr. 29, 1968, Ser. No. 724,799, both now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to flooring systems and more particularly to wood flooring systems having standard pattern conventional wooden floorboards secured to channels.

2. Description of the Prior Art

Various metal channel wood flooring systems for applying, mounting and securing conventional floorboards with continuous tongues and grooves upon a subflooring of concrete or the like have been proposed but these have had clip seating and minimum thickness limitations based upon their construction. None of them provided a noninterference clip seating which would prevent splitting and lifting of boards when standard pattern twenty-five thirty-seconds inch or thicker flooring boards with continuous tight-fitting tongues and grooves were used.

Certain of the systems heretofore proposed required special cutting of the tongue and groove boards at the mill or during installation to provide longitudinal slots, grooves, or the like to provide a noninterference fit for the retaining or holding members. This added appreciably to the cost of the flooring and in most cases necessitated the use of flooring boards approximately 33 ⅓ percent thicker to provide the needed room for the custom clip seating grooves in addition to the thickness required to provide side tongues and grooves. Noninterference clip seating is defined as attaching clips to boards in such a way that no portion of the clip interferes with the tight tongue and groove edge relationship of the boards. Accordingly, the total cost of the installation was greatly increased.

It has heretofore been proposed to utilize, in a flooring system, tongued and grooved floorboards with holddown clips. Typical examples are those of Cherry, U.S. Pat. No. 2,057,135; Urbain, U.S. Pat. No. 2,046,593; Tonn, U.S. Pat. No. 1,986,030; and Wiegert et al., U.S. Pat. No. 2,469,252 who employ clips which engage in an interference fit between the tongue and groove of floorboards or panels. None of the systems heretofore referred to has proven wholly satisfactory because of the necessity of using nonstandard pattern flooring with undesirable oversize grooves to avoid splitting and lifting. Tightly fitting side tongues and grooves are an integral part of standard pattern convention wood flooring boards. An oversize groove permits movement between adjacent boards when vertical loads are applied at midspan, and causes squeaking and edge failure under rolling loads, not to mention dead spots and susceptibility to warpage.

The structures in the U.S. Pats. to Tonn, U.S. Pat. No. 1,986,030, and to Wiegert et al., U.S. Pat. No. 2,469,252, employ clips which engage in an interference fit between the tongue and groove of floorboards or panels. These constructions require either a very loose and sloppy fit between the tongue and groove or require a special clip groove beneath the tongue if there is to be a tight nonsplitting fit between the tongue and groove.

In my application for Letters Patent for Flooring Systems, filed Jan. 31, 1968, Ser. No. 702,005, there is shown a flooring system employing clips but these clips grip the boards above the level of the lower margins of the tongues of the tongued and grooved edges of the boards, portions of the tongues being removed to accommodate the upper parts of the clips. The structure of the present invention does not require the labor and expense of such tongue portion removal.

Historically, tongue and groove flooring boards have been manufactured with standardized edge profiles for a great number of years. The two standard thicknesses which comprise perhaps 90 percent of the overall production are 25/32-inch thick and 33/32-inch thick. The tongues of such standard boards always have a tight vertical fit in the grooves of the adjacent boards, and the bottoms of the tongues are consistently located seven thirty-seconds inch above the bottoms of the boards. This is true in both the 33/32-inch thickness and in the 25/32-inch thickness.

A large number of mills produce these standard boards with tight-fitting tongues and grooves with the configuration referred to above, but only a very limited number of mills produce flooring boards with nonstandard custom profile edge milling. The reason for this is that it is expensive to tool up for special profiles, it costs more to run special profiles because of nonstandard gauging techniques required, and there is a constant inventory problem with lower grades. The end effect is that the great majority of wood flooring mills do not choose to mill other than standard tongue and groove flooring.

For over 30 years various manufacturers have attempted to utilize standard-milled flooring boards with channel systems, because of the obvious economies involved. The reason that they have not succeeded is that they could not conceive of a way to seat the clip which would not interfere with the standard tight tongue and groove edge relationship which is so necessary in channel flooring systems to prevent midspan differential deflection, squeaking, and warpage. When they attempted to locate a clip around or under the tongue, for example, the bottom of the tightly fitting groove portion would invariably split and lift when the boards were driven together.

The system of the present invention differs from all previous attempts in that it permits the use of tight tongue and groove standard matched flooring which can be purchased from many dozens of mills, not from just a few mills that are in a position to do custom milling. Therefore, the cost of the wood, and particularly maple goes down substantially, and many mills can participate in the business. Additionally, the clip in no way interferes with the tight tongue and groove relationship by causing splitting and lifting and is not seated in such a way that its geometry or metal thickness interferes with the tight tongue and groove side matching.

Lastly, the flooring system of the present invention accomplishes the foregoing in a way which does not add expensive tongue removal costs to field labor costs thereby making it perhaps the most economical system in the history of the high-performance nonsplitting tight tongue and groove channel flooring systems.

Clips of the present invention can provide up to about 400 pounds board to channel holding power each working within the seven thirty-seconds inch confines below side tongues and grooves. This level of holding power is recognized by major specification agencies throughout the United States. Clips of the present invention exert a transverse board shrinkage restraint at right angles to the channel approximately four times greater than that of competitive structures using standard matched flooring. Lastly, although this clip has an extremely good level of vertical holding power, the major design consideration is that the holding power is achieved within the available geometry of standard matched flooring and the clip in no way splits or lifts the board when seated while at the same time permitting the necessary tight tongue and groove side matching.

The great economic benefit of the present invention is that it permits the use of relatively inexpensive standard pattern tongue and groove boards of twenty-five thirty-seconds inch and greater thickness and does not require custom tongue removal techniques to achieve noninterference clip seating and to avoid splitting and lifting. Because of the noninterference clip seating, boards are fully supported on the metal channel and can sustain very high vertical loads without causing board breakage around the clip. Also, the nonsplit and nonlift seating of the clip greatly enhances the vertical holding power of the clip in the board which permits the channel to act as a stiffening bar and is important when taken in combination with tight tongue and groove side matching.

SUMMARY OF THE INVENTION

In accordance with the present invention a wood flooring system is provided in which standard pattern conventional wooden tongued and grooved boards are secured to channels carried by the foundation, the securing being effected by clips which engage the floorboards at locations above the channels, in horizontally extending fiber-penetrating relation to the tongued edges of the boards below the tongues, and which may have additional horizontally extending portions for restraining them from movement out of holding position, such additional portions engaging the grooved edges of the boards below the grooves in fiber penetration and greatly enchancing the vertical holding power of the clips.

It is the principal object of the present invention to provide a flooring system utilizing standard pattern conventional edge tongued and grooved floor boards in which the boards are effectively held in place without splitting or lifting or other damage to the floorboards and which can have greatly enchanced vertical holding action in spite of the limited space available in which the holding clip can grip.

It is a further object of the present invention to provide a flooring system utilizing standard pattern conventional edge tongued and grooved floorboards and simple but effective board-penetrating holding clips therefore which retain the boards in place without damaging or disturbing the intended fully supported relationship of the floorboards to their supports.

It is a further object of the present invention to provide a flooring system utilizing standard pattern conventional edge tongued and grooved floorboards in which the tongue and groove and holding clips therefor are engaged and held more strongly then heretofore in engagement.

It is a further object of the present invention to provide a flooring system in which standard pattern conventional wood flooring boards with tightly fitting edge tongues and grooves can be employed with enhanced holding action by clips in penetrating engagement with the tongued edges of the boards.

It is a further object of the present invention to provide a flooring system in which there is no loosening of the clips from the boards in the event of shrinkage, and greatly reduced tendency to longitudinal shrinkage by reason of the longitudinal shear retention of the clips in the floor boards.

It is a further object of the present invention to provide a flooring system having standard pattern conventional tongued and grooved floorboards and employing clips for retaining the floorboards in place and in which the clips do not interfere in any way with the intended relationship of securing boards tightly to channels, of permitting a tight tongue and groove fit and of avoiding any splitting in so doing, and a single size of clip is useful for a wide range of sizes and configuration of floor boards, including the most economical thickness of twenty-five thirty-seconds inch.

It is a further object of the present invention to provide a flooring system of the character aforesaid which will be easy to install and in which the floorboards will be effectively retained in place in use.

It is a further object of the present invention to provide a flooring system in which clips are employed and the holddown power of the clips is not nullified by the splitting of the groove side when the clip is seated in standard pattern conventional wooden flooring boards with tight tongues and grooves.

Other objects and advantageous features of the invention will be apparent from the description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawing forming part thereof, in which:

FIG. 1 is a plan view of a portion of a flooring system in accordance with the invention;

FIG. 2 is a vertical sectional view, enlarged, taken approximately on the line 2–2 of FIG. 1;

FIG. 3 is a vertical sectional view, taken approximately on the line 3–3 of FIG. 2;

FIG. 4 is a view in perspective of one form of holddown clip employed in connection with the invention;

FIG. 5 is a view in perspective of another form of holddown clip which can be employed in connection with the invention;

FIG. 6 is a view in perspective of another form of holddown clip which can be employed in connection with the invention;

FIG. 7 is a view in perspective of another form of holddown clip which can be employed in connection with the invention; and

FIG. 8 is a view in perspective of another form of holddown clip which can be employed in connection with the invention.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to the drawings, it will be noted that a supporting foundation or base **10**, which may consist of a wood, concrete or other subfloor, is provided, upon which a plurality of channels **11** are secured in parallel relation and in level condition. The channels **11** can be secured as in my prior U.S. Pat. No. 3,031,725 but are preferably secured in place on the base **10** by the use of explosively applied fasteners **14**. A waterproofing and vaporproofing coating **12** can be applied on the base **10** prior to securing the channels **11**.

Each of the channels **11** has a web **13** with side marginal portions **15** extending upwardly from the web **13** and inwardly extending rims **16** extending toward each other from the upper ends of the marginal portions **15**, the rims **16** being substantially parallel to the web **13**. The rims **16** have upper faces **17** and lower faces **18**.

The channels **11** are preferably formed to relatively close dimensional tolerances for enhancing their clip-holding action. The channels **11** can be made of any desired material of adequate strength, and are preferably of mild steel with a heavy galvanizing or other coating to prevent rusting.

The floorboards **20** employed in connection with the flooring system of the present invention are of wood, which can be hardwood such as hard maple, or oak, or can be of softer wood, such as yellow pine, and can be of twenty-five thirty-seconds inch in thickness or thicker.

The floorboards **20** are preferably of conventional type with flat top faces **21**, longitudinal edge tongues **22** of any desired configuration, with upper and lower vertical longitudinal edge faces **23** and **24** therealong. The floorboards **20** on their edges opposite to those provided with the standard pattern tongues **22** have longitudinal edge grooves **25** for the reception of the standard pattern tongues **22** of contiguous boards **20**, and preferably with a relatively snug fit and floorboards **20** with normal manufacturing tolerances are suitable. The floorboards **20** have upper and lower vertical side edge faces **26** and **27**, respectively above and below the edge grooves **25**, and have bottom faces **28** which may be provided with stress-relieving grooves **29**.

As is customary in this type of floorboard **20**, the lower faces **24** and **27** are respectively inset with respect to either of the upper faces **23** and **26** and the groove **25** is of greater depth than the horizontal transverse dimension of the tongue **22**.

When the boards **20** are in place, with the tongues **22** extending into the grooves **25**, the faces **23** and **26** are in engagement and the faces **24** and **27** are separated to provide a clearance therebetween. The bottom faces **28** of the floorboards **20** are held in engagement with the upper faces **17** of the channels **15** by clips C, as hereinafter explained.

The clips C, illustrated in more detail in FIGS. 4, 5, 6, 7, and 8 as clips C1, C2, C3, C4 and C5 are preferably made in one piece from metal and of a thickness which preferably does not, for that portion of the clip, exceed the clearance between the lower edge faces 24 and 27 of the floorboards 20.

Each clip preferably has a vertical body portion 30, with notches 31 extending inwardly from side marginal edges 32 for holding engagement with the channels 11. The body portion 30, at the bottom may have, as shown in FIGS. 4, 5, 6 and 7, oppositely extending feet 33 which support the clip C on the channel 11 prior to installation and aid in retaining the clip C upright for installation. The body portions 30 are preferably dimensioned so as to have a tight overfit horizontally and vertically within the channel 11 and tightly at their side edges 32 with the interiors of the side margins 15 and rims 16 of the channels 11 and bind thereagainst.

Referring now to FIG 4, the clip C1 there shown has, at the upper margin of the body portion 30, a plurality of horizontal teeth 34, shown as nonpointed, which penetrate face 24 below the tongue 22. The shaping of the teeth 34, with nonpointed ends as shown permits and aids wood fiber penetration by the teeth 34 for gripping but with a reduced tendency to splitting upon penetration when driven close to the ends of boards.

In a particular embodiment and for a clip C1 of a length between side marginal edges of about 1 inch, teeth 34 can be of a length of about three-sixteenths of an inch and of a width at their roots, of about five-sixteenths of an inch.

For enhanced holding action and as shown in FIG. 5, the body portion 30 of the clip C2 can have extending therefrom in the opposite direction from the teeth 34, a horizontally extending auxiliary tooth 35.

Referring now to FIG 6, the clip C3 there shown has, at the upper edge of the body portion 30 a plurality of horizontal teeth 36, shown as pointed, which penetrate face 24 below the tongue 22. The shaping of the teeth 36, as shown permits wood penetration by the teeth 36 for gripping. In a particular embodiment of clip C3 the teeth 36 may have the same length and root width as the teeth 34.

For enhanced holding action, and as shown in FIG 7, the body portion 30 of the clip C4 can have extending therefrom in the opposite direction from the teeth 36, a horizontally extending auxiliary tooth 37.

For still further enhanced holding action, and as shown in FIG. 8, the clip C5 there shown has, at the upper edge of the body portion or web 30, a plurality of spaced horizontal relatively wide nonpointed teeth 38 extending from one side of the web 30 for insertion in the tongue sides of the boards 20 in the fiber-penetrating relation therein and a plurality of spaced nonpointed horizontal teeth 39 opposite the teeth and an intermediate nonpointed tooth 40 opposite the space between the teeth 39, for insertion in the groove sides of the boards 20 in fiber-penetrating relation therein.

The body portion or web 30 below the notches 31, and for engagement with the channel can have a lower base 41, of greater thickness than that of the web 30 and with rounded ends 42, the base 41 supporting the clip C5 for insertion.

The mode of installation and of use will now be pointed out.

The channels 11 are mounted on and secured on the base 10 in spaced parallel relation. The spacing of the channels 11 can be varied as desired but a spacing on 12-inch centers is suitable for many installations. The floorboards 20 are now successively secured on the channels 11 by the clips C.

With a board 20 at the location desired and transversely to and firmly engaging on the faces 17 of the channels 11, clips C supported in upright position on their feet 33 are successively inserted in the channels 11 and turned to point their teeth 34 or 36 or 38 toward the lower edge face 24. The clip C5 is supported by the base 41. The clips C are then successively driven into holding position to securely hold the board 20 with its bottom face 28 firmly engaged with the top faces 17 of the channel rims 16.

The next board 20 is then brought so that its groove 25 receives the tongue 22 of the board 20 which has just been secured in place and has its upper side face 26 engaged with the upper side face 23 of the first-mentioned board 20. As the board 20 is moved to this engaged position if the clips C2, C4 or C5 are employed, their auxiliary teeth 35 or 37 are caused to penetrate the face 27 below the edge groove 25 and preferably a sufficient distance below so as not to damage the wood below the groove 25. This next board 20 is then secured in place by spaced clips C in the same manner as the first-mentioned board.

The boards 20 with the teeth 34, 36 or 38 of the clips C engaged in penetrating relation at side edges 24 below the tongues 22 and with the tongues 22 engaged in the grooves 25 are firmly held by the clips C against upward displacement and are supported on the channels 11 against downward displacement. The clips C also hold the boards 20 against undesired transverse movement across the channels 11 by their firmly gripped engagement with the channels 11 and by virtue of the teeth 34, 36 or 38 in engagement in the boards 20.

It has been found, as a result of many tests that the auxiliary horizontally extending tongue 35, 37, 39 or 40, disproportionately increase the vertical holddown power of the clips C, the enhanced vertical and transverse holding action apparently being attributable to the lateral retention of the teeth 34, 36 or 38 in their gripping relation. The increase in holding power by one or more auxiliary teeth cannot be credited merely to added strength in shear by the auxiliary teeth 35, 37, 39 or 40.

It will accordingly be clear that the flooring system of the present invention can be easily installed and is effective for carrying out the objects of the invention.

I claim:

1. A flooring system employing standard pattern conventional wooden floor boards having side edge grooves and tongues engaging in said grooves comprising:
- a plurality of spaced parallel channels each with a pair or rims having upper and lower faces,
- a plurality of parallel floorboards having longitudinal edge grooves with tongues of each board in tight-fitting engagement in the grooves of contiguous boards at the top and the bottom thereof,
- said boards being transversely disposed above said channels and having lower faces engaging the upper faces of said rims,
- said boards having immediately below said grooves and tongues spaced vertical edge faces,
- said vertical edge faces below the grooves and tongues being vertically continuous and uninterrupted,
- a plurality of spaced holding clips,
- each of said clips having a vertically disposed body portion disposed between said boards wholly below said side edge grooves and said tongues and between said spaced edge faces,
- each of said clips having at the upper part of said body portion a horizontally extending toothed board holding portion extending directly from said body portion into the vertical edge of the board below said groove and tongue in intersecting relation to an edge face and each of said toothed portions being in fiber-penetrating relation therein,
- each of said clips at the lower part of said body portion being in gripped engagement with the channel.

2. A flooring system as defined in claim 1 in which said toothed portion is wholly in fiber-penetrating relation at the tongue edge of the board.

3. A flooring system as defined in claim 1 in which said toothed portion comprises a plurality of nonpointed teeth.

4. A flooring system as defined in claim 1 in which said toothed portion comprises a plurality of pointed teeth.

5. A flooring system as defined in claim 1 in which each of said clips has a holding portion extending from said body potion in the opposite direction from said toothed portion and in holding relation to the groove side of the board below the groove.

6. A flooring system as defined in claim 5 in which said holding portion comprises a horizontally extending auxiliary tooth in penetrating relation to the groove side of the board.

7. A flooring system as defined in claim 6 in which said auxiliary tooth is pointed.

8. A flooring system as defined in claim 1 in which at least one of said spaced faces is in engagement with the body portions of said clips.

9. A flooring system as defined in claim 6 in which said holding portion comprises a plurality of horizontally extending auxiliary teeth in penetrating relation to the groove sides of the boards.