Sept. 13, 1966 R. E. OMHOLT 3,271,916

UNIFORMLY RESILIENT FLOORING SYSTEMS

Filed Jan. 27, 1965

FIG. 1

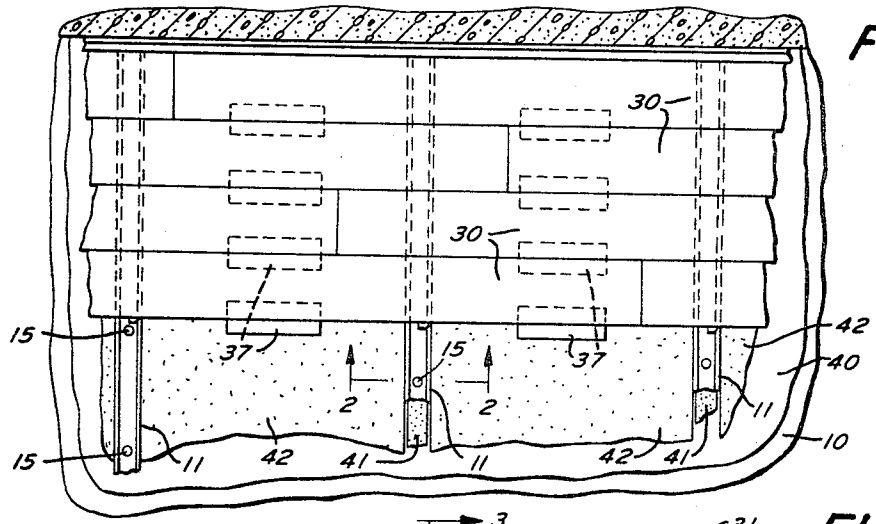


FIG. 2

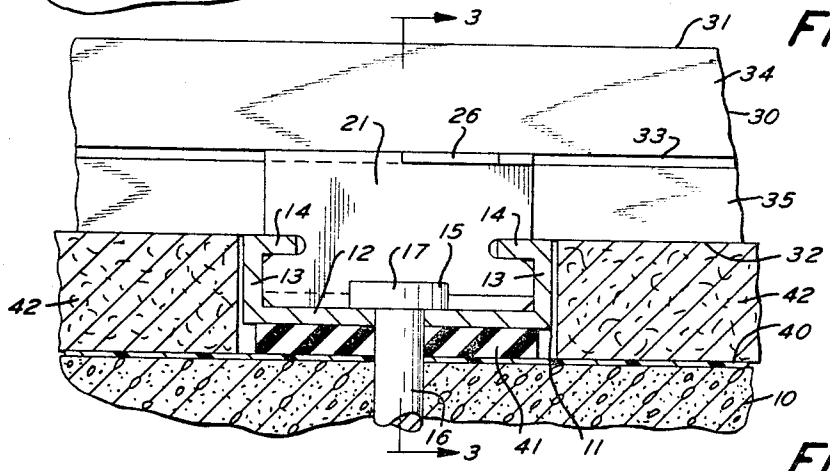
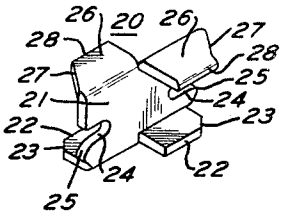


FIG. 4



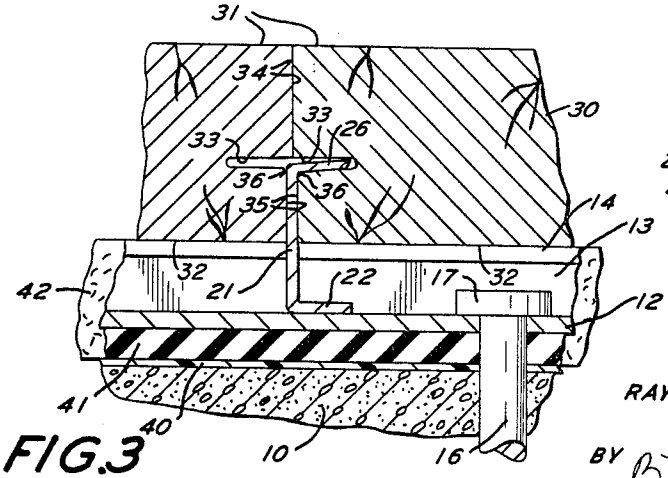


FIG. 3

INVENTOR
RAY E. OMHOLT
BY B. T. Wolensmith
ATTORNEY

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UNIFORMLY RESILIENT FLOORING SYSTEMS

Ray E. Omholt, Berwyn, Pa., assignor to Powerlock Floors, Inc., Philadelphia, Pa., a corporation of Pennsylvania

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5 Claims. (Cl. 52—393)

This invention relates to flooring systems.

In my prior Patent No. 3,031,725, there is disclosed a flooring system which has proven very satisfactory in use. That flooring system includes channels secured to a supporting base and to which the floor boards are secured by spaced clips, with splines engaging the boards interposed between the channels.

Greater stability has been obtained with the flooring of my prior patent than with any other flooring which has been available.

The upper surface of the floor in my prior patent however deflects more when a load is applied at the mid-channel point than when the same load is applied directly over the channels, and the present invention overcomes that condition.

The present invention relates to improvements in floors of the same general type as that of my prior patent but with controlled shock absorbency coupled with uniform rebound.

In accordance with the present invention the channels have interposed between their lower faces and the supporting base a material of predetermined shock absorbency, i.e., ability to deform and at a selected rate of deformation, and recovery, i.e., ability to deform and recover at a selected rate. A material of equal or of lesser total compressibility and of predetermined shock absorbency and rebound characteristics is provided in the voids between channels and between the underfaces of the floor boards and the upper face of the supporting base, and the latter material is in intimate contact with the lower faces of the floor boards except for the portions immediately above the channels.

The channels are limited as to their upward movement, preferably by anchors securing them to the supporting base, and the second mentioned material preferably has a thickness in excess of the spacing between the supporting base and the lower faces of the floor boards of predetermined extent, depending on the characteristics of the material and the specific amount of compressive resistance desired. Uniformly desirable and unique impact response characteristics and great stability are thus achieved.

It is accordingly the principal object of the present invention to provide a flooring system having enhanced impact response with stability.

It is a further object of the present invention to provide a flooring system having differentially compressive supporting materials beneath the channels and beneath the floor boards between the channels so that a desired balance between shock absorbency and resiliency is attained.

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

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

FIGURE 1 is a top plan view of a flooring system in accordance with the invention, parts being broken away to show the details of construction;

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; and

FIG. 4 is a view in perspective of one of the holddown clips for holding the floor boards in locked engagement with the channels.

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.

Referring now more particularly to the drawings, the supporting base is shown at **10**, of concrete, and on which channels **11** are arranged in parallel relation.

The channels **11** each has a web **12** and opposite side marginal portions **13** extending upwardly from the web **12** with inwardly extending rims **14** substantially parallel to the web **12**.

The channels **11** are preferably secured in position by anchoring devices or headed fasteners **15** which have shanks **16** extending into the supporting base and heads **17** which engage the webs **12** and limit the upward movement of the channels **11** while permitting limited downward deflection.

The channels **11**, as in my prior U.S. Patent No. 3,031,-725 are formed to close dimensional tolerances for enhancing their clip holding action. The channels **11** can be made of any desired material of adequate strength and preferably of steel with a heavy galvanizing or other resistant coating to prevent rusting.

A plurality of metallic clips **20** are provided, as in my prior patent, each having a central vertical plate portion **21**, and lower oppositely extending horizontally disposed feet **22**, the corners **23** of the feet **22** being rounded to aid in assembly to the channels **11**.

The central plate portions **21** are provided with notches **24** extending inwardly from each side marginal edge for the accommodation of the rims **14**.

The notches **24** have corner chamfers **25** for disposition at the intersection of the inner faces of the rims **14** and the inner faces of marginal portions **16** of the channels **11**.

At the upper end of the central plate portion **21** oppositely extending fingers **26** are provided with beveled end portions **27** and tapered margins **28**. The fingers **26** are slightly inclined upwardly and outwardly for a stronger holding action when in their final positions.

The floor boards **30** employed with the flooring system are of wood which can be milled or shaped to close dimensional tolerances, hard maple being particularly suitable.

Each of the floor boards **30** used in connection with the system of the present invention preferably has flat longitudinal top and bottom faces **31** and **32** and at a predetermined distance from the bottom face **32**, has a longitudinal slot or groove **33** formed therealong on each side thereof.

The grooves **33** can be about one-third of the distance between the top face **31** and the bottom face **32**, and closer to the bottom face **32** than to the top face **31**, so that an increased wearing part is provided on each board **30** while still providing adequate holding and avoiding splitting.

Each floor board **30** has an upper vertical side wall face **34** extending upwardly from the groove **33** and a lower vertical side wall face **35** extending downwardly from the groove **33** with a beveled face **36** connecting the bottom of the groove **33** and the lower side wall face **35**.

The beveled face **36** is at a location such that the clip finger **26** at its intersection with the plate portion **21** engages thereon.

The faces **34** of contiguous boards **30** are located and

positioned by the plate portions **21** of the clips **20** between the faces **35**, the clips **20** preventing the boards from being driven too tightly in their assembled positions.

The grooves **33** also serve for the reception of holding inserts **37** formed as corrugated strips which are positioned intermediate the clips **20** and channels **11** for retaining the boards **30** against independent deflection between the clips **20**.

In accordance with the present invention the supporting base **10** has a membrane **40** thereon, of any suitable material to isolate the flooring from ground water and ground water vapor in the base **10**. For this purpose the membrane **40** can be of vinyl film of a thickness of the order of six mils.

Each of the channels **11** has interposed between the lower face of its web **12** and the membrane **40** on supporting base **10**, a cushioning runner **41** and preferably of substantially rectangular cross section and of shock absorbing butyl rubber, or like material with the desired characteristics of resiliency and recovery under load. The runner **41**, for a particular embodiment can have a thickness of the order of one eighth of an inch and in addition to its cushioning action it also provides a gasket seal at the channel anchors **15**.

Between the channels **11** and extending therealong for continuous engagement with the bottom faces **32** of the boards **30** between the channels **11**, panel inserts **42** are provided. The inserts **42** are preferably rectangular in transverse cross section, fill or substantially fill the space between channels **11**, engage the bottom faces **32** of the boards **30** and engage the membrane **40**. The panel inserts **42** can be of any preferred material having the specific resiliency characteristics and recovery under load, as well as being inert and not subject to mold, insect infestation or the like. For this purpose a fiberboard having a density in the range from **16** to **33** pounds per cubic foot and with impregnation with asphaltum of the order of 15% by weight is preferred. The density is varied to suit the particular problem, greater density being employed for floors for industrial installations and lesser density being employed for gymnasium floors. The panel inserts **42**, prior to the installation of the floor boards **30**, preferably extend about one sixty-fourth of an inch above the top surfaces of the rims **14**, so that they are continuously under compression and continuously engage the bottom faces **32** of the floor boards when the floor boards **30** are in place.

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

The channels **11** are mounted in spaced parallel relation, with the cushioning runners **41** in supporting relation to the channels **11**. The fasteners **15** have their heads **17** in engagement with the webs **12** of the channels **11**. This engagement permits the channels **11** to deflect downwardly when a load is applied but does not permit any upward movement because of the limit stop action of the heads **17**.

While any preferred spacing of the channels **11** can be employed, a spacing of the order of 12 inches between centers has been found satisfactory.

With the channels **11** in place the panel inserts **42** are positioned between the channels **11** from end to end thereof.

With the channels **11** secured in place, a plurality of clips **20** are inserted in the channels **11** and turned so that the plate portions **21** thereof are transversely disposed with respect to the channels **11**. Upon turning of the clips **20** they will be moved to a position so that the feet **22** are in firm gripping relation with the inner face of the central horizontal web **13**. The upwardly facing portions of the notches **24** are in firm gripping engagement with the under sides of the rims **14** and to an extent to slightly deform the channel **11** for this purpose.

The floor boards **30** are now brought successively to positions with their lower faces **32** supported by the upper faces of the rims **14** and with the panel inserts **42** engaging the faces **32**, and are moved to positions to engage the holding fingers **26**. The holding fingers **26** urge the boards **30** downwardly into gripping engagement with the upper faces of the rims **17** and with the boards **30** compressing the panel inserts **42**. The panel inserts **42** are under compression as previously indicated.

At predetermined locations between the clips **20**, the holding inserts **37** are provided and prevent independent movement or deflection of one floor board **30** with respect to the next at the locations at which the inserts **37** are provided.

It will thus be seen that the physical characteristics of the panel inserts **42** and cushioning runners **41** can be balanced both beneath the floor boards **30** and the channels **11** so that an improved impact response is provided with a high order of stability.

The structure heretofore described is accordingly particularly suited for attaining the objects of the invention.

I claim:

1. In a flooring system having

a plurality of floor boards superposed on and transversely spanning a plurality of spaced parallel supporting members on a foundation,

said floor boards having upper and lower faces, and

fastening members holding said floor boards to said parallel supporting members, and

members for attaching said supporting members to the foundation,

the improvement which comprises, for imparting substantially uniform load bearing and impact response characteristics to the upper faces of the boards,

resilient supporting inserts in and substantially longitudinally filling the spaces between said supporting members and enhancing the span response of said floor boards to load and impact,

said resilient supporting inserts having their upper margins in engagement with the lower faces of said floor boards and their lower margins in engagement with said foundation and thereby directly imparting their load bearing and impact response characteristics substantially uniformly to the floor boards,

said parallel supporting members having resilient supports interposed between said supporting members and said foundation,

said resilient supports and said resilient supporting inserts having different predetermined resiliency and load bearing characteristics for substantially balancing the load bearing and resilient impact response characteristics of said floor boards in span and over said supporting members.

2. A flooring system as defined in claim **1** in which said members for attaching said supporting members to the foundation have portions permitting downward deflection of said supporting members but restraining upward movement thereof.

3. A flooring ssytem as defined in claim **1** in which said resilient inserts are in continuous compressed relation.

4. A flooring system as defined in claim **1** in which said resilient supports are continuous strips.

5. A flooring system as defined in claim **4** in which said resilient supports are of resilient material and provide gasket seals at the intersection with the foundation of said members for attaching.

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RICHARD W. COOKE JR., *Primary Examiner.*

FRANK L. ABBOTT, *Examiner.*

R. A. STENZEL, *Assistant Examiner.*