July 24, 1962 W. F. LIVEZEY, JR 3,045,294

METHOD AND APPARATUS FOR LAYING FLOORS

Filed March 22, 1956 2 Sheets-Sheet 1

FIG. 1.

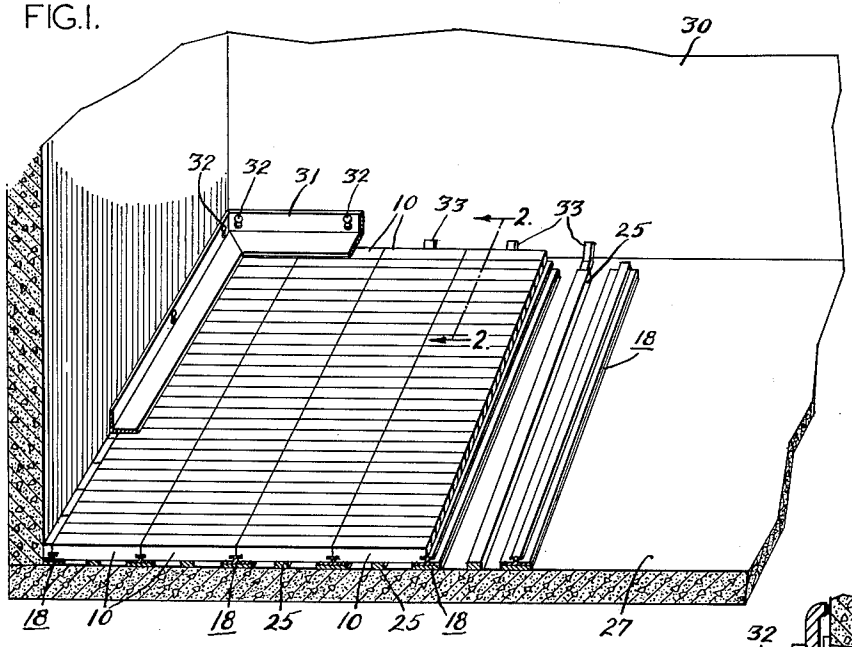

FIG. 2.

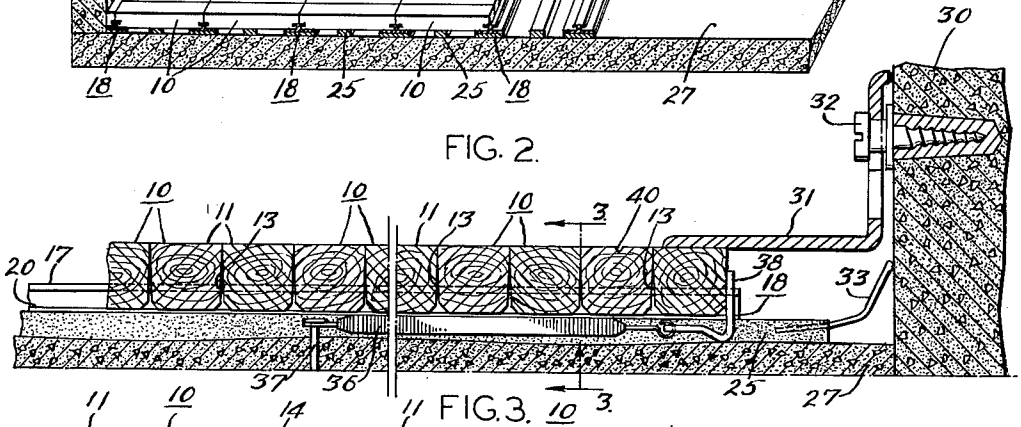

FIG. 3.

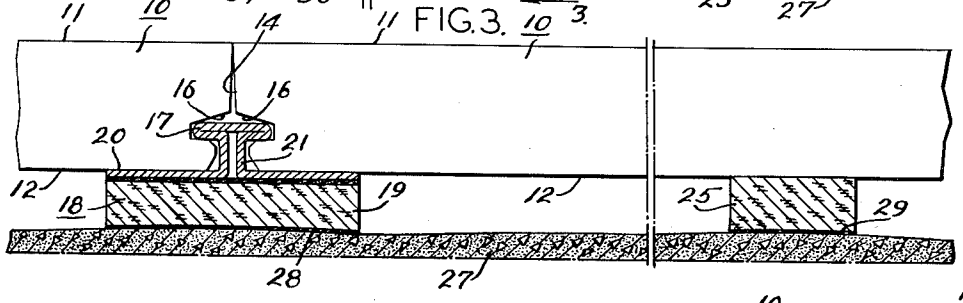

FIG. 4.

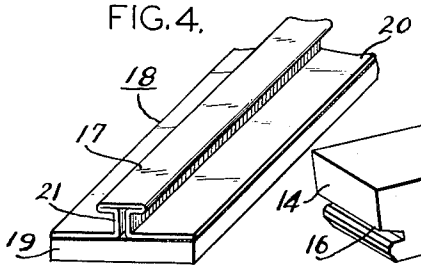

FIG. 5.

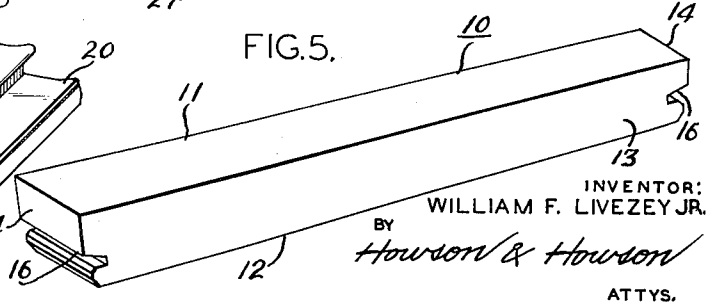

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FIG. 6.

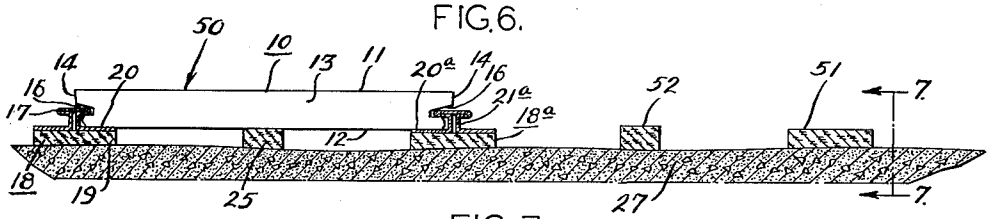


FIG. 7.

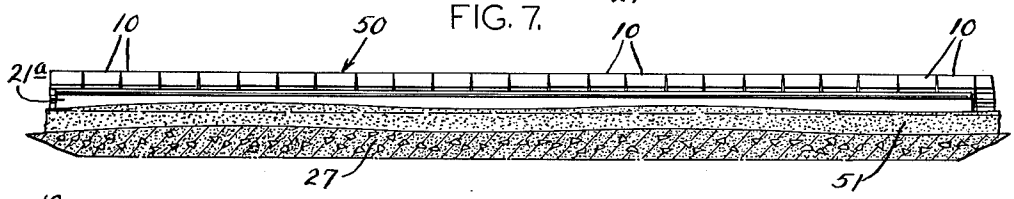


FIG. 8.

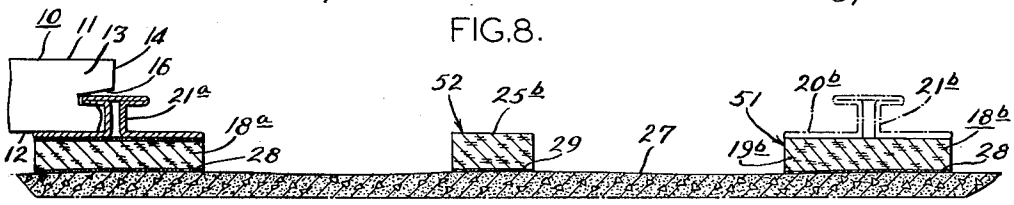
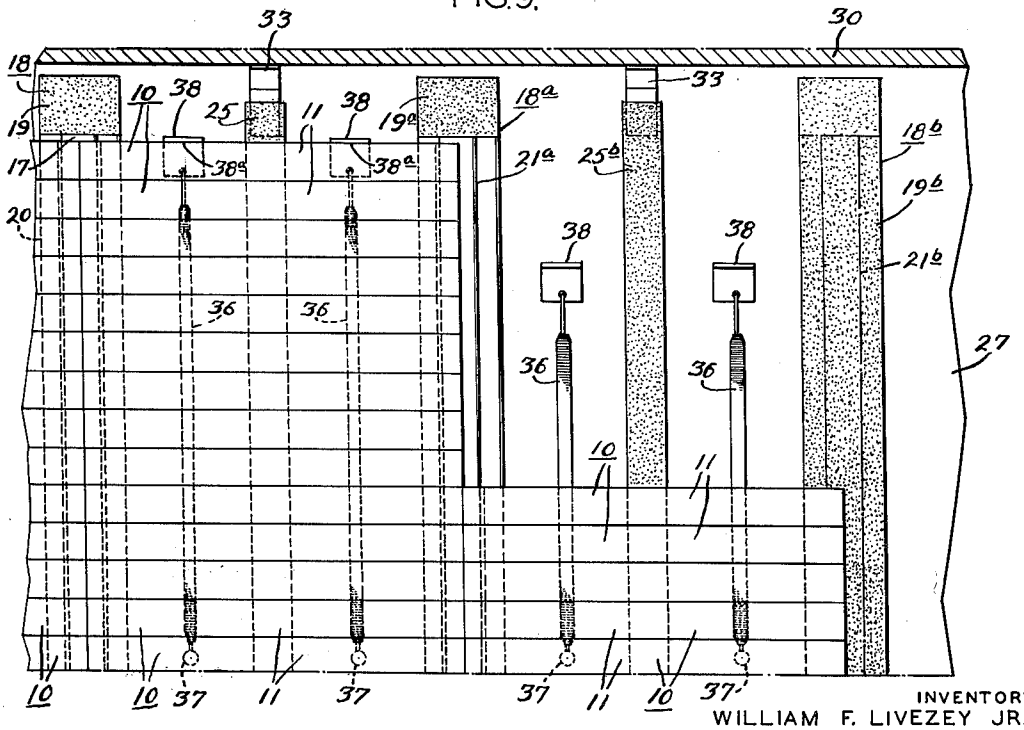


FIG. 9.



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3,045,294

METHOD AND APPARATUS FOR LAYING FLOORS

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5 Claims. (Cl. 20—8)

The present invention relates to a method and apparatus for laying floors, and more particularly to a method and apparatus for laying wooden floors on concrete and similar sub-floors.

The primary reasons for the widespread use of wood flooring are its durability and the ease with which its surface may be refinished. One of the major drawbacks of wooden and similar floorings is the problem caused by the expansion and contraction of the material by reason of severe changes in the atmospheric humidity. In addition to changes of atmospheric humidity, substantial damage is normally caused when a quantity of water is spilled on the floor. The conventional method of laying floors attemps to overcome these difficulties by restricting the expansion and contraction of the flooring. While this method is satisfactory for laying floors in small areas, it is not entirely satisfactory for laying large floors both as to cost and as to resistance against soaking by water spillage.

Another important factor in laying certain types of floors is the requirement for precise leveling of the sub-floor, since the finished floor laid in conventional manner, must follow the contour of the sub-floor. The laying of a level sub-floor is so costly, that the trade must tolerate a sub-floor which varies substantially from true level.

In laying conventional floors, the flooring is secured directly to a support base, either by nailing or by an adhesive coating. To provide a nailable surface on concrete sub-floors, it is the usual practice to lay wooden sleepers at specified locations on the concrete sub-floor. When laying the sleepers, it is possible to compensate for variations from the level of the sub-floor, but the sleepers normally project slightly above the level of the surrounding concrete. The laying of the sleepers is accomplished by securing the sleepers to a base structure, and then slushing cinder concrete into the areas intermediate the sleepers. Since the sleepers are laid in a moist substance, they absorb a substantial quantity of moisture and are subject to expansion and later contraction. If the flooring is laid while the sleepers are expanding from the dampness, a loose, squeaky floor with open joints between the individual boards results when the sleepers and flooring boards dry and contract. Should the floor later become wet, for example as a result of spillage, more severe damage occurs, and at a faster rate.

Furthermore, the resilience of the conventional floor varies across its surface. Where the boards are secured to the sleepers, substantially no resilience is present; however, intermediate the sleepers, the boards are unsupported and the flooring exhibits a degree of resilience. If a uniform floor is desired, the sleepers must be laid within short distances of one another which substantially eliminates all resilience. It is not commercially practical to provide resilience in a floor of this type.

In a second conventional method, the base sub-floor is fabricated within the tolerated limits of level as set forth above. The top surface of the floor is primed or painted with asphalt and an asphalt adhesive or mastic is troweled over the complete surface. The finished flooring is then laid on the mastic, leaving expansion areas at walls, columns, doorways, etc. The expansion area is then filled with hot asphalt. To provide damp-proofing, roofing felt is placed on the top surface of the concrete after it has been primed, and the mastic is troweled onto the damp-proofing instead of being placed directly on the primed surface of the concrete. This type of flooring is only as level as the sub-floor, and provides practically no resilience. When laid in large areas, and when the flooring is subject to severe atmospheric changes in humidity, the individual boards, being held against movement, are slightly, but permanently crushed about their periphery by the expansion forces exerted upon them by the adjacent boards. When the humidity disappears, the boards dry out and are no longer subject to the expansion forces. The crushed peripheries of the boards then leave open joints. When water spillage occurs, the expansion forces are sufficiently great to cause the boards to heave up or buckle, causing irreparable damage to the boards, and necessitating laying of a new floor in the damaged area. This method of laying floors does not provide resilience unless a resilient layer is placed over the complete sub-floor area intermediate the sub-floor and the finished floor.

With the foregoing in mind, a primary object of the present invention is to provide a method and apparatus for laying floors which provide a uniform resilience over the entire floor area without the requirement for a sheet of resilient material underlying the complete floor area.

Another object of the present invention is to provide a method and appaartus for laying floors which provides a precisely level floor substantially independent of the levelness of the sub-floor.

Another important object of the present invention is to provide a floor which affords expansion and contraction of the flooring material without buckling or leaving open joints in the floor surface.

Another object of the present invention is to provide a floor which is highly economical to lay, and which may be lifted and replaced by anyone to correct damage.

All of the objects of the invention and the various features and details of the operation thereof are more fully set forth hereinafter with reference to the accompanying drawings in which:

FIG. 1 is a fragmentary perspective view of a floor being laid in accordance with the present invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary perspective view of a composite sleeper made in accordance with the present invention;

FIG. 5 is a perspective view of a flooring strip;

FIG. 6 is a view showing an intermediate step in the laying of the floor in accordance with the present invention;

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 6;

FIG. 8 is an enlarged view similar to FIG. 6 showing the succeeding step in the operation; and

FIG. 9 is a plan view showing a further step in the operation.

The present invention provides novel apparatus and methods for laying flooring in which the floor consists of a plurality of short lengths of flooring boards. The individual boards may be 12 inches long, 1 inch high and 1⅜ inches wide, but of course, variations are possible within the scope of the present invention. The individual boards are laid in laterally abutting relationship across the full width of the floor, to form a first series of boards, and subsequent series are laid in endwise abutting relation thereto. The boards are supported at their ends by sleepers which extend across the full width of the area being floored, and an auxiliary support is provided intermediate the sleepers to insure substantially uniform resilience

along the length of the board. The boards are laterally slidable on the supports to compensate for lateral expansion and contraction due to the changes in temperature and humidity, and means is provided to bias the boards together to insure tight joints therebetween at all times.

Referring now to the drawings, the flooring of the present invention is composed of a plurality of boards **10**. As shown in FIGS. 2, 3, 5, and 6, the boards **10** have parallel top and bottom surfaces **11** and **12**, respectively, and slightly downwardly tapered side and end surfaces **13** and **14**, respectively. The tapered side and end surfaces insure a neat joint on the upper surface of the floor, while affording clearance between the boards adjacent the lower surface. As shown, the ends of the board are grooved as indicated at **16** to receive outwardly projecting flanges **17** of the composite sleeper **18** upon which the ends of the boards are supported.

In accordance with the invention, the sleepers **18** each comprise a base portion **19** preferably formed of cork or a similar resilient substance and an upper portion or facing plate **20** of metal or other durable material. The face plate **20** is formed with an upstanding central portion **21** which mounts the outwardly projecting flange **17** which is received in the groove **16**, as described above, and as shown in FIG. 3. Intermediate the sleepers **18** is disposed an auxilary support member **25** which is formed of cork or other suitable resilient material. Thus, when the floor is assembled, the individual boards are held against upward movement by reason of the engagement of the flanges **17** in the grooves **16** at the opposite ends of the board. The board is resiliently supported against downward movement by the undersurface of the board **12** resting on the face plate **20** of the sleepers **18** and on the auxiliary support member **25**. However, the board is free for lateral sliding movement on the sleepers **18** and the auxiliary support **25**. To insure freedom of movement of the boards laterally, the upper surfaces of the sleepers **18** and the support **25** are lubricated, for example, by a thin coating of paraffin or other wax material. Endwise movement of the boards is limited by the abutting engagement of the boards of one series with those of the adjacent series, and to a certain degree by the engagement of the upper portion of the sleepers **18** in the grooves **16**.

The sleepers **18** and the supports **25** are securely united to the sub-floor **27** by means of mastic or other suitable cement indicated at **28** and **29**, respectively, in FIG. 3. The sleepers **18** and the auxiliary supporting members **25** perferably extend continuously across the width of the area being laid terminating short of the opposite side walls **30**. Likewise, the boards **10** are laid in series extending across the width of the area and are coextensive with the sleepers **18**. Since the sleepers **18** terminate short of the side walls **30**, the boards **10** are free to slide outwardly toward the wall and to become disengaged from the sleeper, for example, when severe conditions of humidity are present.

The space between the end of the flooring and the wall **30** is covered by a suitable trim **31** such as cove base and the like. In doorways and the like, threshold plates effectively cover the expansion margin. Preferably, the trim **31** is mounted as indicated at **32** to be susceptible of vertical displacement when pressure is exerted on the underside. Thus, under severe humidity changes, when the boards **10** expand toward the wall **30** and disengage the upper portion of the composite sleeper **18**, the boards may be displaced upwardly and displace the trim **31**, thereby freeing the board. To insure against jamming of the board between the walls, an elevating element **33** is perferably imbedded in the support member **25** to engage the board and effect upward movement thereof upon its disengagement from the flange **17** of the composite sleeper **18**.

Under normal conditions, the boards **10** are displaced only slightly in a lateral direction by reason of their expansion to the changes in humidity. Means is provided to return the boards to their normal position when the humidity returns to the condition at which the floor is laid. To this end, the boards are biased inwardly of the area away from the wall **30**. While other resilient members may be employed, preferably an elongated spring **36** is tensioned between the outermost board and the sub-floor **27**. To this end, as shown in FIG. 2, the spring is anchored in the sub-floor, for example, as indicated at **37** and is engaged at the other end against the outermost board, for example, by an angle member **38**. The angle member **38** bears against the outermost board **10** without physical attachment thereto so that upon extremely severe changes in humidity, the board is free to be displaced upwardly by the member **33**. Under normal conditions, however, the outermost board remains engaged with the flange **17** of the sleeper **18** and travels back and forth in accordance with the cumulative lateral contraction and expansion of the series of boards. Freedom of movement of the boards is obtained by tensioning the spring sufficiently to overcome the frictional forces of the boards on the sleeper in moving them laterally along the sleepers. Thus, the spring does not severely restrain the expansion or contraction of the boards, but simply returns the boards to their initial position to close up open joints therebetween as the boards contract after having expanded.

It is noted that the present sleepers **18** and auxiliary supports **25** provide a dead air space intermediate the sub-floor **27** and the finish floor composed of the boards **10**. Because of the dead air space between the bottoms **12** of the boards **10** and the sub-floor **27**, the boards are not in direct contact with the sub-floor surface. Thus when water spills on the floor, it may accumulate in the dead air space without soaking the flooring boards. Therefore the boards do not soak up the water on the sub-floor as would the boards in conventional floors wherein the boards are in direct contact with the sub-floor.

The present invention provides for ready repair of the floor when damaged. For example, in normal installations, if a substantial quantity of water is spilled on the floor, the conventional floors are severely damaged by reason of the normal restraining forces which limit the expansion of the individual members of the floor. The present invention provides a floor which is readily disassembled in the event of damage. Damage by water spillage is substantially eliminated because the expansion forces are not restrained, and in the event of spillage of an excessive quantity of water, the floor is readily picked up by removing the trim **31** releasing the tension on the spring **36** and sliding out the individual boards **10** beyond the end of the sleeper, and removing them. After the removed boards **10** and the sub-floor have been dried, the floor is relaid in the same manner by simply sliding the boards laterally thereof longitudinally of the sleepers to their original positions on the composite sleepers, reengaging the angle member **38** with the outermost board, and replacing the trim **31**.

To provide an indication when severe expansion has taken place, a groove is made in the upper surface **11** of the boards as indicated at **40** in FIG. 2, adjacent the outer terminus of the trim **31**. The amount of expansion or contraction may then be observed by gaging the distance between the groove **40** and the outer terminus of the trim **31**.

The composite sleeper **18** and the auxiliary support members **25** not only provide resilience in the floor at substantially less cost than the conventional method of laying resilient wood floors, but also provides means for obtaining a precisely level finish floor on the unlevel surface of a sub-floor. This is accomplished by forming the resilient portion **19** of the sleeper **18** in a manner to conform to the contour of the sub-floor on its lower surface, but maintaining precisely level its upper surface which mounts the facing plate **20**. Thus, the vertical

dimension or thickness of the resilient portion of the sleeper **18** varies in accordance with the variation of the sub-floor surface below the desired level or elevation of the finish floor, and the upper surface of the resilient portion **19** of the composite sleeper **18** is precisely parallel to the desired level or elevation.

The present invention affords an economical method for laying floors which are truly level. In carrying out the improved method of the invention, the sub-floor **27** is laid or poured in the conventional manner so as to be approximately level. Strips of cork or other resilient materials which will constitute the portion **19** of the composite sleeper **18** are cemented to the sub-floor in proper spacing, preferably 12 inches, from center to center, and a strip which forms the supporting member **25** is cemented to the sub-floor intermediate the other strips. Preferably, the strips are laid starting adjacent one end wall of the area being floored. The strips when laid are of uniform thickness and follow the contour of the sub-floor. The upper surface of the strips of resilient material is then shaved or cut with the aid of proper instruments to be truly level, the central strip which forms the supporting member **25** being cut or shaved to a height greater than the other strips by an amount equal to the thickness of the plate **20**.

The upper portion of the composite sleeper **18** is then cemented in place upon the level surface of the resilient material adjacent the end wall, and thereafter the upper surfaces of the sleeper **18** and the strip **25** are lubricated. The first series of boards is then engaged against the upper portion of the strip with the groove engaging the flange **17** and the bottom surface resting on the plate **20** and the strips **25**. When the series of boards has been laid with the boards in laterally abutting relation with one another, the upper portion **21***a* of the next composite sleeper **18***a* is lubricated by a coating of paraffin or the like and is inserted into the grooves at the other end of the boards and is cemented onto the level upper surface of the corresponding resilient strip which has been previously leveled. When the series of boards has been laid in this manner, a precisely level surface has been obtained, as indicated at **50** in FIGS. 6 and 7.

In the succeeding operation, a resilient strip of greater thickness than the portion **20***b* of the next sleeper **18***b* is then cemented to the sub-floor **27**, for example, as indicated at **51** in proper spacing for the next series of boards, for example with the center 12 inches from the end of the boards **10** constituting the surface **50**. A second strip of resilient material of greater thickness than the strip **51** is then laid intermediate the strip and the level surface as indicated at **52**. With the surface **50** as a supporting surface, a machine is then advanced to shave or cut the marginal portion of the strips **51** and **52** to a precise level condition corresponding to the level condition of the surface **50**. The strip **52** is shaved to a height greater than the strip **51** to form an intermediate support **25***b*, the leveled strip **51** forming the base **19***b* of the composite sleeper **18***b*. The next series of boards is then mounted against the boards of the surface **50** in engagement with the composite sleeper indicated at **18***a* in FIGS. 6 and 8. When laying the boards adjacent the side wall **30**, the springs **36**, **36** (see FIG. 9) are extended to engage the angles **38**, **38** against the outermost board of the series, for example as shown at **38***a* in FIG. 9.

With the complete series of boards in place, the upper portion, indicated by broken lines at **21***b* in FIG. 8, of the composite sleeper **18***b*, is engaged in the grooves at the opposite ends of the boards **10** comprising the second series and the upper portion **21***b* is cemented against the upper surface of the base portion **19***b*. When the strip **21***b* is cemented to the portion **19***b*, a second composite sleeper **18***b* is formed. Thus, the second series of boards constitute a continuation of the level surface **50** formed by the first series of boards. Additional strips of resilient material such as cork are laid beyond the second series and the surface just formed is employed as a guide surface for shaving or cutting the strips to dispose their upper surfaces precisely level, and the next series of boards is laid in the manner just described. These steps are repeated until the complete area is floored at which time the upper surface tis finished in the conventional manner; the trim strips **31** are applied around its periphery; and the index grooves **40** are formed.

While I have described the preferred method of installation, several modifications are possible within the scope of the invention. For example, instead of laying the complete series of boards **10** in place before cementing the upper portion of the composite sleeper to the lower portion, it is possible to assemble the composite sleeper prior to laying the boards of the series and then follow the procedure outlined previously in connection with the replacement and repair of damaged floors.

Also, instead of starting at one end of the area, it may be found desirable to erect a temporary level platform across the full width of the central part of the area which serves as a level guiding base for shaving or cutting the strips forming the bases of the first composite sleepers and the intermediate supporting member to the precisely level condition. The platform is removed after laying the first series of boards and the remainder of the floor is laid in the manner described above.

While particular forms of the present invention have been herein illustrated and described, it is not intended to limit the invention to such a disclosure, but changes and modifications may be made therein and thereto within the scope of the following claims.

I claim:

1. A floor construction comprising a sub-floor, a plurality of sleepers, each consisting of a base portion of resilient material secured to said sub-floor and an upper portion united to said base portion and having a face plate with an upstanding web terminating in outturned flange portions parallel to said face plate, and a plurality of floor boards each having a flat undersurface supported at its ends on the face plate of the upper portion of said sleepers and having means defining grooves in its end walls receiving said outturned flange portions, said grooves affording sliding movement of said boards on the upper portions of said sleepers, and spring means of less thickness than said resilient material and underlying said floor boards and overlying said sub-floor intermediate said sleepers, said spring means being secured to said sub-floor at a point underlying said floor boards and engaging at the other end an outer floor board to bias the same inwardly longitudinally of the sleepers.

2. Construction according to claim 1 wherein said flange portion terminates in spaced relation to the lateral edges of said sub-floor, and including means to displace the boards upwardly upon lateral movement thereof beyond the terminus of said flange portions.

3. The method of laying a level floor comprising the steps of forming a sub-floor, securing resilient base strips to said sub-floor at spaced parallel locations therealong, forming said secured base strips to dispose their upper surfaces level, securing upper portions to said leveled base strips to form composite sleepers, and mounting a series of floor boards to span between the upper portions of adjacent composite sleepers, to form a row of boards substantially coextensive with said sleepers by sliding successive boards longitudinally of said sleepers into sidewise abutting relation.

4. The method according to claim 3 wherein the boards are mounted row by row and wherein further the previously laid row is used as a guide for forming the base strips to dispose their upper surfaces level.

5. The method according to claim 3 including the step of applying a laterally inward resilient bias on the series of floor boards in each row to resiliently maintain said boards of said series in laterally abutting relation.

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