A flooring system with at least a first and a second flooring panel is disclosed. The first flooring panel has a first top surface and a first engagement portion. The second flooring panel has a second top surface which is essentially parallel to the first top surface, and a second engagement portion. The first engagement portion can be an elongated tongue with a locking projection extending therefrom. The locking projection has a first inclined surface which is inclined at a first angle relative to the first top surface. The second engagement portion can be in the form of an elongated recess with a locking cavity extending therefrom. The locking cavity has a second inclined surface which is inclined at a second angle relative to the first top surface. The second angle is larger than the first angle. Whereby, as the first and second panels are moved into engagement, the first inclined surface cooperates with the second inclined surface to bias the first flooring panel relative to the second flooring panel such that the first top surface and the second top surface are positioned in the same plane.
FLOORING PRODUCT

FIELD OF THE INVENTION

The invention generally relates to flooring panels. More specifically, the invention is directed to flooring panels which are maintained in position relative to each other by the use of tongue and groove technology.

BACKGROUND OF THE INVENTION

Many different flooring options are available to consumers who are building structures or remodeling existing structures. Flooring such as carpeting, linoleum, and ceramic tile have been around for many years. These types of flooring can be professionally installed or can be installed by an industrious homeowner. However, the installation of these types of flooring can be time consuming and can result in a less than perfect floor if not done right.

Wood flooring is another alternate flooring option. In the past, wood flooring has been an expensive option and one that requires a good deal of skill to install properly. However, today wood flooring and simulated wood flooring can be manufactured in such a manner to make it cost competitive with other options. Because wood is an affordable option, more homeowners are installing these types of floors. Therefore, in order to further enhance the desirability of wood flooring, it is advantageous to make the installation as easy and straightforward as possible. This reduces the labor required to install the floor, whether it is installed by a professional or a “do-it-yourselfer.” By minimizing the amount of tools, hardware, and adhesives needed for installation, wood flooring installations will dramatically increase in popularity.

SUMMARY OF THE INVENTION

The invention is directed to a flooring system made of flooring panels. A first flooring panel or member has a first top surface and a first engagement portion. A second flooring member has a second top surface which is essentially parallel to the first top surface, and a second engagement portion. The first engagement portion can be an elongated tongue with a locking projection extending therefrom. The locking projection has a first inclined surface which is inclined at a first angle relative to the first top surface. The second engagement portion can be in the form of an elongated recess with a locking cavity extending therefrom. The locking cavity has a second inclined surface which is inclined at a second angle relative to the first top surface. The second angle is larger than the first angle. Whereby, as the first and second members are moved into engagement, the first inclined surface cooperates with the second inclined surface to bias the first flooring member relative to the second flooring member such that the first top surface and the second top surface are positioned in the same plane.

Many advantages are provided by the flooring panels and system of the present invention. The configuration of the flooring panels insures that the top or upper surfaces of the panels will be positioned in the same plane, adding significantly to the aesthetic and functional nature of the floor. Also the cooperation of the panels insures that the panels will fit together properly and prevents the separation of the panels from each other, thereby eliminating inappropriate spaces between panels.

As the panels are moved together, a positive retention force is exhibited between the panels. This positive retention provides sufficient force to retain the flooring panels together, with or without the use of a glue or adhesive. Consequently, the invention can be used with or without glue.

In the present invention, the cost of tooling to produce the flooring panels is minimized. As many of the dimensions of the panels do not have to be as precisely controlled as the prior art panels, the tooling does not need to be reconditioned as often, thereby eliminating costly downtime for the tooling.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood by reference to the following drawing figures wherein:

FIG. 1 is an overview illustrating a portion of the installation of a flooring panel in a flooring system according to the present invention;
FIG. 2 is a second overview illustrating another portion of the installation of a flooring panel in a flooring system according to the present invention;
FIG. 3 is a partial perspective of several flooring panels installed on a subfloor;
FIG. 4 is a cross-sectional view of a flooring panel prior to installation;
FIG. 5 is a partial cross-sectional view of two flooring panels prior to being mated together; and
FIG. 6 is a partial cross-sectional view of the flooring panels of FIG. 5 after they are mated together.

DETAILED DESCRIPTION

FIG. 1 illustrates a flooring system according to the invention. Each flooring panel 10 has a first major surface 12 and an oppositely facing second major surface 14. Side surfaces 16, 18 and end surfaces 20, 22 extend between the major surface 12 and 14. Although the flooring panels 10 are shown as rectangular, other types of configurations are possible. The first major surface 12 has a laminate or thin layer 24 of decorative wood provided thereon and is designed to face away from the subfloor, as shown in FIG. 1. The core 26 of each flooring panel 10 is made from material which has the strength, absorption, and other characteristics required. As the core will not be exposed once the flooring system is completely installed, the core 26 must not be as aesthetically appealing as the layer 24.

As best shown in FIG. 4, side surface 16 has a laminate portion 30 which extends from the first major surface 12 in a direction essentially perpendicular to the first major surface. A raduised portion 32 is provided proximate the laminate portion 30. The raduised portion extends inward toward side surface 18 from the plane of laminate portion 30. A tongue 40 extends from side surface 16 outward in a direction away from side surface 18. The tongue is positioned below the raduised portion 32 when viewed in FIG. 4. A bottom straight portion 34 and bottom angled portion 36 also are provided on the side surface 16. The portions 34 and 36 are offset toward side surface 18 from the plane of laminate portion 30.
As best shown in FIGS. 4 through 6, tongue 40 has a fixed end 42 attached to side surface 16 and a free end 44 which has a rounded or arcuate configuration. An upper surface 46 and a lower surface 48 extend between the free end and the fixed end. In the embodiment shown, the planes of the upper and lower surfaces are essentially parallel to the plan of the first major surface 12. A projection 50 extends from the lower surface 14. The projection has a first inclined surface 52 and a second inclined surface 54. The first inclined surface 52 is inclined at an angle A from a line which is perpendicular to the plane of the first major surface 12. The second inclined surface 54 is inclined at an angle B from a line which is perpendicular to the plane of the first major surface 12. In the embodiment shown, the angle A is 70° and the angle B is 45°. However, the angles can be varied and still fall within the scope of the invention.

Side surface 18 has a laminate portion 60 which extends from the first major surface 12 in a direction essentially perpendicular to the first major surface and essentially parallel to the laminate portion 30. A lead-in portion 62 is provided proximate laminate portion 60. The lead-in portion 62 slopes inward toward side surface 16. A recess 70 extends from side surface 18 inward in a direction toward side surface 16. The recess 70 is provided below the lead-in portion 62 when viewed in FIG. 4. A raduisued portion 64 and bottom angled portion 66 are provided on the side surface 18. The portions 64 and 66 are offset toward side surface 16 from the plane of laminate portion 60.

Recess 70 has an open end 72 and a closed end 74. An upper surface 76 and a lower surface 78 extend between the open end and closed end. In the embodiment shown, the planes of the upper and lower surfaces 76, 78 are essentially parallel to the plane of the first major surface 12. The space X between upper surface 76 and lower surface 78 is dimensioned to be larger than the dimension Y between the upper surface 46 and lower surface 48 of the tongue 40. A channel or locking cavity 80 is provided in the lower surface 78 and extends from the lower surface in a direction toward the second major surface 14. The channel 80 has a first inclined surface 82 and a second inclined surface 84. The first inclined surface 82 is inclined at an angle C from a line which is perpendicular to the plane of the first major surface 12. The second inclined surface 84 is inclined at an angle D from a line which is perpendicular to the plane of the first major surface 12. In the embodiment shown, the angle C is 65° and the angle D is 45°. However, the angles can be varied and still fall within the scope of the invention.

Referring to FIG. 1, individual flooring panels 10 are joined together to form a flooring system. During installation, various individual flooring panels 10 are positioned on the subfloor and manipulated into engagement with other flooring panels 10. This process is best illustrated in FIGS. 1 and 2. As best shown in FIG. 1, a respective flooring panel 10 is laid on subfloor 90, such that the second major surface 14 is in contact with and essentially parallel to the subfloor 90. The flooring panel 10 is moved in the direction of the arrows until such time when the tongue 40 of flooring panel 10 engages a portion of recess 70 of flooring panel 10. (The use of the prime symbol is for ease of explanation; parts designated by prime are identical to parts which are not designated by prime.) Referring to FIGS. 5 and 6, this movement continues until raduisued portion 64 engages projection 50. The engagement of projection 50 and raduisued portion 64 is assured even if the respective flooring panels are slightly misaligned. As tongue 40 has a free end 44 which has an accurate or rounded configuration and side surface 18 has a lead-in portion 62 and a raduisued portion 64, the cooperation of end 44 and portions 62 and 64 will cause the recess 70 to be moved into alignment with the tongue 40 as mating occurs. As the dimension M of tongue 40 is greater than the dimension N of recess 70, an increased force is required to continue the mating of flooring panel 10 with flooring panel 10. As shown in FIG. 1, this increased force is supplied by the installer using a hammer and a block. The installer will supply the appropriate force to the opposite side 16 of the flooring panel 10 to cause the raduisued portion 64 to move beyond the projection 50 of the tongue 40 and into cooperação with channel 80 of recess 70. As this movement occurs, the portions of flooring panel 10 which are above and below recess 70 resiliently deform to allow the tongue 40 and projection 50 to move accordingly. The force applied to side 16 must be sufficient to resiliently deform flooring panel 10 while not causing damage to side 16 or tongue 40 extending therefrom.

Referring to FIGS. 5 and 6, as flooring panel 10 is moved into engagement with flooring panel 10, channel 80 cooperates with projection 50. As best shown in FIG. 6, the first inclined surface 52 of projection 50 cooperates with the first inclined surface 82 of channel 80 and the second inclined surface 54 of projection 50 either cooperates with or is in close proximity to second inclined surface 84 of recess 80.

The cooperation of first inclined surface 52 and first inclined surface 82 performs an important function with respect to the proper installation of the flooring system. In order for the flooring system on both esthetically pleasing and function properly, the first major surfaces 12 of each flooring panel must be aligned and must be in the same plane. Even slight variances in the positioning of the first major surfaces can cause the floor to be unattractive and unsafe. Therefore, it is important to provide the flooring panels with a mechanism to insure that the first major surfaces will be coplanar.

In order to insure coplanarity, the interaction between first inclined surface 52 and the first inclined surface 82 is critical. According to the present invention, first inclined surface 52 extends at an angle A from a line perpendicular to the first major surface and the first inclined surface 82 extends at an angle C from a line perpendicular to the first major surface. As angle A is 70° and angle C is 65°, the slope of surface 82 is steeper than the slope of surface 52. Therefore, as flooring panel 10 and flooring panel 10 are moved together, surface 52 will engage surface 82. The continued installation of flooring panels causes surface 52 to be biased upward. As installation is complete, surface 52 is biased upward by surface 82 causing upper surface 46 of tongue 40 to engage upper surface 76 of recess 70. The positioning of upper surface 46 is accurately controlled relative to the first major surface 12 as the flooring panel 10 is manufactured. Likewise, the upper surface 76 is accurately controlled relative to the first major surface 12 as the flooring panel 10 is manufactured. Consequently, the dimensioning of the flooring panels insures that when surfaces 46 and 86 are provided in engagement, the first major surface 12 will be positioned in the same plane as any other
respective first major surface 12'. Therefore, with tongue 40' positioned in recess 70 and the surface 46' biased against surface 76 as described, the coplanarity of the first major surface 12' with first major surface 12 is assured.

[0024] It is important to note that while the angles described with respect to the preferred embodiment have certain defined values, the scope of the invention is not limited to those specific values. Rather the invention is accomplished if angle A is greater than angle C, thereby causing surface 82 to have a steeper slope than surface 52'.

[0025] With respect to angle B and D, these angles are identical in the embodiment shown. This insures that surfaces 54' and 84 are essentially parallel to each other. This type of configuration helps to hold surfaces 52' and 82 in position relative to each other. The cooperation of surfaces 54' and 84 help to maintain surfaces 52' and 82 in engagement, thereby facilitating the coplanarity of surfaces 12 and 12'. The cooperation of surfaces 54' and 82 also prevents the separation of panel 10 from panel 10'. However, the dimensions of angles B and D are not as important as the dimensions of A and C. In fact, in order for the flooring panels to be properly positioned, it is not essential that surfaces 52' and 82 be coplanar.

[0026] Referring to FIG. 2, once the sides of the flooring panels have been joined, the ends are joined in essentially the same manner, and therefore, a detailed description of the joining of the ends will not be addressed in detail, as it would be repetitive of the operations previously described.

[0027] In the embodiment described above, the tongue 40' extends from flooring panel 10' and the recess 70 is provided in flooring panel 10. However, the invention operates in the same manner if the recess 70' is provided in the flooring panel 10 and the tongue 40 extends from flooring panel 10.

[0028] Many advantages are provided by the flooring panels 10 and system described herein. As previously stated, the configuration of the flooring panels insures that the upper surfaces 12 of the panels will be positioned in the same plane, adding significantly to the aesthetic and functional nature of the floor. Also, the cooperation of the projection 50 with channel 80 prevents the separation of the panels. If the panels are permitted to separate, the aesthetics of the flooring system is degraded. Separation of the panels can also cause safety and maintenance issues.

[0029] Due to the fact that the angles do not have to be precisely controlled (i.e. angle A must be greater than angle C, but the exact measurement of the angles can vary), the cost of tooling to produce the flooring panels is minimized. As the exact angles must not be cut with extreme precision, the tooling does not need to be reconditioned as often, thereby eliminating costly downtime for the tooling.

[0030] The configuration of the sides and ends of the flooring panels also helps insure that the flooring panels will fit together properly. Other than the tongues and recesses, the only other portions of the flooring panels which engage are the portions 30 and 60 which are proximate the surface 12. As no other portions engage, the other portions will not prevent the surfaces 12 of panels from being held in the proper spaced relationship.

[0031] As the panels are moved together, portions of the panels resiliently deform, which allows the tongue to effectively click in place in the recess. This positive retention of the tongue in the recess provides sufficient force to retain the flooring panels together, with or without the use of a glue or adhesive. Consequently, the invention can be used with or without glue.

[0032] The foregoing illustrates just some possibilities for practicing the invention. Many other embodiments are possible within the scope of the invention. It is, therefore, intended that the foregoing description be regarded as illustrative rather than limiting, and that the scope of the invention is given by the appended claims together with their full range of equivalents.

What is claimed is:

1. A flooring system comprising:

   a first flooring member having a first top surface and a first engagement portion;

   a second flooring member having a second top surface which is essentially parallel to the first top surface, and a second engagement portion;

   the first engagement portion defining an elongated tongue with a locking projection extending therefrom, the locking projection having a first inclined surface which is inclined at a first angle relative to the first top surface;

   the second engagement portion defining an elongated recess with a locking cavity extending therefrom, the locking cavity having a second inclined surface which is inclined at a second angle relative to the first top surface, the second angle is larger than the first angle;

   whereby the first inclined surface cooperates with the second inclined surface to position the first flooring member and the second flooring member such that the first top surface and the second top surface are positioned in the same plane.

2. The flooring system as recited in claim 1 wherein the elongated tongue extends from a first side surface of the first flooring member in a direction away from a second side surface of the first flooring member.

3. The flooring system as recited in claim 2 wherein the elongated tongue has a fixed end attached to the first side surface and a free end having accurate surfaces.

4. The flooring system as recited in claim 3 wherein the locking projection extends from a lower surface of the tongue which extends between the free end and the fixed end.

5. The flooring system as recited in claim 4 wherein the locking projection has a third inclined surface which extends from the first inclined surface to the lower surface of the elongated tongue and is inclined at a third angle relative to the first top surface.

6. The flooring system as recited in claim 5 wherein the elongated recess extends from a third side surface of the second flooring member in a direction toward a fourth side surface of the second flooring member.

7. The flooring system as recited in claim 6 wherein lead in portion is provided on the third side surface proximate the elongated recess.

8. The flooring system as recited in claim 6 wherein the elongated recess has an open end positioned proximate the third side surface and a closed end.
9. The flooring system as recited in claim 8 wherein the locking cavity is provided in a lower surface of the elongated recess which extends from the open end to the closed end.

10. The flooring system as recited in claim 9 wherein the locking cavity has a fourth inclined surface which extends from the second inclined surface to the lower surface of the elongated recess and is inclined at a fourth angle relative to the first top surface.

11. The flooring system as recited in claim 1 wherein the slope of the first inclined surface and the slope of the second inclined surface cause the first inclined surface and the second inclined surface to bias the first flooring member toward the second top surface.

12. The flooring system as recited in claim 11 wherein an upper surface of the tongue engages an upper surface of the recess when the first flooring member is biased toward the second top surface, whereby when the tongue upper surface is in engagement with the recess upper surface, the first top surface, and the second top surface will be provided in the same plane.

13. A flooring system comprising:
   a first flooring member having a first top surface and a second top surface;
   the first flooring member having an elongated tongue projecting from a first side surface, the tongue having a first thickness as measured between an upper tongue surface and a lower tongue surface, a locking projection is positioned on the lower tongue surface;
   the second flooring member having an elongated recess projecting inward from a second side surface, the recess having a second thickness as measured between an upper recess surface and a lower recess surface, the second thickness being greater than the first thickness, a locking cavity is positioned on the lower recess surface;
   the locking projection and locking cavity engage to bias the first flooring member upward such that the upper tongue surface is in engagement with the upper recess surface;
   whereby the dimensioning between the tongue upper surface and the first top surface and the dimensioning between the recess upper surface and the second top surface are precisely controlled to insure that the first top surface and second top surface are positioned in the same plane when the tongue upper surface is in engagement with the recess upper surface.

14. The flooring system as recited in claim 13 wherein the elongated tongue extends from a first side surface of the first flooring member in a direction away from a third side surface of the first flooring member.

15. The flooring system as recited in claim 14 wherein the elongated tongue has a fixed end attached to the first side surface and a free end having accurate surfaces.

16. The flooring system as recited in claim 15 wherein the locking projection extends from a lower surface of the tongue which extends between the free end and the fixed end.

17. The flooring system as recited in claim 16 wherein the locking projection has a first inclined surface which is inclined at a first angle relative to the first top surface, the locking cavity has a second inclined surface which is inclined at a second angle relative to the first top surface, the second angle is larger than the first angle, whereby the first inclined surface cooperates with the second inclined surface to position the first flooring member and the second flooring member such that the first top surface and the second top surface are positioned in the same plane.

18. The flooring system as recited in claim 17 wherein the locking projection has a third inclined surface which extends from the first inclined surface to the lower surface of the elongated tongue and is inclined at a third angle relative to the first top surface.

19. The flooring system as recited in claim 18 wherein the elongated recess extends from the second side surface of the second flooring member in a direction toward a fourth side surface of the second flooring member.

20. The flooring system as recited in claim 19 wherein the elongated recess has an open end positioned proximate the elongated recess.

21. The flooring system as recited in claim 19 wherein the elongated recess has an open end positioned proximate the second side surface and a closed end.

22. The flooring system as recited in claim 21 wherein the locking cavity is provided in a lower surface of the elongated recess which extends from the open end to the closed end.

23. The flooring system as recited in claim 22 wherein the locking cavity has a fourth inclined surface which extends from the second inclined surface to the lower surface of the elongated recess and is inclined at a fourth angle relative to the first top surface.

24. The flooring system as recited in claim 17 wherein the slope of the first inclined surface and the slope of the second inclined surface cause the first inclined surface and the second inclined surface to bias the first flooring member toward the second top surface.

25. The flooring system as recited in claim 24 wherein an upper surface of the tongue engages an upper surface of the recess when the first flooring member is biased toward the second top surface, whereby when the tongue upper surface is in engagement with the recess upper surface, the first top surface, and the second top surface will be provided in the same plane.