Aug. 15, 1944. W. G. WEBB 2,355,834

WOOD FLOORING

Filed July 8, 1940 2 Sheets-Sheet 1

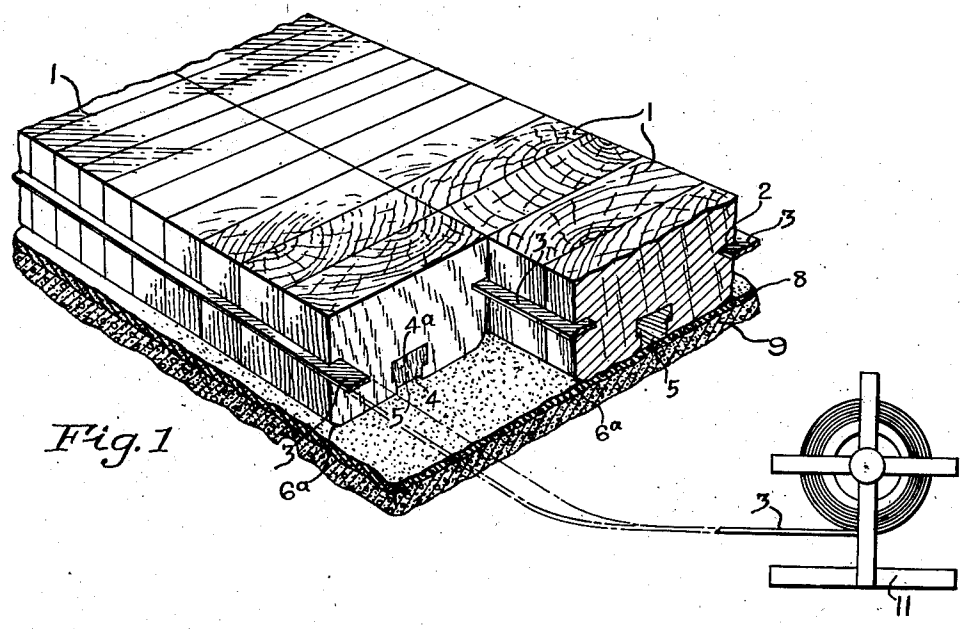

Fig. 1

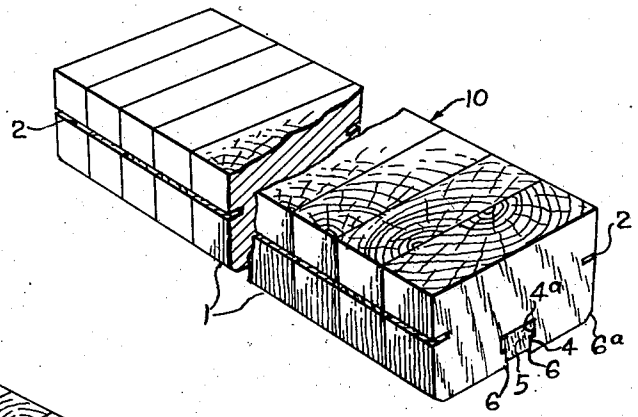

Fig. 2

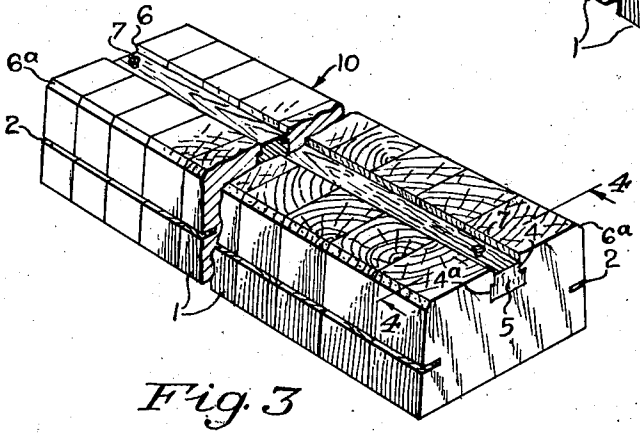

Fig. 3

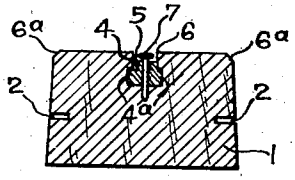

Fig. 4

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WOOD FLOORING

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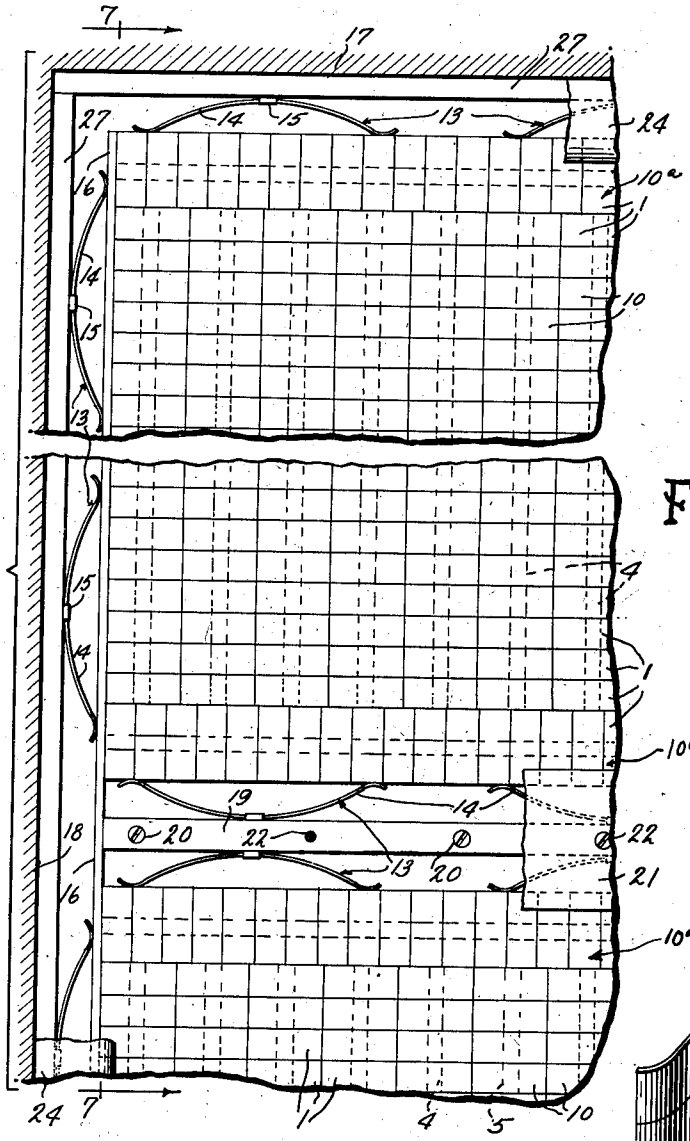

Fig. 5.

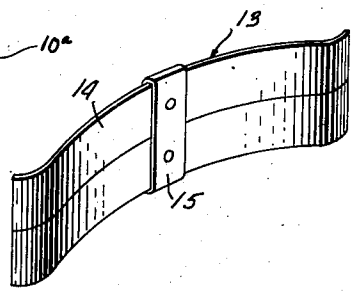

Fig. 6.

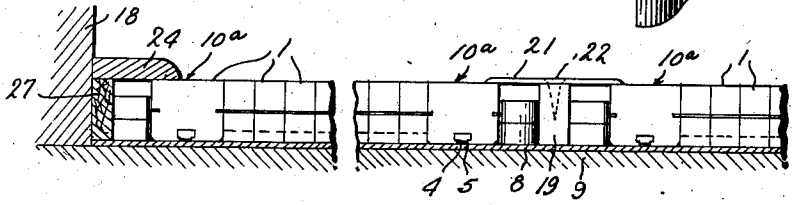

Fig. 7.

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UNITED STATES PATENT OFFICE

2,355,834

WOOD FLOORING

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Application July 8, 1940, Serial No. 344,352

8 Claims. (Cl. 20—8)

This invention relates to composite wood block flooring, to a process of manufacturing, and to a method of handling and laying the same, and in particular to flooring of end-grain blocks preferably assembled and held in unit strips for finishing, handling and laying.

Generally, the invention contemplates and has for its principal objects the provision of improved features in a floor of this or similar type, and related improvements in the process of manufacturing and the method of handling and laying such floor units whereby the finished floor will be laid level, will remain level, and will not be apt to buckle from expansion of the blocks due to moisture.

Another object of this invention is to provide a method whereby the flooring unit strips can be cheaply and efficiently manufactured, and the flooring can be shipped in bundles of unit strips and easily laid to produce a finished floor.

Other objects and advantages of this invention will readily become apparent through a reading of the following detailed description and the accompanying drawings, in which:

Fig. 1 is a broken-away perspective view showing portions of two strips in a finished floor, and indicating the spline reel used in laying the flooring,

Fig. 2 is a perspective view of an upright unit strip,

Fig. 3 is a similar, but upside down, perspective view showing the underside of this strip, and

Fig. 4 is a section taken on the line 4—4 of Fig. 3,

Fig. 5 is a broken-away plan view showing a number of strips, as laid in a room floor, and their side splines,

Fig. 6 is a perspective view showing a unit of a pair of springs, and

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 5.

Referring now to the drawings in detail, in which like reference characters indicate like parts throughout the several views:

Rectangular, wooden blocks 1 are cut to present their end grain for wear, so that the grain of these blocks is substantially vertical when the blocks are in the floor. Narrow spline slots 2 extend into each outer side of the blocks, as shown. These slots 2 are preferably located below the middle, or closer to the bottom, of these blocks to increase the depth available for wear.

Slots 2 receive long, thin, springy metal splines 3 which are fitted into the corresponding slots of adjacent rows of blocks with moderate looseness or free slidability, so that the splines will hold adjacent rows of blocks from relative tilting or vertical displacements and yet will permit the blocks of the several rows to partake of free longitudinal movements along the splines upon expansion due to moisture. This will prevent buckling or warping of the floor, since the expansion can be transmitted along the rows of blocks to take up all clearances and finally to the edge expansion joints.

A key-way groove or dowel opening 4, having a wider inner portion 4a, extends across and through the central bottom portion of each block 1 and along the row of blocks of each strip. The wider inner portion 4a of this key-way provides shoulders to prevent the blocks from coming off the correspondingly shaped key or dowel 5, which is freely or rather loosely fitted into the key-way to hold all of the blocks of a strip in position and yet to permit longitudinal sliding movements of the blocks on the key 5 upon expansion, to thus prevent buckling.

The lower corners or sharp shoulders 6 of this key-way groove are adapted to engage in the mastic 8 in which the blocks are laid, and thus they aid in holding the blocks against lateral movements. Also, the lower side corners of the blocks are cut away at 6a to provide upwardly extending openings to receive mastic between adjacent rows of blocks.

As shown in Figs. 2 and 3, the blocks 1 are assembled in suitable unit lengths upon the wooden dowels or keys 5 of the same length. It will be apparent that the non-circular key 5 holds the blocks against relative tilting or lateral movements but does not hold them against longitudinal movements. Accordingly, the ends of the key 5 are removably secured to the end blocks by nails 7 to prevent such longitudinal movements until the strips are laid in the floor.

It will be noted that key 5 is of smaller depth than the key-way 4—4a so that it does not entirely fill the key-way and thus leaves a lower recess or lower, open portion of groove 4.

At least one, or preferably both, of the nails 7 are only partially driven in so that they may be readily removed by inserting a suitable lifting tool under their heads. The heads of these partially driven-in nails 7 are entirely within the remaining recess of the groove 4 under the key 5, as shown in Fig. 3. Thus the heads of these nails will not catch on anything during finishing of the manufacturing operations and during shipping and handling.

As shown in Fig. 1, these blocks are laid on the concrete sub-floor 9 on a suitable layer of mastic 8. This mastic may be, for example, a suitably prepared, hot or cold asphaltic cement which retains its elasticity and forms a waterproof seal holding the bottoms of the blocks.

As shown in Figs. 2 and 3, the unit strips of blocks are represented as a whole by numeral 10.

In the following description of the manufacture and installation of this flooring, certain preferred dimensions and other details are given by way of example only, and it will be understood that other sizes are and can be used.

In the manufacture of this flooring at the factory, the blocks are cut from long lengths of so-called "two-by-fours" of yellow pine which have been previously dried and kiln-dried to less than eight percent moisture. These "two-by-fours" are, of course, rough and not exactly this size in inches. These lengths go through a surfacing machine which finishes all four sides to give them final dimensions of 1¾" by 3¾". They then go to the cut-off saws which cut them into lengths of approximately thirty inches. These shorter lengths go to a gang saw which simultaneously cuts them into blocks or lengths of about 2⅝", which dimension will be the thickness of the blocks in the flooring when laid.

The cut blocks are carried on a belt, with the end grain up, into the throat of the key-way cutting machine. While on this belt, the blocks are inspected and defectives removed. The key-way cutting machine forms the T-shaped cut across the bottom side of each block, and the blocks 1 are then automatically fitted and slid onto the key 5 which is held in place until the last block goes on. These strips are preferably about six feet long. The complete strip is then moved to one side so that the operation may be repeated.

These unit strips 10 are now turned upside down and the nails 7 put through the ends of the key 5 to fix the end blocks.

It will be noted that the blocks of the strips 10 now have unfinished top and bottom surfaces.

The strip is now carried by a belt into a molding machine, the upper and lower cutters of which true and finish the upper and lower surfaces of the blocks, the lower surface being only squared off or finished roughly. At the same time, or while the strips are held fixed, the lower corners 6a are cut off, saws of the proper width cut in the spline groove 2, and the sides of the strip are tapered in slightly towards the bottom so that the blocks, when laid, will be sure to join at their tops.

Note that during all these substantially simultaneous finish operations, all the blocks of the unit strip are held aligned and in fixed position by, and with respect to, the key 5. Since these operations are performed together, the spline cuts 2 and also the bottom faces of the blocks will be accurately spaced with respect to the finished top surfaces. This is very important in this type of flooring. Accordingly, the blocks, when laid in the floor and held by the splines 3, present an even top surface and will not require expensive finishing in place.

Further, it will be noted that the removable nails 7 hold the blocks together to go into the molding and sawing machine or machines without danger of catching, since they are within the recess at the bottom of key-way 4.

As shown in the several figures, the key 5 is cut from suitable strips and is made with edge grain; that is, the grain runs along the length and up and down or vertical in the strip. This edge grain has approximately fifty percent less expansion, due to moisture or the like, than would occur if the key were made of a flat-sawn strip having the grain running lengthwise and across the key. Thus, the key 5 will have but little lateral expansion which would cause it to grip tightly the sides of key-way 4—4a and prevent free sliding or, if excessive, to possibly split the end-grain blocks. The greater expansion of the key in a vertical direction is readily taken care of by the extra space or recess underneath the key and also by forming the upper, longitudinal portion 4a of the key-way a little bit deeper than the depth of the upper or cross portion of the T-shaped key member.

The details or precise form of the apparatus and machines mentioned herein form no part of the present invention, and it is intended that any of the commercially available machines may be used, as will be well understood by those skilled in this art.

The floor is laid as follows:

The mastic, a suitable bituminous or asphaltic cement, is laid on a dry concrete sub-floor which has been waterproofed, if necessary, and treated with a suitable bituminous primer. The workman removes one nail from one end of each strip, leaving each individual block free on the dowel. Both nails may be removed if desired, but if the workman removes only one nail of each strip, he can lift each strip with its loose end up. The one loose, end block will be sufficient to give all the blocks the required longitudinal freedom of movement since the next strip in the row can move along slightly on the continuous splines.

The strips may then be put in place. It will be apparent that this method of handling the strips with their removably fastened end blocks, will save time and produce a well-laid floor.

An expansion joint, such as a two inch strip of treated cork, is used all the way around the edge of the room or flooring, and a complete row of strips is laid end-to-end entirely across one edge or side of the floor. Then the metal spline 3, which is preferably a flexible band of tempered steel suitably galvanized and about one-half inch wide by four-hundredths of an inch thick, is fitted easily or rather loosely into the slot 2 along the full length of the row of strips from one side of the room to the other. Light taps with a hammer may be used to put the spline into the slot.

The spline 3 is used in a coil or a continuous roll which is preferably mounted on a simple reel for easy handling. This reel 11 is shown in use in Fig. 1. The end of the metal strip 3 is cut off when it has been laid the full length of the row of unit strips.

In like fashion, the next row of units is laid with its corresponding slot 2 fitting over the protruding portion of the spline 3, as shown in Fig. 1. Preferably, the several rows of strips are laid in "break joint" fashion; that is, with the joints between strips in one row overlapped by the intermediate portion of a strip 10 of adjacent rows. The strips can be readily cut into shorter lengths by sawing off dowel 5 and also splitting blocks when necessary to start a new row laid "break joint" or at the end of a row.

The blocks should be laid rather loosely where the humidity is high, but may be laid more closely in dry locations.

The mastic 8, which retains its elasticity and is both adhesive and waterproof, grips the bottom of the blocks, projects up into the recess under the key 5 to be engaged by the shoulders or corners

6, and also projects up into the openings between the cut-off corners 6a.

In lieu of the above mentioned expansion joint of treated cork, I prefer to use springs acting on at least two of the adjacent sides of the room floor or other equivalent area. As will be apparent, these springs may, if desired, be employed on opposite sides or on all four sides, or else only upon the two sides which are adjacent at a corner.

While these springs may be of any proved or suitable type within the purview of this invention, I prefer springs of the type shown by 13 in Fig. 6 and comprising two bent flat-type springs 14 suitably secured together by clip 15 to form a pair acting in parallel. As will be seen in the upper portion of Fig. 5, and considered with the foregoing disclosure, the plurality of blocks 1 of each unit strip 10 is freely slidable along its key 5 and its side splines 3 to thus permit free expansion of the blocks due to moist conditions without causing buckling. This expansion, which may take place without breaking the bond to the floor through the elastic mastic, will add up to a considerable amount over a long length of floor taken along the length of strips 10, as shown in Fig. 5, so that in practice it may compress the springs 13 shown at the top of Fig. 5 from a width of about 1½" down to about ¼" in extreme cases.

In addition, the blocks 1 of the unit strips 10 will expand sideways of the length of the strips, and this expansion is taken up by compressing the springs 13 shown along the side or at the left of Fig. 5. As will be apparent, the resilient resistance of these springs acting against expansion due to moisture, will hold the individual blocks and the several strips 10 tightly together. Upon dry conditions causing shrinkage of the blocks, the springs will gradually expand and push the individual blocks and the unit strips together and thus prevent the formation of openings or cracks which would otherwise appear between the strips and blocks.

It will be apparent that there is a useful cooperation between the individual blocks 1 being slidable along their keys 5 and side splines 3 and the springs (the upper springs 13 of Fig. 5) acting against this sliding movement caused by expansion or contraction. In addition, it will be noted that the unit strips 10 are slidable sideways or laterally of their lengths, and this movement is, in turn, resisted by the springs shown at the side or left of Fig. 5.

Referring in detail to Figs. 5 and 6, the unit strips 10 are laid in break-joint fashion, as mentioned above, with their lengths parallel to the wall 18 of the room or other space and perpendicular to the adjacent wall, or the like, 17. Wooden strips 27 may be laid against walls 17 and 18, and springs 13 preferably have their center portions acting against these wooden strips 27; or they may be in reverse position if desired. Referring to the left-hand edge of Fig. 5, it will be seen that each end of each of the suitably spaced springs 13 will rest on only one block 1, and the space between these ends and between the springs spans a number of blocks. Accordingly, I provide a light strip such as 16 which has a certain amount of inherent springiness or bendability but will cause one spring unit 13 to act upon a plurality of the individual blocks 1.

Similarly, it will be seen from the upper end of Fig. 5 that each end of the spring unit 13 will act upon the end of only one strip 10. Accordingly, I may employ a strip such as 16 or, as shown, I may provide a unit strip turned perpendicular to the length of the rest of the strips so that it lays across their lengths, as shown in 10a. Thus, this unit strip, and particularly its key 5, will act like the strip 16 and will transmit pressure from the spring to a plurality of the strips 10.

In cases where a large floor area is covered or where the floor is particularly long in one direction, I prefer to provide intermediate expansion joints, as indicated in the lower broken-away portion of Fig. 5 wherein the wooden filler strip 19 is attached to the concrete floor 9 by conventional concrete nails or expansion screws which are well-known and hence not illustrated herein. The springs 13 act against this strip 19 as they do against the side strips 27. The suitable wood or metal cover plate 21 is secured to strip 19 by screws 22 or other suitable means.

As shown, transversely laid unit strips 10a are employed in the same way as shown and described in connection with the top portion of Fig. 5. The open spaces formed at the edges of the floor are covered by a suitably secured metal or wood covering plate 24.

After the floor is laid, it is brushed clean, sanded, and finished with a coat of penetrating sealer.

It will be apparent that the wooden, T-shaped key or dowel 5 is so positioned that it is not apt to receive any appreciable quantities of moisture and cause it to expand and tightly grip or split the blocks. The key 5 is well below the center of the blocks so that moisture from above would have to penetrate through most of the thickness of the blocks to reach it. The lower surface of the blocks is sealed in by the mastic, and moisture is not apt to come through the sides of the blocks.

The metal splines 3 are quite thin and require only a narrow cut or slot 2. Thus they do not unduly weaken the blocks. Since the splines are of metal, they do not expand due to moisture, and thus will not tend to break off the rather easily split sides of the end-grain blocks, as often happens with the larger, wooden, side splines. Another disadvantage of the larger, wooden, side splines is that when they shrink due to dryness they permit the blocks to tilt or cant under load and thus make the floor uneven.

Since the end-grain yellow pine does not expand much lengthwise of the grain, the blocks will not tend to grip the spline under moist conditions. Further, it will be noted that the metal splines are buried in insulating wood which reduces expansion of the metal spline itself due to heat.

Thus, it will be apparent that these thin, flat, elastic splines will hold all of the blocks level and will transmit load from one row of blocks to the other. In addition, the fact that the thin splines are continuous holds the end-to-end strips level, prevents wasting of spline lengths, prevents injury to the spline band since it can be handled in a roll or on a reel, and makes possible an efficient method of laying the floor. The continuous, elastic, thin, springy steel band 3 effectively transmits load from row to row and between the strips of a row.

It will also be apparent that the individual blocks are longitudinally removable or slidable on both the key 5 and the splines 3 to permit expansion without buckling.

As numerous modifications or changes may be made in the above construction or in carrying

out the above methods without departing from the scope of this invention, it is intended that the above specific description and illustration shall be interpreted as purely illustrative and not in a limiting sense. It will be apparent to those skilled in the art that various changes in the form or in the uses for the above features and methods may be made within the purview of this invention, the scope of which is commensurate with the appended claims.

I claim:

1. Wooden flooring comprising a row of end grain blocks each having an opening therethrough and an elongated wooden key member with its grain extending longitudinally and also vertically to give edge grain for small lateral expansion slidably fitting through the openings of said row to position its blocks but to permit them to shift longitudinally thereon upon expansion, said openings and key being formed so that they fit closely but slidably from side to side but loosely from top to bottom to provide space for vertical expansion of said key.

2. As an article of manufacture, an elongated, unit flooring strip comprising a row of wooden blocks each having a longitudinally extending opening therethrough, a wooden dowel extending the length of said strip and readily slidable in each of said openings to hold all of said blocks against relative lateral displacements, and two means each comprising a recess and a fastening means wholly countersunk therein to avoid interference with or catching on other articles and at least one of said fastening means being only partly fastened in and hence readily removable, securing each end block to said dowel against longitudinal movement thereon, so that all of said blocks are held in a unit strip for shipping and handling and the countersunk but readily removable fastening means may be removed during laying to permit free longitudinal block movements due to expansion in the floor.

3. As an article of manufacture, an elongated, unit flooring strip comprising a row of wooden blocks each having a non-circular groove opening from and extending across its bottom face, a correspondingly shaped key member extending the length of said strip and non-rotatable but readily slidable in each of said grooves with its under surface above the under surface of said blocks to provide a recess, and means wholly within said recess extending through each end of said member and fixing it to the end blocks, one of said means being readily removable.

4. A strip of wooden, flooring blocks adapted to be laid in mastic and comprising a row of blocks each having a key-way groove across its lower face, a long, wooden key slidably fitting in the grooves of said row but being of smaller depth and countersunk therein to provide a lower, mastic-engaging groove and shoulders, and means, at least one being readily removable, securing said key to each end block and each being positioned wholly within said mastic-engaging groove.

5. A unit strip of wooden, flooring blocks adapted to be laid in mastic and comprising a row of blocks each having a non-circular key-way groove across its bottom face, a long, correspondingly shaped, wooden key member of less depth than said grooves slidably received and countersunk therein to hold said blocks against relative tilting or lateral movements and to provide a lower, mastic-engaging groove for each block under said key member, and a nail through each end of said key member into each end block to hold said blocks against longitudinal movements on said key member during handling, the head of each nail being completely within said mastic-engaging groove to avoid catching during handling, or the like, and at least one of said nails being only partially driven-in to be readily removed prior to laying.

6. A composite wooden floor comprising a plurality of side-by-side rows of unit strips, each strip comprising a row of end-grain blocks having a longitudinally extending, non-circular, wooden key slidably fitting in said opening and extending the length of said strip, each upright side of each strip having a narrow, horizontal, inwardly extending slot, and continuous splines comprising bands of thin, flat metal slidably mounted in the slots of adjacent strips to prevent relative vertical movements of said strips, each spline band extending along a plurality of strips from one side of the floor to the other.

7. Wooden flooring comprising a plurality of side-by-side rows of end grain wooden blocks, each block of a row having a keyway of polygonal cross section extending across its bottom face in a direction longitudinally of the row, said keyways cooperating to form a continuous keyway throughout the length of the row, an elongated wooden key member having a polygonal cross section corresponding generally to the polygonal cross section of said keyway and loosely fitted and lying wholly within said continuous keyway in such manner that each wooden block of the row is readily slidable on said key member but is prevented from relative rotary or tilting displacement thereon, the upright, exposed opposite sides of the blocks along each row having slots extending longitudinally of the row and cooperating to form continuous slots on each side of the row throughout its length, and resilient metal splines extending along each side of each row and being slidably fitted in opposed slots of adjacent rows to permit longitudinal shifting of blocks in each row but to resiliently retain rows of blocks against vertical or tilting displacement in the floor.

8. Wooden flooring comprising a plurality of side-by-side rows of end grain wooden blocks, each block of a row having a keyway of upright T-shaped cross section extending across its bottom face in a direction longitudinally of the row, said keyways cooperating to form a continuous keyway throughout the length of the row, an elongated wooden key member having an upright T-shaped cross section corresponding generally to the cross section of said keyway and loosely fitted and lying wholly within said continuous keyway in such manner that each wooden block of the row is readily slidable on said key member but is prevented from relative rotary or tilting displacement thereon, the upright, exposed opposite sides of the blocks along each row having slots extending longitudinally of the row and cooperating to form continuous slots on each side of the row throughout its length, and resilient metal splines extending along each side of each row and being slidably fitted in opposed slots of adjacent rows to permit longitudinal shifting of blocks in each row but to resiliently retain rows of blocks against vertical or tilting displacement in the floor.

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