Sept. 7, 1937. K. E. CROOKS 2,092,694

COMPOSITE FLOORING AND METHOD OF LAYING THE SAME

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FIG. 1.

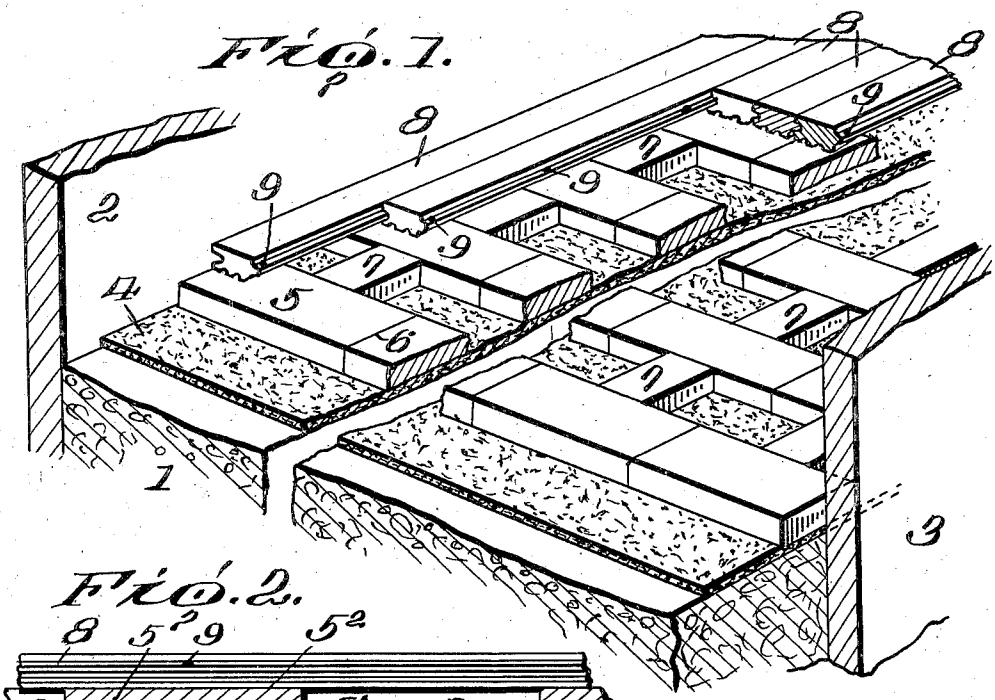


FIG. 2.

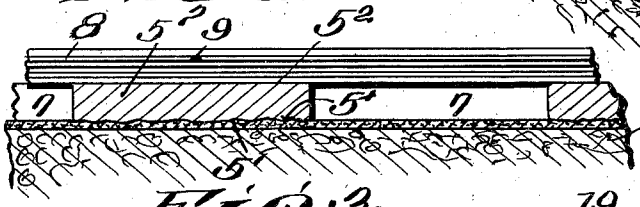


FIG. 3.

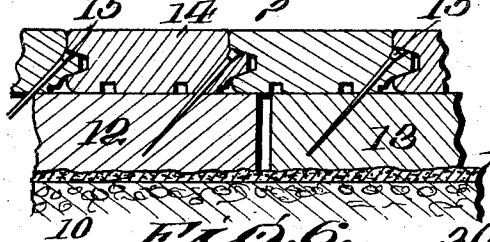


FIG. 4.

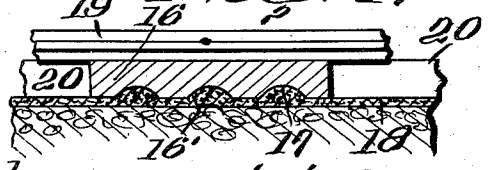


FIG. 5.

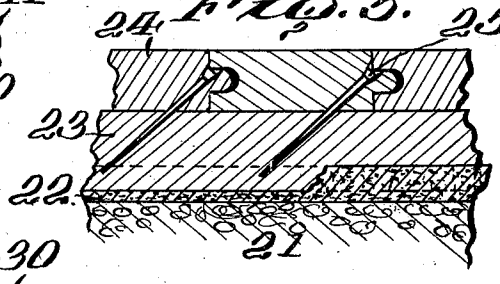


FIG. 6.

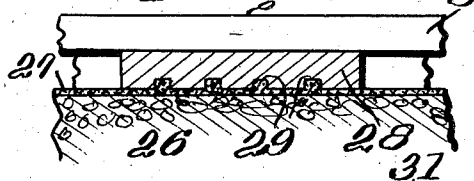
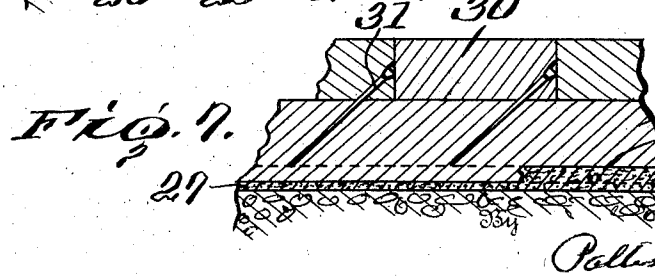


FIG. 7.



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Sept. 7, 1937. K. E. CROOKS 2,092,694

COMPOSITE FLOORING AND METHOD OF LAYING THE SAME

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FIG. 8.

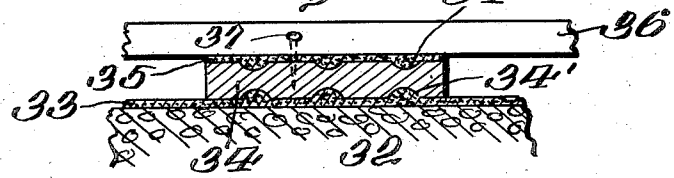


FIG. 9.

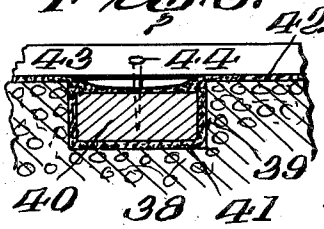


FIG. 10.

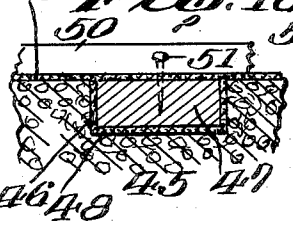


FIG. 11.

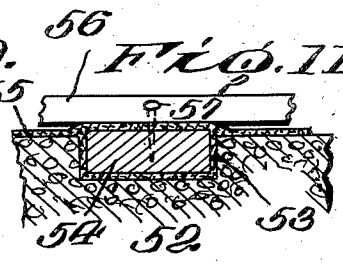


FIG. 12.

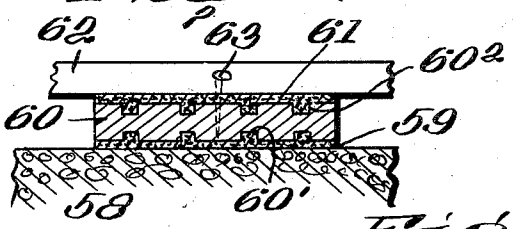


FIG. 13.

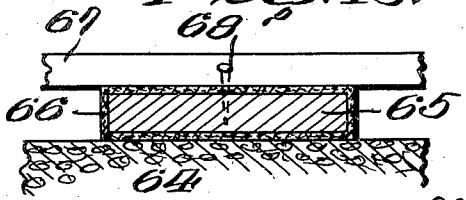
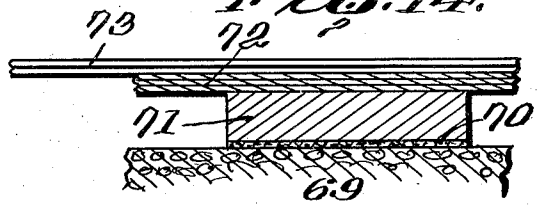


FIG. 14.



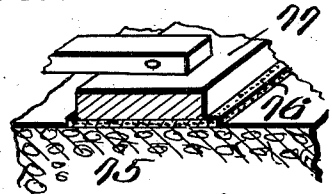
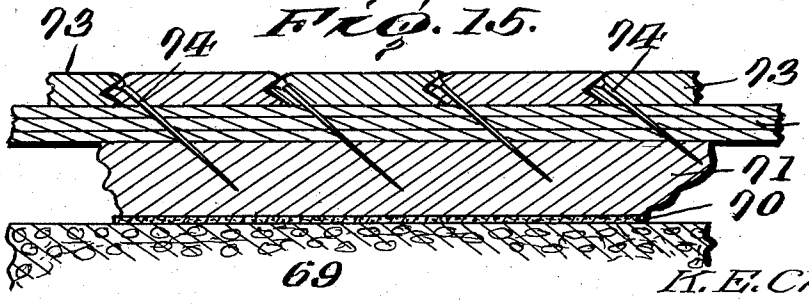


FIG. 16.

FIG. 15.



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COMPOSITE FLOORING AND METHOD OF LAYING THE SAME

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Fig. 17.

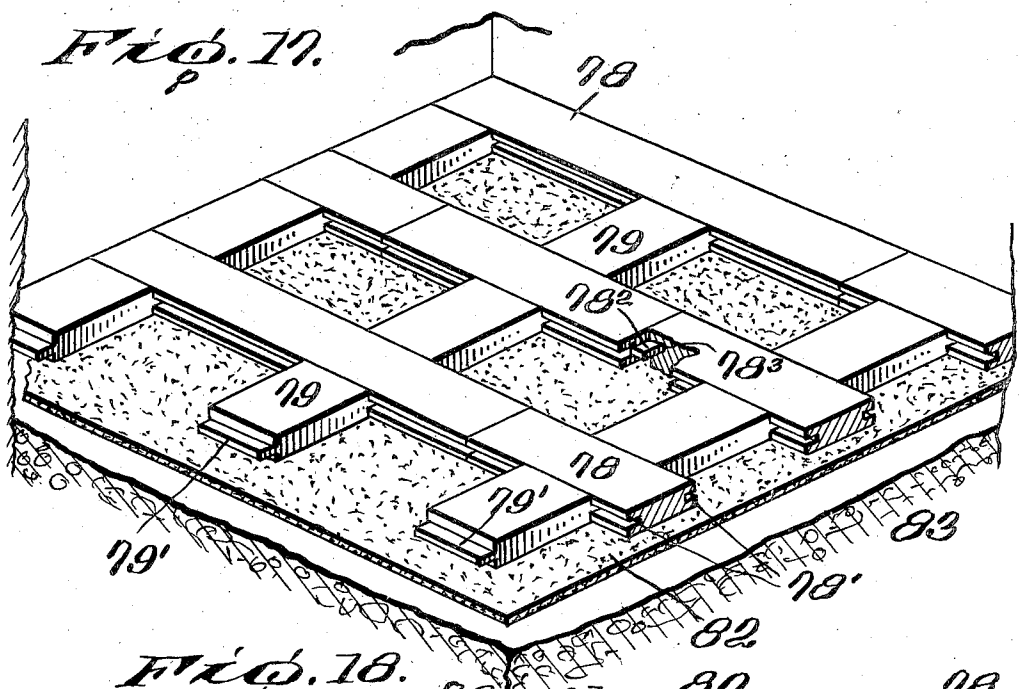


Fig. 18.

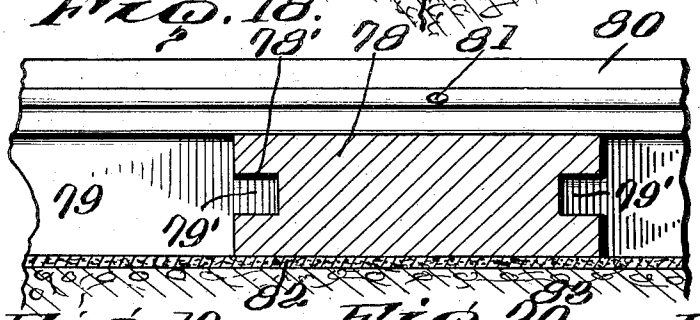


Fig. 19.

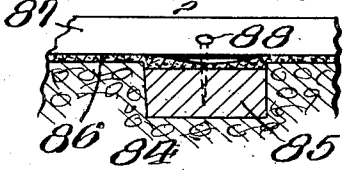


Fig. 20.

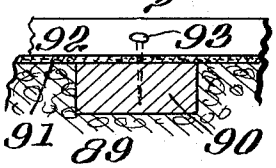


Fig. 21.

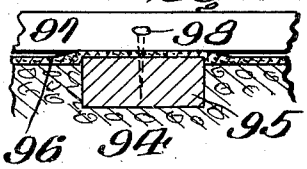
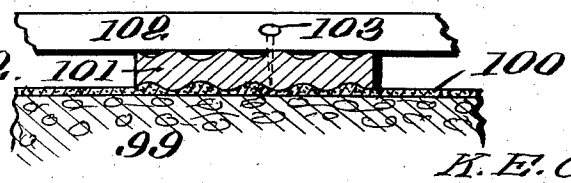


Fig. 22.



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COMPOSITE FLOORING AND METHOD OF LAYING THE SAME

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Fig. 29.

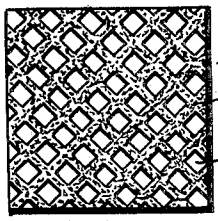


Fig. 23.

Fig. 24.

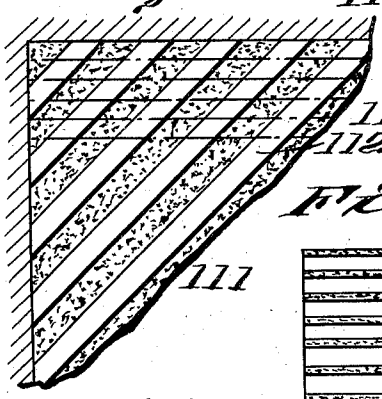


Fig. 25.

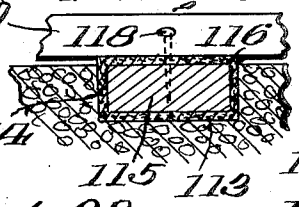


Fig. 26.

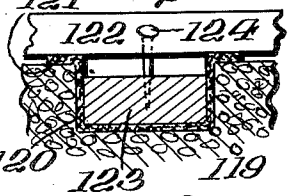


Fig. 27.

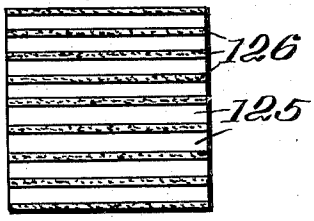


Fig. 28.

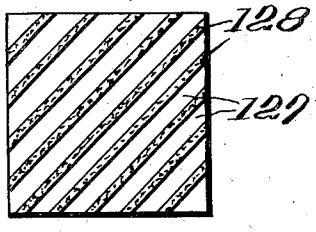


Fig. 30.

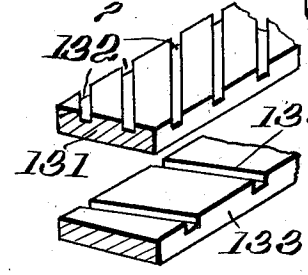


Fig. 33.

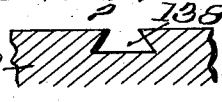


Fig. 35.

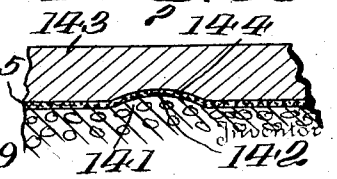


Fig. 34.



Fig. 31.

Fig. 32.

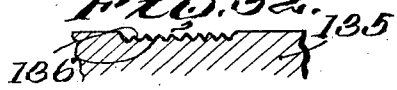


Fig. 36.



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Patented Sept. 7, 1937 2,092,694

UNITED STATES PATENT OFFICE

2,092,694

COMPOSITE FLOORING AND METHOD OF LAYING THE SAME

Kenneth E. Crooks, Williamsport, Pa.

Application March 2, 1935, Serial No. 9,091

10 Claims. (Cl. 20—7)

This invention relates to a method of laying commercial strip flooring composed of crooked and straight strips of various lengths on a mineral subfloor, such as concrete, metal, asphalt, or any material which will not retain a nail when driven therein, the object being to provide supporting strips for the flooring strips in order to allow the flooring strips to be nailed to the supporting strips to permit the drawing of the flooring strips up tight against one another as it is laid, thereby enabling the crooked strips of flooring to be laid with the straight strips on a non-nail-holding subfloor.

Another object of my invention is to provide a method which is especially adapted to be used in laying prefinished flooring, having a self-leveling joint as disclosed in my application, Serial Number 532,102, filed April 22, 1931, whereby I am able to produce a floor very cheaply having many advantages over previous constructions of floors.

Another object of my invention is to provide a method in which narrow and short supporting strips are secured to the subfloor by adhesive material, such as a non-setting water-resisting, adhesive material as mastic, hot or cold, which permits the bridging of hollow spots in the subfloor, thereby enabling the shimming of the hollow spots with mastic, shavings, pieces of wood or cardboard to eliminate the hollow sound so noticeable in floors which are laid directly on mineral subfloors.

Another object of my invention is to provide a method in which the flooring is so laid that cupping and buckling is greatly reduced, whereby the flooring will be held in its proper position under all atmospheric conditions.

Another object of my invention is to provide a method in which the disadvantages now existing in having the adhesive material, such as mastic, squeeze up between the flooring joints when the flooring is laid directly on mastic disposed upon the subfloor, eliminated as the surface of mastic is reduced, which allows the mastic to flow transversely instead of vertically, thereby preventing the flooring from being discolored at the time of laying or due to atmospheric changes or when pressure is brought to bear on the floor after it has been laid.

Another object of my invention is to provide a method in which the flooring produced thereby is quieter, warmer, more resilient and produces a floor structure by means of which an entirely sound-proof flooring can be produced with a very little additional cost by providing pockets between the supporting strips into which sound-proof material can be placed.

A still further object of the invention is to provide a method in which the supporting strips can be fabricated into a solid mat for supporting the flooring strips to provide means for securing the flooring strips thereto by fastening members, such as nails or the like.

Another object of my invention is to provide a method for producing a floor on a mineral base formed of flooring strips, the edges of which can be straight or provided with tongues and grooves of various shapes, either finished or unfinished, treated or untreated, to make the flooring waterproof or water-resisting.

To meet the various conditions existing in laying commercial strip flooring on a subfloor such as a concrete base, I have produced three methods, which are as follows: First: The arrangement of nail-holding supporting strips either in or on a mineral base and securing the strips thereto by adhesive material, preferably a non-setting plastic mastic, to provide a support to which the crooked and straight strips of flooring can be secured by securing members, such as nails, when laying the same whereby the flooring strips will be drawn together and straightened as they are laid and secured by nails, thereby enabling the use of the ordinary run of flooring which contains straight and crooked flooring strips of various lengths. Second: The method of providing nail-holding supporting strips which are secured to the mineral subfloor by adhesive material, preferably a non-setting plastic mastic and placing upon the upper surface of said supporting strips a coating of adhesive material, preferably non-setting plastic mastic on which is laid the strip flooring which enables the flooring to be secured to the supporting strips not only by the plastic mastic, but by nailing in such a manner that the difficulties existing in laying flooring on plastic mastic is eliminated as the mastic is prevented from squeezing up between the flooring strips as it is free to move laterally off the supporting strips when the flooring strips are drawn together or excess pressure is brought to bear upon the floor after it has been laid. This method provides means for holding or securing the flooring strips in position by two means, namely, the adhesion of the plastic mastic and nailing, thereby preventing the strips from raising off the supports when they shrink or from buckling when they absorb moisture. Three: A method of embedding nail-holding supporting strips in a subfloor formed of concrete or

its equivalent when wet and coating the entire surface of the concrete including the supporting strips with a coating of water-proof adhesive material, preferably non-setting plastic mastic on which is laid strip flooring, the strips of flooring being secured to the supporting strips by members, such as nails, and the adhesion of the mastic in such a manner that when the supporting strips rot or deteriorate due to the absorption of moisture from the wet concrete when laid, the supporting strips will be held in their proper position by the plastic mastic as by that time, they will have become set and the rotten wood within the concrete subfloor forms an insulating material to prevent the creation of the hollow sounds in flooring when there is a hollow space under the same.

In the various figures of the drawings, for the sake of illustration, I have shown a thickness of the coating of adhesive material, such as non-setting plastic mastic exaggerated, although I do not wish to limit myself to the use of any desired thickness of adhesive material, although I have found in practice that under ordinary conditions when using plastic mastic, a thin coating is sufficient to hold the supporting strips to the mineral subfloor in their proper position and hold the flooring strips on the supporting strips in their set position and I am aware that various changes can be made in the arrangement of the supporting strips and the kind of adhesive material used without departing from the spirit of my invention.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings,

Figure 1 is a perspective view illustrating my improved method of laying flooring on a concrete base;

Figure 2 is a detail section;

Figure 3 is a detail section showing self-leveling flooring in position on supporting strips and the supporting strips arranged promiscuously on the non-setting plastic mastic;

Figure 4 is a detail view of one of the supporting strips provided with grooves in its under surface to allow the mastic to flow up into the grooves in order to more securely hold the supporting strips to the concrete base;

Figure 5 is a detail section showing the ordinary construction of flooring used in carrying out my improved method;

Figure 6 is a detail section showing the modified form of supporting strips in which the grooves are formed square either by saws or suitable machines;

Figure 7 is a detail section showing the method of laying the straight or square edge flooring;

Figure 8 is a detail section in which the supporting strip is provided with grooved upper and lower faces, the upper as well as the lower face being provided with a coating of non-setting plastic mastic to secure the flooring strip thereto;

Figure 9 is a detail section of another form of my method wherein the concrete base is formed with grooves into which are disposed supporting strips which are secured in position therein by a coating of non-setting plastic mastic;

Figure 10 is a similar view showing the supporting strips arranged flush with the upper surface of the concrete base;

Figure 11 is a similar view showing the supporting strip extending slightly above the upper surface of the concrete base and in all Figures 9, 10 and 11, the strips are either coated or dipped or plastic mastic is placed within the grooves for securing the strips in position therein and to provide a weather-proof or resistance coating for the strips to prevent the same from rotting;

Figure 12 is a detail vertical section of a slightly modified form of supporting strip;

Figure 13 is a detail section showing a supporting strip dipped in a non-setting plastic mastic;

Figure 14 is a detail section showing the use of a ply-board on the supporting strips in order to enable $\frac{5}{16}$'' or $\frac{3}{8}$'' floor to be used;

Figure 15 is a section at right angles to Figure 14 showing a prefinished flooring arranged thereon provided with a self-leveling joint;

Figure 16 is a detail perspective view showing only a portion of the concrete base provided with a coating of non-setting plastic mastic to provide means for securing the supporting strip thereto;

Figure 17 is a perspective view of a portion of the concrete base, the supporting strips joined together by tongues and grooves to form a mat on the flooring strips;

Figure 18 is an enlarged section through the same;

Figure 19 is a detail section showing a concrete base with a supporting strip embedded therein when the concrete is wet, the surface being coated with a non-setting plastic mastic, the supporting strip being arranged slightly below the upper surface of the concrete;

Figure 20 is a detail section of a portion of a concrete base in which the flooring strips are embedded within the wet concrete and the upper surface flush with the top surface of the concrete, the same being coated with a coating of non-setting plastic mastic;

Figure 21 is a similar view with the supporting strip embedded within the concrete base when it is wet with the upper surface slightly above the surface of the concrete, the entire surface being coated with non-setting plastic mastic;

Figure 22 is a detail section showing a modified form of supporting strip in which the upper and lower surfaces are fluted;

Figure 23 is a detail perspective view showing the filler block disposed between the spacing blocks to receive the abutting ends of the flooring strips when they do not end on the supporting ends;

Figure 24 is a detail view showing the supporting strips arranged at an angle of 45° in respect to the flooring strips;

Figure 25 is a detail view showing the supporting strip with a coating of mastic over the entire surface arranged within a groove formed in a subfloor and a flooring strip secured thereto;

Figure 26 is a detail view of a subfloor with the groove, the walls and the upper surface of which are coated with plastic mastic and in which a supporting strip is disposed and to which the flooring strips are secured by nails;

Figure 27 is a detail plan view showing a subfloor provided with strips of plastic mastic arranged in spaced relation with one another on which can be disposed the supporting strips at any angle desired;

Figure 28 is a similar view with the spaced strips of plastic mastic laid at an angle to receive the supporting strips;

Figure 29 is a plan view showing the subfloor blocked off, blanks being left between the coating of plastic mastic;

Figure 30 is a detail perspective view of a modified form of supporting strip;

Figure 31 is a detail perspective view of another form of supporting strip;

Figure 32 is a detail view of another form of supporting strip;

Figure 33 is a detail view of another form of supporting strip;

Figure 34 is a detail view of still another form of supporting strip;

Figure 35 is a detail view showing a supporting strip cut away to receive a hump in the subfloor; and

Figure 36 is a detail perspective view of another modified form of supporting strip showing the same formed with recesses.

In carrying out my method of laying commercial strip flooring composed of straight and crooked strips of various lengths on a mineral subfloor, strips of flooring can be used constructed of various designs as shown by the various figures of the drawings and supporting strips of various designs can be used as shown by the drawings, therefore I wish it to be clearly understood that my method is capable of being carried out by using various designs of supporting strips and any kind of strip flooring whether unfinished or prefinished, treated or untreated, therefore I do not wish to limit myself to the use of a design of flooring strip nor to the design of supporting strip or the adhesive material used for securing the supporting strip to the subfloor and the flooring strip to the supporting strip.

My method is particularly adapted for laying $\frac{13}{16}$'' floor as disclosed in my application, Serial Number 532,102, filed April 22, 1931, covering self-leveling flooring, which can be either prefinished or unfinished, treated or untreated, but is preferably treated to make it moisture-proof or moisture-resistant and while I am aware that this particular design of flooring has many advantages, when laid in accordance with my improved method, over other constructions of floors, I am fully aware that my method can be carried out by using any type of floor desired and therefore I wish it to be clearly understood that my invention consists broadly in enabling strip flooring composed of crooked and straight strips of various lengths to be laid on a mineral subfloor.

Prior to my invention what is known in the art as commercial strip flooring which is composed of crooked and straight strips having a length from 1' to 16' or more, the shorts being laid with the longs, have never successfully and economically been laid on a mineral base in adhesive material, such as plastic mastic for the mastic did not have sufficient adhesion and cohesion to hold crooked and straight strips together after being forced together and I have found that by using supporting strips to which the flooring strips can be secured by members, such as nails, these flooring strips can be drawn together properly so as to form a smooth floor and be held in their proper position in respect to one another by the nails and the adhesion and cohesion qualities of the mastic where the mastic is used in contact with the flooring strip.

I am also aware that various attempts have been made to lay strip flooring with mastic on a non-nail-holding subfloor as for example, a concrete base but all prior methods have proven failures for the simple reason that there is no means provided for securing crooked strips with the straight strips in close contact with one another to provide a smooth surface without leaving cracks and while it is common in the flooring art to lay block flooring or its equivalent in plastic mastic on a concrete base, this type of floor in view of its dimensions does not require the drawing or straightening out of crooked pieces of flooring as it is laid as does commercial strip flooring which vary as to length and shape due to stresses and the like.

In the method illustrated in Figure 1 of the drawings I have shown a perspective view illustrating a portion of a room which comprises a mineral base 1 and walls 2 and 3. Over the mineral base 1 is spread a layer 4 of coating of adhesive material, preferably of the non-setting moisture-proof kind, such as non-setting plastic mastic and while in the drawing I have shown the thickness of this layer of plastic mastic somewhat exaggerated, I do not wish to limit myself to the thickness of the layer as this will vary according to the various requirements and conditions of laying flooring in various buildings.

The non-setting plastic mastic is preferably spread in the ordinary manner in order to give the upper surface of the dense subfloor, such as concrete, a coating and on which I arrange short narrow strips 5 with the ends abutting one another as shown at 6 and the ends of the strips adjacent the walls are in contact with the walls 2 and 3 so that these strips extend from one wall to another and are cut so as to fit snugly therebetween to prevent them from moving endwise after they have been placed in position.

The strips 5 as herein shown are spaced by spacing strips 7 and these supporting strips 5 and spacing strips 7 form a base of nail-holding material upon which the flooring strip is adapted to be laid and secured by members such as nails as herein shown. The flooring strips 8 are of the self-leveling type and are so arranged that the ends of the break joints are disposed on the supporting strips and these flooring strips are secured to the supporting strips by nails 9.

The type of flooring herein shown is $\frac{13}{16}$'' or $\frac{25}{32}$'' flooring and can be either unfinished or prefinished, treated or untreated, but I have found with prefinished flooring that when the entire surface is treated to make it moisture resistant it has many advantages over unfinished flooring.

The supporting strips 5 and the spacing strips 7 can be formed of any material which will receive and hold a nail and as herein shown are of wood and are dried to the proper moisture content at the factory and are treated to prevent rotting or absorption of moisture, the under surface being undressed as shown at 5' and the upper surface dressed as shown at 5^2 and these strips are preferably formed narrow and short to enable the hollow spots in the concrete to be bridged and shimmed up with mastic, shavings, pieces of wood or cardboard to prevent the hollow sounds so noticeable with flooring laid with mastic directly on a dense subfloor, such as a concrete base, and by having the under surface rough, the adhesive material such as non-setting plastic mastic adheres more firmly thereto and by having the upper surface of the supporting strips smooth a more even surface is provided for the flooring strips and while this, of course, is a matter of choice, I have found that by constructing these nail-holding supporting strips as above described,

that flooring can be laid quickly and it will be retained in its proper position.

It is, of course, understood that the adhesive material used can be of the quick setting type or the non-setting type and therefore I do not wish to limit myself to the exact material and design of forming the supports for the flooring strips and the material holding the supporting strips in position.

While I have shown the use of spacing strips in connection with the supporting strips, I wish it to be clearly understood that I do not wish to limit myself to the use of these spacing strips as I am fully aware that the adhesion and cohesion qualities of the non-setting plastic mastic or of setting cement will hold these strips in their proper position, but I have found in practice that these spacing strips will serve the purpose as a filler strip to support the abutting ends of a pair of strips of flooring when the ends do not meet over one of the supporting strips.

I am also fully aware that it is not essential to have these short narrow supporting strips disposed symmetrically or with their ends in contact with one another so that they are wedged between the opposing walls, therefore I wish it to be clearly understood that my invention consists broadly in providing a method of laying strip flooring composed of crooked and straight strips of various lengths on a dense subfloor by securing to said subfloor, preferably by moisture-resisting non-setting adhesive material, supporting strips of any dimension to allow the flooring strips to be secured thereto by nailing in laying in order to straighten out and draw tightly together and firmly secure the various irregular shaped pieces of flexible flooring.

While my method is especially adapted to be used in laying wood flooring on a dense subfloor, I wish it to be clearly understood that I do not wish to limit myself to the use of wood strip flooring as my method is capable of being carried out by laying flexible composition flooring where it is necessary to straighten out and secure straight and crooked strips of flooring together.

In order to clearly disclose the modified form of promiscuously disposing the supporting strips of various kinds on the concrete base and securing the same thereto by adhesive material, I have illustrated in Figure 3 a dense base **10** of concrete coated with plastic mastic **11** on which are disposed supporting strips **12** and **13** spaced apart on which the flooring strips **14** are laid and secured by nails **15** and it is, of course, understood that other ways of laying and placing these supporting strips can be used without departing from the spirit of my invention.

The type of flooring laid corresponding to the type illustrated in Figures 1 and 2 is of the prefinished self-leveling type of flooring as disclosed in my application above referred to and in the form illustrated in Figure 4, the supporting strip **16** is provided with a groove **16'** in its under surface into which a non-setting plastic mastic **17** disposed on the concrete subfloor is adapted to flow in placing the supporting strips in position.

The flooring strips **19** are nailed directly to the supporting strips and these supporting strips are shown held the proper distance apart by spacing strips **20**. This provides a supporting strip with a key to receive the plastic mastic or cement and while I have shown a particular form of groove, I wish it to be clearly understood that I am fully aware that the shape of these grooves can be varied and the manner of forming the same can be varied as my invention consists in providing the supporting strips with recesses formed by either cutting or pressing the same into the face or faces of the supporting strips to hold and key the mastic and therefore I do not wish to limit myself to any particular design of recesses or manner of forming the same.

In the form shown in Figure 5 the mineral base **21** is coated with a non-setting plastic mastic **22** and grooved supporting strips **23** are disposed thereon on which are secured a flooring formed of the standard design flooring strips **24** which are nailed to the supporting strips by nails **25** and this illustrates the use of a different design of flooring.

In the form shown in Figures 6 and 7, the mineral base **26** is provided with a coating of non-setting plastic mastic **27** on which are disposed supporting strips **28** which are formed with square grooves **29** arranged parallel with one another, which grooves can be formed by suitable milling tools or by saw kerfs and form additional means for keying the strip to the plastic mastic.

In order to illustrate another design of flooring, I show the strip of flooring **30** which is provided with straight edges and secured by nails **31** to the supporting strip.

In Figure 8 I have illustrated a method in which the mineral base **32** is provided with a coating of non-setting plastic mastic **33** and disposed thereon are supporting strips **34** provided with grooves **34'** in its under surface and grooves **34²** in the upper surface. The grooves **34²** are adapted to receive and hold the coating of plastic mastic **35** which is disposed on the upper surface of the supporting strip and upon which is laid the flooring strip **36** which is secured to the supporting strip by a nail **37**. This provides means for securing the flooring strips in position by a non-setting plastic mastic and by nailing and while I have shown a supporting strip provided with grooves in its bottom and its top to form recesses, I am aware that a flat or ungrooved supporting strip can be used in connection with a method in which the top and bottom of the supporting strip is in contact with a layer of mastic without departing from the spirit of my invention.

This illustrates a method of using both mastic and nailing to hold the flooring in its proper position and it will be apparent that when the flooring shrinks the grooved edge will be prevented from rising as the mastic will hold the flooring in its proper position.

Prior to my invention flooring strips were only nailed along the tongued edge thereof and no means were provided for holding the grooved edge other than the interlocking tongue of the adjacent strip and as flooring shrinks and pulls apart, nothing prevented the flooring from raising so that it made an uneven surface, while with my method this is eliminated.

This provides a construction in which the flooring is placed directly in adhesive material such as plastic mastic and yet the disadvantages existing of having the mastic creep up between the joints is eliminated for if the coating of plastic mastic or other adhesive material is too thick, or if the viscosity of it changes by atmospheric conditions or if it is wedged up between the joints in laying or due to excess pressure, it moves laterally and runs over the side edges of the supporting strips and therefore does not creep up to the upper surface of the flooring and spoil the appearance thereof. This is very essential

in laying flooring in mastic under certain atmospheric conditions and I have found by experimenting that it is almost impossible to cause the mastic to creep up between the joints of the flooring when laid on a supporting strip.

In Figures 9, 10, and 11 I have shown a method of laying strips of flooring on a dense subfloor, such as a concrete base, in which grooves are molded or pressed into the base when being formed. In these grooves supporting strips are secured by a non-setting plastic mastic or any other suitable adhesive material and while there are various ways of coating the strips and coating the walls, grooves and the surfaces of the subfloor with adhesive material, such as a non-setting plastic mastic, I do not wish to limit myself to the particular manner of coating and securing the strips so long as the strips are held in their proper position by the adhesion of the mastic.

In Figure 9 the mineral or concrete base **38** is provided with a groove **39** in which is disposed a supporting strip **40** formed of a nail-holding material secured therein by plastic mastic **41** and this supporting strip is of such a size that the upper surface thereof is arranged slightly below the surface of the concrete which forms a slight recess in a plane below the surface of the concrete for the purpose hereinafter fully described. After the strips have been placed in position a coating of plastic mastic **42** is placed over the entire upper surface of the concrete and exposed surface of the supporting strip and flooring strips **43** are laid directly on the layer of plastic mastic and secured to the supporting strips by nails. This provides suitable spaced recesses to receive the excess plastic mastic which squeezes up between the flooring strips when being laid and prevents the plastic mastic from extending up to the surface of the flooring and injuring the appearance of the same.

In the form shown in Figure 10 the base **45** is provided with a groove **46** in which is placed a supporting strip **47** secured therein by non-setting plastic mastic **48** and the upper surface of this strip is flush with the surface of the concrete base and over the entire surface including the supporting strip a coating of plastic mastic **49** is arranged on which the flooring strips **50** are placed which are secured to the supporting strips by nails **51**.

In the form shown in Figure 11, the base **52** of concrete is provided with a groove **53** which is arranged with a nail-holding supporting strip **54** which is secured in position therein by a coating of plastic non-setting mastic **55**. In this form the upper surface of the supporting strip **54** extends above the top surface of the concrete subfloor and over the entire surface is spread a layer of non-setting plastic mastic **55**. The flooring **56** is laid directly on top of the coating of plastic mastic **55** and flooring strips are nailed and secured by suitable members to the supporting strips and as herein shown, nails **57** are employed for this purpose in order to allow the strips to be readily drawn together. This provides means for elevating the flooring a sufficient distance above the subfloor to allow the excess plastic mastic to flow transversely from between the joints of the flooring so as to prevent it from squeezing up through the flooring and injuring the surface thereof and is a reversal of the construction shown in Figure 9.

In the form shown in Figures 9, 10 and 11, the supporting strips which are formed of a nail-holding material can be formed with a coating of plastic mastic in order to allow these strips to be placed within the previously formed grooves and secured thereto by the mastic and I am aware that they could be previously dipped and then laid in the groove or mastic could be laid in the grooves and supporting strips dropped in on the non-setting plastic mastic so as to hold them in the proper position thereon and to also protect them against moisture seeping up through the concrete.

This provides means for securing the flooring strips to the supporting strips in order to straighten out the irregular shaped flooring strips in laying flooring of different lengths so that the flooring strips can be drawn tightly together and secured. If these supporting strips dry rot or deteriorate by the absorption of moisture or for any other reason, the flooring strips will have become set in their proper position in close contact with one another so as to form a perfect flooring and will be held in that position by the adhesion and cohesion qualities of the plastic non-setting mastic so that it is immaterial whether these strips rot or not so long as they have sufficient strength to initially allow the flooring to be laid properly and held until they have become set as crooked flooring strips when properly drawn together soon become set and after becoming set, do not require much pressure to hold them in a set position.

In Figure 12 I have shown a mineral base, such as concrete **58**, on which a layer of mastic **59** is disposed, the layer of mastic being only approximately the width of supporting strips **60** and the supporting strips are formed with square grooves **60'** and **60²** in its top and bottom and the upper surface is coated with mastic **61** of the non-setting plastic kind and on which the flooring **62** is laid and secured by securing members such as nails **63**. This provides a cheap method of laying flooring in which the flooring is held in position by both nailing and by the adhesion of plastic mastic as the quantity of mastic used is reduced, only coating the subfloor where the strips are placed.

In Figure 13 I show a method in which a mineral base **64** has disposed thereon a supporting strip **65** which has been previously dipped to give it a coating of plastic mastic **66** and as this plastic mastic is preferably of a non-setting kind, these strips can be disposed on the mineral subfloor or base in any position desired and the flooring strips **67** laid directly thereon and secured by nails. This is an exceedingly cheap method of laying strip flooring of various lengths on a dense subfloor formed of mineral, metal or the like and securing crooked and straight strips in position both by the adhesion qualities of the mastic and by nailing or the equivalent of nails.

In Figures 14 and 15 I have shown a modified form of my method which is especially adapted to be used in connection with laying $\frac{5}{16}$'' and $\frac{3}{8}$'' prefinished flooring which has either been treated or untreated, preferably constructed substantially as shown in my Patent 1,551,544, granted to me September 1, 1925, which provides a self-leveling flooring.

In this type of flooring the subfloor or base **69** is provided with a coating of non-setting plastic mastic **70** on which is disposed a supporting strip **71** on which is laid strips of plyboard **72** to form a subfloor for the self-leveling prefinished flooring strips **73** of such material that the flooring can be nailed thereto as shown by nails **74** which provides a more expensive flooring with additional advantages and it is more sound-proof

and warmer and provides pockets between the supporting strips which can be filled with sound-deadening material, if desired.

It will be apparent that in this type of flooring it is not essential that the entire surface of the subfloor be coated with adhesive material as only a sufficient quantity of adhesive material need be used to hold the strips in their proper position.

In the form shown in Figure 16 I have illustrated a mineral subfloor or base **75** having a coating of non-setting plastic mastic **76** which is laid in strips and on which is laid a supporting strip **77** which illustrates that the supporting strips can be formed of a greater width and without grooves and that these supporting strips can be used without spacing members and with only a sufficient amount of plastic mastic to cause it to adhere to the subfloor or base as the mastic is laid in spaced layers or in spaced spots to receive the supporting strips and does not cover the entire concrete subfloor and I wish it to be clearly understood that in all of the forms shown, the essential features of my invention are, first, to provide means for holding the supporting strip to the subfloor by adhesive material and second, to provide moisture resisting material to meet certain atmospheric conditions and therefore I do not wish to limit myself to the amount of mastic employed.

In Figures 17 and 18 I illustrate a method in which a supporting mat is formed by fabricating a plurality of supporting strips **78** and spacing strips **79**. The supporting strips **78** are provided with grooved side edges **78'** and one end of each strip is provided with a tongue 78^2 and the other with a groove 78^3 so that they can be locked together endwise and the spacing strips **79** are provided with tongues **79'** which fit in the grooves **78'** so as to interlock the spacing strips and supporting strips together to form a base for the flooring **80** which can be secured thereto by nails **81**. This mat is adapted to be disposed on a layer of non-setting plastic mastic **82** arranged over the concrete base **83** and while I have failed to show these strips secured together by nailing, I am aware that this fabricated base can be secured by nails, or by any other suitable means, if desired.

In Figure 19 I show a mineral base **84** in which is embedded when the concrete is wet a supporting strip **85**, the upper face of which terminates below the plane of the concrete base and the entire upper surface of the mineral subfloor or base is coated with a coating of adhesive material, such as non-setting plastic mastic **86** and upon which the flooring strips **87** are adapted to be laid and secured by nails **88**.

In Figure 20 the mineral concrete base **89** has embedded therein when it is wet and being formed, a supporting strip **90**, the upper surface of which is flush with the top surface of the concrete base or subfloor and over which is arranged a coating of non-setting plastic mastic **91**. Disposed on the coating of plastic mastic is a flooring **92** which is secured by nails **93**.

In the form shown in Figure 21, the mineral base **94** has embedded therein a supporting strip **95** when the concrete is wet and being formed, which extends slightly above the top surface of the concrete subfloor or base and has a coating of non-setting plastic mastic **96** disposed thereon. Arranged on this coating of plastic mastic is a floor **97** which is secured to the supporting strips by nails **98**.

In the form shown in Figures 19 and 21, the supporting strips are so disposed as to enable the plastic mastic to squeeze out laterally between the strips to prevent it from creeping up or being forced up and injuring the surface of the finished strip. In this form the strips of flooring which are crooked and of various lengths when laid are drawn tightly together and secured by the nails so that when the supporting strips rot out, the flooring strips will have become set in their proper position to form a perfect floor and will be held in this set position by the adhesion and cohesion qualities of the plastic mastic.

In Figure 22 I show a concrete base **99** having a coating of non-setting plastic mastic **100** on which is disposed a supporting strip **101**, the upper and lower surfaces of which are wavered and on the upper surfaces of which are disposed a flooring strip **102** which is secured by a nail **103** and this illustrates a modified form of design of supporting strip and I wish it to be clearly understood that these various designs shown in the various figures of the drawings can be interchanged with one another without departing from the spirit of my invention.

In Figure 23 I show a perspective view of another form of method in which I arrange a layer of adhesive material **104** over a mineral subfloor **105** in which are disposed supporting strips **106** herein shown spaced apart by spacing blocks **107**. Over these supports and spacing blocks I arrange strip flooring **108** and secured by nails **109** and where the ends of the strips of flooring **108** turn out between two spacing strips, I arrange a filler block **110** for supporting the abutting ends of the strips.

In Figure 24 I show a coating of plastic mastic **111** which is placed over a subfloor and supporting strips **112** are arranged diagonally to receive the flooring strips so that instead of having the flooring strips arranged at right angles to the supporting strips, they are arranged at an angle of 45° and while in this form I have shown the entire surface of the subfloor covered with mastic to secure the supporting strips thereto and to prevent mastic from creeping up from the subfloor, I wish it to be clearly understood that any of the forms and manner of securing the supporting strips as illustrated in Figures 1 to 22 can be employed as these strips can be used with and without spacing strips or filler blocks.

In Figure 25 I show a subfloor **113** provided with a groove **114** in which is arranged a supporting strip **115**, the outer surface of which is coated with adhesive material **116** and upon said strip is adapted to be secured the flooring **117** by nail **118** and in this form, the plastic mastic is allowed to move laterally instead of upwardly between the cracks of the floor so as to prevent it from discoloring the floor by creeping up through the same.

In Figure 26 the subfloor **119** is formed of concrete or any other suitable material and is provided with a groove **120** and the wall of the groove and the upper surface of the subfloor is coated with plastic mastic **121**. Arranged on the coating of mastic is a flooring formed of strips **122** which are secured to a supporting strip **123** which is arranged within the groove and secured thereto by the plastic mastic. The supporting strip **123** has a thickness less than the depth of the groove in order to form recesses to allow the mastic to flow into it when the strips are drawn together under pressure of the nails **124** or due to the change of atmospheric conditions after the floor has been laid.

In Figure 27 the mineral base 125 is provided with strips of adhesive material 126 arranged spaced apart in the form of ribbons in order to hold the supporting strips (not shown) in their proper position thereon.

In Figure 28 the subfloor 127 is provided with diagonally arranged ribbons of adhesive material 128 over which the supporting strips are adapted to be arranged.

In Figure 29 the subfloor 129 is provided with a coating of plastic mastic 130 which is blocked off so that the entire surface is not coated with this mastic.

In Figures 27, 28 and 29, the mastic is disposed for solely securing the supporting strips and can be used where there is very little moisture present.

In Figure 30 I show a supporting strip 131 provided with obliquely arranged grooves 132.

In Figure 31 I show a supporting strip 133 with transversely arranged grooves 134.

In Figure 32 I show a supporting strip 135 with a series of closely arranged grooves 136.

In Figure 33 I show the supporting strip 137 with a dovetailed groove 138.

In Figure 34 I show a supporting strip 139 with a V-shaped groove 140.

In Figures 30 to 34 inclusive I have illustrated various modified forms of grooves in the supporting strips in order to allow the adhesive material to flow therein in order to key either the floor to the supporting strip or the supporting strips to the subfloor and while I have only shown a few forms to illustrate the preferred embodiment of my invention, I am aware that various other forms of recesses or grooves can be formed in the supporting strips, either by cutting or by pressing the same therein and therefore I do not wish to limit myself to the use of any particular construction of recess for the mastic.

In Figure 35 a concrete base 141 is shown with a bump 142 and the supporting strip 143 is cut away at 144 on its under surface to receive the bump, the layer of mastic 145 being disposed between the subfloor and the supporting strip for securing the strip thereto. This illustrates a method of leveling up the supporting strips without the use of shims of any kind as the under surface of the supporting strip can be cut away and fitted to receive any bump in the subfloor.

In Figure 36 I have shown the supporting strip 146 provided with recesses 147, which can either be cut or pressed in the surface of the strip.

In all of the forms of my invention wherein supporting strips are disposed with the supporting surfaces above the concrete subfloor, I wish it to be clearly understood that I do not wish to limit myself to the use of spacing strips and to the width of any supporting strip and that I am aware that when it is desired to manufacture an absolutely or a perfect sound-proof floor that the space between the supporting strips and spacing strips can be filled with sound deadening material, such as cork, sand, asbestos, or any other sound-proofing material.

I also wish it to be understood that I am fully aware that other constructions can be used in carrying out my methods of laying strip flooring of various lengths upon a concrete subfloor as my invention consists broadly in all of the various modifications of the methods herein described in providing means for securing strip flooring in laying the same in order to straighten out and hold together the various lengths of strip flooring until it has become set.

In the specification I have set up that the preferred adhesive material is a non-setting plastic mastic but, it is, of course, understood that any kind of waterproofing adhesive cement can be used for securing the supporting strips to the dense base as well as securing the flooring strips to the supports without departing from the spirit of my invention.

I do not wish to limit myself to the use of any particular kind of supporting strips so long as the strip can be penetrated by a nail, peg, pin or screw so as to hold the flooring strips in the proper position while being nailed, pegged, pinned or screwed.

In the specification I have set up a method of securing commercial strip flooring formed of crooked and straight strips of various lengths to a dense or non-nail-holding subfloor by the use of an adhesive material which is used to resist moisture and to secure supporting strips to a subfloor and can also be used to secure the flooring strips to the supporting strips in addition to the fastening means employed whereby I am able to use strip flooring where it has been impossible to use the same in the past and secure the said strip flooring in position either by nailing or by nailing and the adhesive qualities of a material such as plastic mastic and I have found in practice that it is not necessary to shim unless the hollow space covers a large area as the supporting strips and the flooring form sufficient insulating material to eliminate the hollow sounds so noticeable in the present type of flooring laid directly on a concrete subfloor.

I am also aware that it is not necessary in laying commercial strip flooring to nail each strip when the strip flooring is laid in mastic but the number of nails or securing means would be determined by the straightness of the strip and therefore I wish it to be clearly understood that my invention consists broadly in producing a method which enables strip flooring to be laid cheaply on a dense subfloor either in mastic or not in mastic and therefore I do not wish to limit myself to the use of any kind of material in forming the subfloor so long as it is not nail-holding material and I do not wish to limit myself to the use of any kind of material in forming the supporting strips so long as it is nail-holding material and I do not wish to limit myself to the use of forming a floor of wooden flooring strips so long as the flooring is flexible and formed of crooked and straight strips of various lengths and I do not wish to limit myself to the use of any particular kind of adhesive material as I am aware that under certain conditions a quick-setting adhesive material may have an advantage over a non-setting adhesive material and therefore I reserve the right to carry out my method of using any combination of the forms herein shown and described without departing from the spirit of my invention.

In the drawings and specification I have shown and described flooring of various thicknesses from $\frac{3}{8}$'' to $\frac{3}{16}$'', but I do not wish to limit myself to the use of any thickness or width of flooring or any kind of flooring or the particular manner of securing the same to the supporting strips as I am aware that instead of driving the nails obliquely through the edges of the flooring strip into the supporting strip, that they could be driven straight through from the top and where straight edge flooring strips are used, this is a common practice in nailing the strips in position and while I preferably employ nails in order

to allow the floor to be nailed quickly, other forms of fastening members can be employed without departing from the spirit of my invention.

While in the drawings I have stated that the mastic could be applied by spraying or by dipping, I do not wish to limit myself to the means of applying the adhesive material to either the subfloor or to the supporting strip as I am aware that it can be brushed, sprayed or troweled on the subfloor or it could be brushed, sprayed or troweled on the supporting strip or the supporting strip could be dipped.

I am aware that various attempts have been made in the past to provide means for nailing flooring to a subfloor by embedding in the subfloor when being formed nail-holding strips or securing to the subfloor when being formed nail-holding strips by cement or the like and my invention differs from these other methods by providing a method which can be either carried out when the subfloor is being made or after the subfloor has been made as I employ an adhesive material of such a character that it will adhere to the supporting strip and to the subfloor whether the subfloor is green or cured and therefore I wish it to be clearly understood that these prior methods are impractical as a floor cannot be leveled unless short strips are employed and that the proper support for the flooring cannot be produced unless they are secured by an adhesive material of the character set forth. With my method employing a non-setting adhesive material, the supporting strips are movably mounted so that the floor is free to move and this obtains many advantages over the prior constructions. By the use of a waterproof adhesive material, I am able to waterproof the subfloor or base and use the waterproof material to form means for securing the supporting strips thereto.

From the foregoing description it will be seen that I have provided a composite flooring and method of producing the same which enables a flooring formed of flexible strips of various lengths to be laid on a dense subfloor by arranging on said subfloor a plurality of supporting strips and securing said strips solely thereto by adhesive material whereby the crooked and straight strips of the commercial flooring can be secured to the supporting strips so as to draw the strips in their proper position in respect to one another.

What I claim is:

1. A method of laying a mixture of straight and crooked wooden strips of flooring of various lengths on a non-nail-holding subfloor consisting in first coating the surface of the subfloor with a waterproof non-setting plastic mastic to prevent moisture from creeping up through said subfloor, second placing short and narrow supporting strips of nail-holding material on said coating of plastic mastic and securing said strips in spaced position on said subfloor solely by the adhesion of said mastic, coating the surface of said supporting strip with mastic, and then laying the flooring strips on the mastic on said supporting strips at an angle thereto and securing said flooring strips tightly together by blind nailing said flooring strips to said supporting strips.

2. The method of laying flexible strip flooring of various lengths on a mineral subfloor consisting in securing to said subfloor by a non-setting plastic mastic short supporting strips, coating the upper surface of said supporting strips with mastic and then laying the strips of flooring on said mastic and securing said flooring strips to said supporting strips by blind nailing members for drawing said flooring strips tightly together.

3. A composite floor comprising a mineral subfloor, a layer of non-setting plastic mastic disposed on said subfloor, supporting strips disposed on said plastic mastic, a layer of non-setting plastic mastic disposed on said supporting strips and strips of wooden flooring of various lengths disposed on said supporting strips and secured thereto by blind nailing.

4. The method of laying wooden strip flooring on a concrete subfloor consisting in first coating the upper surface of the concrete with a non-setting plastic mastic, second placing spaced supporting strips provided with recesses on said coating to secure said strips thereto by adhesion and then laying strips of flooring on said spaced recessed supporting strips at angles thereto and securing said flooring strips to said first mentioned strips by blind nailing and the adhesion of a layer of non-setting plastic material.

5. The method of laying wooden strips of flooring on a concrete subfloor consisting in securing spaced fluted supporting strips of wood previously coated with a layer of non-setting plastic mastic by the adhesion of said mastic, then laying wooden strips of flooring on the supporting strips at right angles thereto, then blind nailing said strips of flooring to the supporting strips to draw the flooring strips tightly together, the adhesion of the non-setting plastic layer between the flooring strips and the supporting strips aiding in holding the flooring strips in their proper position in respect to one another and allowing said flooring to expand and contract.

6. The method of laying wooden strip flooring on a concrete subfloor consisting in first coating the upper surface of the concrete with a non-setting plastic mastic, second placing spaced strips on said coating to secure said strips thereto by adhesion and then laying strips of flooring on said spaced strips and securing said flooring strips to said first mentioned strips by blind nailing and the adhesion of the layer of non-setting plastic mastic, the layer of non-setting plastic mastic forming means for holding said strips in their proper position and allowing said strips to expand and contract.

7. The method of laying wooden strip flooring on a concrete base, consisting in laying spaced supporting strips on the upper surface of a concrete base and securing said strips thereon by the adhesion of a non-setting plastic mastic, laying wooden flooring strips on said supporting strips and securing said flooring strips thereon by blind nailing said flooring strips to said supporting strips, supporting said flooring strips on said supporting strips by a layer of non-setting plastic mastic of sufficient thickness to support said flooring strips out of contact with said supporting strips and filling the spaces between said supporting strips and said flooring strips with sound-deadening material.

8. A composite floor comprising a concrete base, a coating of waterproof non-setting plastic mastic arranged over said base, strips of wood arranged on said non-setting plastic mastic and secured solely thereto by the adhesion of said mastic, a layer of non-setting plastic mastic arranged on the upper surface of said supporting strips, sound deadening material arranged between said supporting strips and strips of flooring having self-leveling joints and of random lengths arranged on said supporting strips and secured

thereto by the plastic mastic and blind nailing said flooring strips to said supporting strips.

9. The method of laying flexible crooked and straight strips of flooring of various lengths on a mineral subfloor consisting in first securing supporting strips to said subfloor by a waterproof normally plastic adhesive material, second securing flooring strips of various lengths on said supporting strips by normally plastic adhesive material and then securing the abutting straight and crooked flooring strips tightly in engagement with one another in position on said supporting strips.

10. A composite floor comprising a mineral subfloor, a layer of normally plastic adhesive material disposed on said subfloor, supporting strips disposed on said normally plastic adhesive material, a layer of normally plastic adhesive material disposed on said supporting strips, straight and crooked strips of flooring of various lengths disposed on the adhesive material on said supporting strips and means for securing the abutting straight and crooked flooring strips tightly in engagement with one another in position on said supporting strips.

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