Sept. 13, 1932. G. L. BENNETT 1,876,597

SHEET METAL ROOF

Filed June 7, 1928 2 Sheets-Sheet 1

Fig. 1.

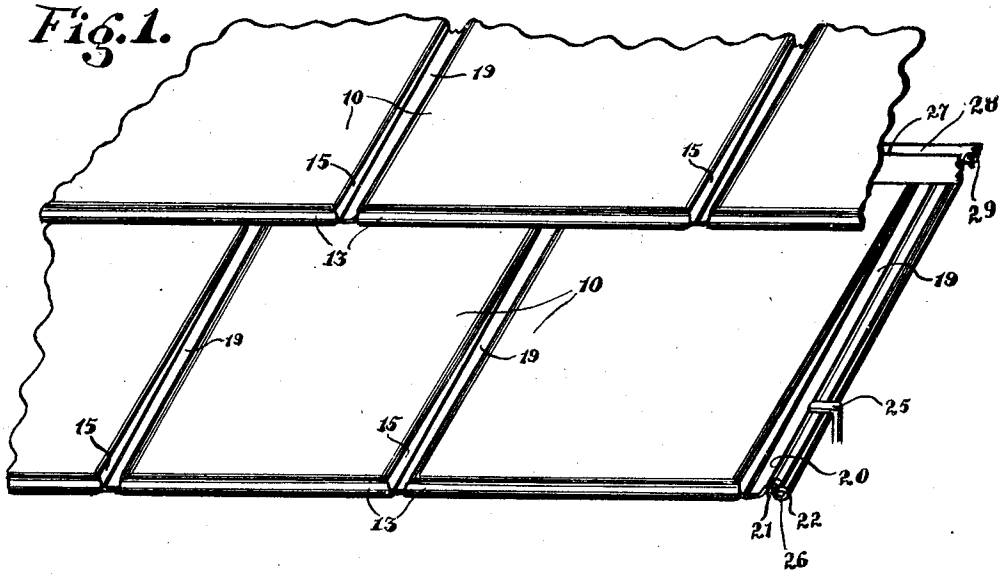


Fig. 2.

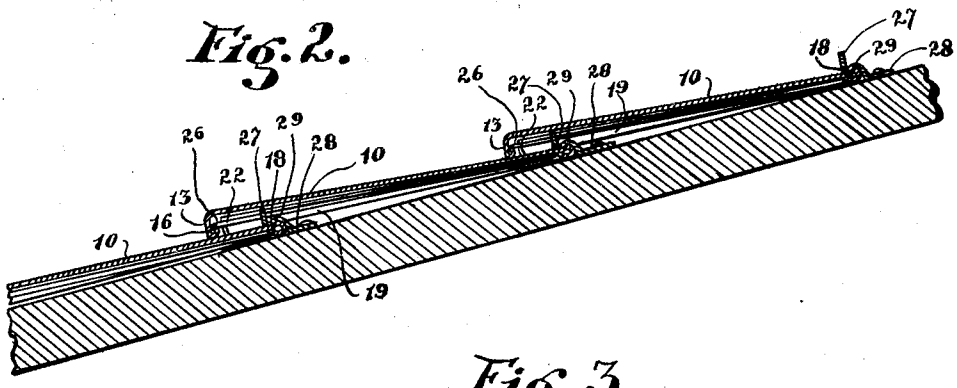


Fig. 3.

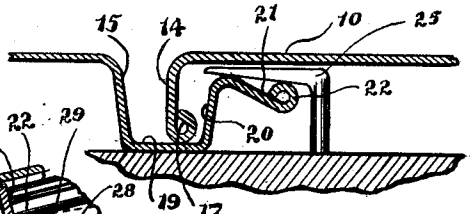
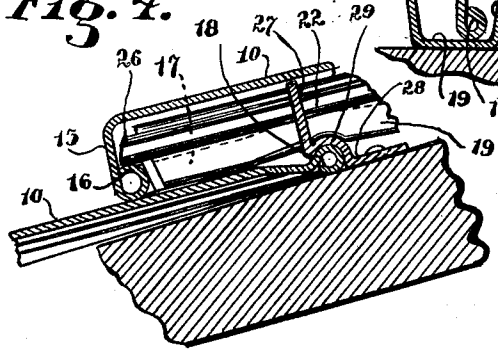


Fig. 4.



George L. Bennett
INVENTOR

BY Grover O. Wentworth
his ATTORNEY.

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Fig. 5.

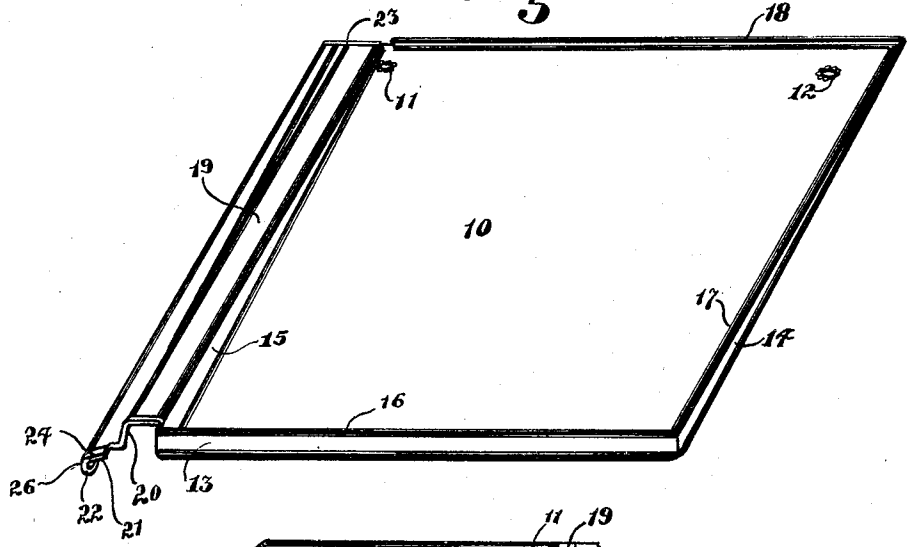


Fig. 7.

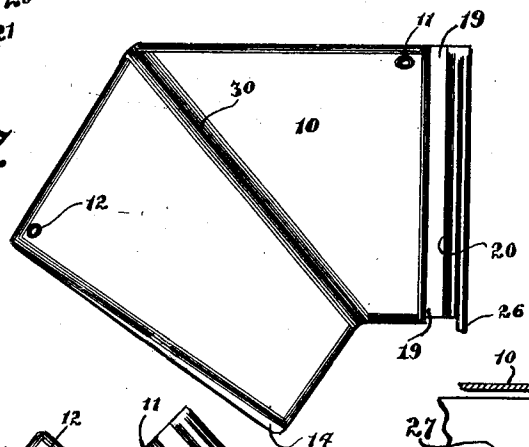


Fig. 6.

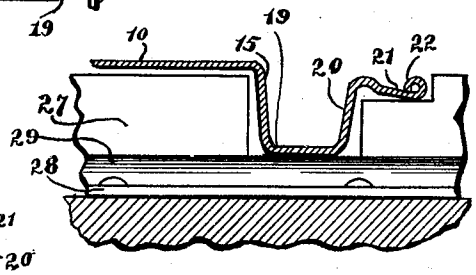
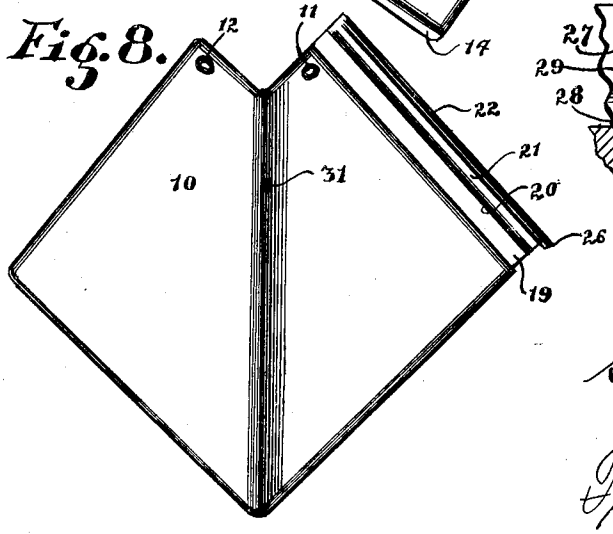


Fig. 8.



George L. Bennett

INVENTOR

BY Frank P. Wentworth

his ATTORNEY

Patented Sept. 13, 1932 1,876,597

UNITED STATES PATENT OFFICE

GEORGE L. BENNETT, OF CLEVELAND HEIGHTS, OHIO

SHEET METAL ROOF

Application filed June 7, 1928. Serial No. 283,471.

My invention relates to sheet metal roofs, and more particularly to a structure of this kind composed of a plurality of separate units, known as metal shingles or tiles, so combined as to afford as a whole an effective weathertight roofing.

Metal roofs formed of so-called metal shingles or tiles have heretofore been used to a considerable extent, such shingles or tiles having been produced by blanking and forming operations, and finished by being coated with enamel, ordinary porcelain enamel being used. The shingles or tiles have been provided with close fitting, interlocking seams at the side edges thereof, and have been secured in place by being nailed directly to the roof sheathing or decking.

All edges of such shingles or tiles have had a single thickness of the metal, presenting what might be termed raw edges, and experience has demonstrated that deterioration of the shingle starts at such raw edges, corrosion having the effect of causing the cracking and flecking of the coat of enamel finish from the shingle or tile, an unsightly and imperfectly watertight roof being the ultimate result.

Furthermore, in roofs of the character above referred to, there is a monotonous uniformity throughout, since the construction has been such as to necessarily require all shingles or tiles to have the same dimensions. Furthermore, cutting and fitting of the shingles or tiles at the ends of the different courses, or at hips or valleys, occurring in the roof was required. This cutting of the shingles or tiles, chipped the coat of enamel finish and required a special finishing job, and resulted in the aggregate in a considerable area of exposed metal, particularly subject to deterioration from erosion.

In all metal shingles or tiles heretofore used, notwithstanding that the coat of enamel surfacing was applied thereto by a dipping of the shingle or tile in its entirety in a bath of porcelain enamel, the edges of the metal have always been partly or wholly unprotected by the surface enamel coating, which condition was due in part to the failure of such edges to be properly covered because of the angularity due to a sharp shear at such edges, and in part to shrinkage of the coat of enamel from the sharp edges of the metal during the drying operation, whether this was at normal or elevated temperatures.

With the above conditions in mind, I have provided a roof structure in which uniform dimensions of the several shingles or tiles is unnecessary, excepting as to the interlocking portions of adjacent shingles or tiles of each course, and ordinarily of the underlying or top edge of the shingle or tile. While the interlock is so formed as to produce the artistic effect of spacing between adjacent shingles or tiles, the main purpose of this construction is to permit the relative adjustment of the different shingles in a course. Shingles or tiles of different widths and lengths may be used in a course, thus not only securing a desired artistic effect, but avoiding the necessity of any cutting and fitting at the eaves, at hips or valleys and minimizing adjustment at the interlocks.

Each interlock affords, adjacent each side edge of each shingle, a channel or trough ensuring effective drainage, and avoiding leakage, at this point, and is so formed as to prevent possible or material seepage of water across the interlock to beneath the shingles or tiles, either as a result of capillary attraction or of the action of the wind.

In addition to permitting the relative adjustment of adjacent shingles or tiles, when laying the roof, the interlock permits free expansion and contraction of the material of the butt portion of the shingles, and facilitates the laying of each course.

I have found that there is a tendency, particularly in a high wind, for the shingles or tiles to lift slightly adjacent the butts, and to correct this condition, I provide means operative adjacent the troughed portion of the interlock of each shingle or tile for holding it, adjacent its butt, firmly in position, and also through engagement of a portion of the interlock with a projection on the butt of the adjacent shingle, acting upon the latter to hold it against vertical displacement. Each shingle or tile thus has its butt held in engagement with the roof sheathing or deck-

ing, or with the surface of shingles or tiles in a lower course at each side edge thereof, by concealed means acting directly upon only one edge of each shingle or tile.

In conjunction with the individual shingles or tiles, I provide a dam secured directly to the roof sheathing or decking which will effectively seal the upper end of each trough and the upper edge of each shingle or tile; which will materially aid in properly alining the shingles or tiles of each course and which will assist materially in securing a proper adjustment thereof to avoid the necessity for cutting and fitting.

The individual shingles or tiles are so formed as to present no sharp edges at any point thereof, unless there is an adjacent pocket in which fluid enamel will accumulate in sufficient quantity, during the coating operation, to avoid possible shrinkage, cracking or flecking of the surface enamel even though high grade vitreous enamels be used, and high temperatures are used in fusing or burning the finish.

With the exception of the formation of the body of the shingle or tile necessary to conform to hips or valleys, the same general construction is present in the various shingles or tiles used throughout the roof, thus avoiding flashings on the valleys and special work at the hips, it being possible to continue a course of the shingles or tiles right across a hip or valley.

The invention consists in the novel features of construction and combination of parts hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a perspective view of roofing embodying the invention;

Fig. 2 is a vertical section through a plurality of courses of the roofing shown in Fig. 1;

Fig. 3 is a sectional view of an enlarged detail transversely of the joint between adjacent shingles or tiles in a course;

Fig. 4 is an enlarged detail of the dam structure and overlying portions of the shingles or tiles of adjacent courses;

Fig. 5 is a perspective view from the bottom of one of the shingles or tiles;

Fig. 6 is an elevation of a portion of the dam and the trough of a shingle or tile in relation thereto in cross section;

Fig. 7 is a plan view of a valley shingle or tile; and

Fig. 8 is a plan view of a hip shingle or tile.

Like numerals refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawings, the roof construction includes therein a plurality of shingles or tiles, each of which, except as to its configuration and dimensions, is the same as every other, the shingles or tiles of each course being so assembled in relation to each other and to the roof sheathing or decking and to adjoining courses, as to secure an attractive, artistic, watertight, durable roof.

Since the essential characteristics of each shingle or tile are identical with every other, a description of but one of them will be entered into.

The shingle or tile is made of sheet metal, preferably sheet steel, having a weather face consisting of a substantially flat portion 10, having nail openings 11 and 12 adjacent the upper edge thereof to facilitate the nailing of the shingle in position upon the sheathing or decking. To secure the effect of a butt of the desired thickness, and a progressively increasing thickness of the shingle or tile from the upper edge toward the butt, the metal forming the shingle or tile has a butt flange 13 and side flanges 14 and 15 extended at substantially right angles to the weather face 10. These flanges may be formed either by a drawing or a bending operation, care being taken, however, to have a curvature, preferably of short radius, at the juncture of the face 10 and the butt flange 13 and side flanges 14 and 15. These side flanges 14 and 15 have a depth greater than the thickness of the shingle or tile at the upper edge thereof, and this depth progressively increases toward the butt flange, their depth at their point of juncture with this flange being the same as that of said flange.

If a drawing operation be resorted to, the shingle or tile will have a seamless construction. If the flanges, however, are formed by bending, the seams are closed by a welding operation. Whether the point of joinder of the butt and side flanges be produced as a result of drawing or welding, care should be taken to have the juncture of such flanges and the weather face curved so as to avoid any sharp angularity between the weather face 10 and these flanges, and between the flanges 13, and 14 and 15 respectively.

When forming the sheet metal blank from which the shingle or tile is made, sharp angles at the edges of the blank cannot be avoided, but, as will more fully appear hereinafter, the presence of such angles will prevent a proper coating of the shingle with porcelain enamel. To correct this condition, I preferably form a closed bead 16 at the lower edge of the butt flange 13, a closed bead 17 at the lower edge of the side flange 14, and a closed bead 18 at the upped edge of the weather face 10. All of these beads are formed inwardly of the several flanges and of the upper edge of the weather face 10. While such beads will impart additional rigidity to the flanges and to the weather face, reinforcement is not the primary function of such beads. While the curvature at the juncture of the weather face

10 and the butt and side flanges will avoid weakening of the shingle or tile along the lines of such juncture, the object of this formation is not primarily because of the mechanical production of the shingles or tiles.

Before proceeding with a description of the troughed interlock, it is desired to point out that because of the curvature at the juncture of the weather face 10, the butt flange 13 and the side flanges 14 and 15 and the closed beads 16, 17 and 18, there will be no shrinkage, cracking or flecking of the surface coating at any of these points, even though high grade vitreous enamels be used and the finishing operation be at a high temperature. The closing of the beads will have the effect of forming external pockets along the edges of the material where it is closed upon the flanges or upon the under side of the weather face 10 in which sufficient enamel will accumulate to prevent such shrinkage thereof, during burning, as will result in the exposure of any portion of the raw edge of the metal. Furthermore, these points will not be exposed to the elements.

The nail holes 11 and 12 also have metal upset around the edge thereof, securing an eyelet effect with its slight curvature which will ensure the enamel extending entirely about the wall of this opening in the same manner as it extends about the beaded edges of the various flanges.

The lower edge of the flange 15, instead of being provided with a closed bead, has formed integrally therewith, a troughed interlock section having a bottom 19 extending upon a curve of short radius from the lower edge of said flange 15, and provided with a side wall 20 also bent on a curve adjacent the trough bottom 19 and extended upwardly to slightly less than the height of the face of the top plate 10. The trough thus formed will be of progressively increasing depth from the upper edge of the weather face 10 to adjacent the butt flange 13, being at the top substantially flush with the upper surface of the said weather face 10.

The metal at the top of the side wall 20 is turned outwardly upon a curve, then formed downwardly slightly to form a supplemental trough 21, and the free edge thereof formed in a closed bead 22. It will be noted, by this construction, that the opposite edges of the bottom of the trough 19, the top of the side wall 20 thereof and the edge of the supplemental trough 21 and the bead 22 present no sharp angles. The metal at the opposite ends of the extension forming the trough and the supplemental trough is turned upon itself at 23 and 24 so as to avoid sharp angles at the edges adjacent the bead 18 and the bead 16 of the butt flange 13. The height of the wall 20 of the trough is slightly below the level of the weather face 10 adjacent the butt flange 13 to compensate for the thickness of the metal in the weather face of an adjacent shingle or tile, and at the same time to accommodate means securing the shingle or tile to the roof sheathing or decking without obstructing the auxiliary channel 21.

The troughed section between the side flange 15 and the side wall 20 may be of different widths so long as such is greater than the diameter of the bead 17, in order to not only secure the effect in a roof of spaced shingles or tiles, but to permit movement of the flange 14 and its bead 17 of one shingle or tile transversely of the trough of the adjacent shingle or tile when laying a course of the shingles or tiles.

It is to be noted that the exposed or top portion of the weather face 10 is without obstructions of any kind, and that the troughed construction of interlock described, acts only between adjacent shingles in the same course. Consequently, the shingles or tiles in each course do not require to be of any particular width, or to have any particular contour as to the butt. It is obvious, however, that the troughed section 19—20—21 of one shingle, and the beaded flange 14 of the adjacent shingle must be substantially parallel to secure the desired interlocking effect. This feature of uniformity in the various shingles, however, is concealed, and a completed roof presents no outward indications of the same characteristics in the different shingles.

The nail openings 11 and 12 are positioned adjacent the upper edge of the face 10, and one of them, as 12, is closely adjacent the edge flange 15 so as to act adjacent the portion of the shingle or tile stiffened by the troughed interlock section. This manner of securing the shingles to the roof sheathing or decking does not afford adequate resistance to the lifting action of the wind upon the shingles or tiles, so that it is desirable to provide means adjacent the butt flange 13 for holding the butt of the shingle down upon the sheathing or decking or upon a lower course of shingles or tiles.

To avoid the presence of openings through the shingle, except in the portion of same underlying the upper course, and at the same time to conceal the securing means, I provide a hooked member 25, the head of which overlies the supplemental trough 21. This will avoid the possible lifting of the shingle or tile adjacent the flanged edge 15 thereof, but it is impracticable to provide similar securing means adjacent the flanged edge 14. In order to hold this side of the shingle or tile against lifting action, I provide the extension forming the supplemental trough 21 and the bead 22 with an extended portion 26, adapted to engage the bead 16 of the butt flange 13 of an adjoining shingle or tile and hold the edge of said tile adjacent its flange 14 against lifting action through the medium

of the hooked member 25 operative upon the adjacent shingle or tile.

By reason of the general dished effect within each shingle or tile, the contact area between the shingles or tiles in one course, and those in another course, is limited to the beaded flanges 13 and 14 and the bottom 19 of the troughed section of the interlock of each shingle or tile. While the interlock construction will avoid the accumulation of water within the interlock or between same and the weather face 10 of the shingle or tile upon which it rests, there is the possibility of water, if accompanied by a high wind, being forced beneath the butt of the shingles or tiles of one course, and along the underlying faces 10 of the course below. To avoid such water passing across the upper edge bead 18 and thus passing between the shingles or tiles and the roof sheathing, tar paper or decking, I provide a particular construction of dam which not only effectively prevents such flow of the water, but will materially assist in properly alining the shingles or tiles of each course, and at the same time, the adjustment of the shingles and tiles in fitting them in relation to each other to avoid cutting and fitting of an end tile of the course.

This dam consists of an angular metal strip 27, the foot 28 of which is adapted to be nailed to the roof sheathing or decking. Adjacent this foot the strip is provided with an offset bulge 29 adapted to receive the bead 18. Preferably, the strip 27 will extend continuously throughout the entire length of the course to be laid. It may, however, be made up of separate sections. Owing to the irregularity in the width and the setting of the shingles or tiles, I prefer to make this strip of a soft metal, such as zinc, which may be readily cut, by means of a special hand tool, to provide space for the passage of the main troughed portion of the shingles of a course adjacent that co-operating with said strip. This dam strip will afford an effective barrier to surface water being blown along the weather face of the shingle or tile with which it co-operates, since the portion 29 overlays the beaded upper edge 18 of the shingles or tiles of that course, and the portion above the bulge 29 extends at substantially right angles to the shingles or tiles into close proximity to the under face of the weather face of the shingles or tiles of an upper course.

Heretofore, I have referred more particularly to shingles or tiles in the straight run of the course. The same general construction of shingle or tile, however, may be used at the valleys and hips of a roof so that the valley or hip shingles or tiles may be included in a continuous course. It is merely necessary that such valley or hip shingles or tiles should have their butt so formed as to conform to the angle due to the changing of the direction of the course, and that the tile should be depressed or raised according to whether it is a valley tile or a hip tile. The construction of the various butt and side edge flanges, trough and upper edge in the valley or hip shingles or tiles is the same as with the straightaway shingles or tiles.

A valley tile is shown in Fig. 7, the depressed portion being indicated at 30 and the other portions having reference numerals corresponding with the same parts in a straightaway tile.

A hip tile is shown in Fig. 8, the raised ridge portion being indicated at 31, and the various flanges, trough, etc., being indicated by the same reference numerals as the straightaway tile.

The manner of laying, and the results secured by, a sheet metal roof embodying my invention, is substantially as follows:—

The common practice, in laying a course of shingles or tiles of the general type to which the invention relates, is to work from left to right, and the construction of the shingles or tiles shown in the drawings is such as to permit this general practice to be followed. This, however, is a mere matter of choice and compliance with established practices.

It is also a common practice to provide gable shingles or tiles having one side edge flange of a depth to span and enclose the sheathing at the gables, and this practice may be followed with the shingles or tiles embodied in my invention, if desired. Since this construction is old in the art, it is not herein shown nor described in detail.

When laying the shingles or tiles embodied in my invention, the roofer first locates the metal dam strips 27 of the eaves course. These strips may be of any desired length convenient for handling, or as stated, may be of short lengths, and the effect of a continuous length secured when positioning the strips upon the roof.

When a sufficient length of the dam strips has been secured, shingles or tiles are placed with the upper edge thereof abutting against the dam strip and the bead 18 underlaying and interlocked with the offset bulge 29 of the strip. As each succeeding shingle or tile is thus positioned, its flange 14 is positioned in the trough formed by the flange 15, the bottom 19 and wall 20, before the upper edge thereof is forced into engaging relation with the dam strip 27. An entire course of the shingles or tiles, when this course is in the straightway, is laid before any of the shingles or tiles are secured in position. If a valley or hip is located in the length of the course, however, the laying of the shingles or tiles will extend merely to such valley or hip, unless it so happens that the width of the various shingles or tiles in the course is

such as to exactly fill the entire course, which will, however, seldom occur, particularly when the shingles or tiles are of varying widths.

If it be found that the aggregate width of the various shingles or tiles of a course is in excess of the length of the course, if the variation is not too great, the shingles or tiles in the course may be adjusted in relation to each other by movement of the flange 14 laterally of the trough in which it is seated, which adjustment will take care of a considerable variation between the aggregate lateral dimensions of the shingles or tiles and the length of the course. This affords great flexibility and avoids any possible necessity for the cutting and fitting of the shingles or tiles. The aggregate adjustment required will always be less than the width of a narrow shingle or tile, and by distributing the adjustment throughout the various interlocks in the course, an adjustment of several inches can be secured without any perceptible variation in the gap between adjacent shingles or tiles, which gap it is desired to preserve in order to maintain artistry in the roof.

If there be a shortage in the aggregate width of the shingles or tiles of a course, as compared with the length of the course, this will require correction by the removal of some shingles or tiles of the course and the substitution of wider shingles or tiles therefor.

The use of the dam strip 27 and the interlock between same and each shingle or tile will hold all of the shingles or tiles in position and at the same time permit them to be shifted laterally when adjustment is required. When the shingles or tiles have been properly fitted by adjustment, if necessary, then nails are driven through the openings 11 and 12 of the shingles or tiles respectively, beginning at the left of the course, the hooks 25 being secured to the sheathing or decking in relation to one shingle or tile before the nails are driven in the next shingle or tile, the latter being raised sufficiently to permit the driving of this hook.

In laying the second and succeeding courses, the same practice is followed, although with skilled workmanship, the extent of adjustment might not be as great in the later courses, although this depends in large measure whether the courses are of the same or different lengths, in which latter case the extent of adjustment may be the same as to different courses.

The result is a roof structure in which all of the safeguards against deterioration through corrosion, provided in the production of the shingles or tiles, are preserved in the roof structure. Furthermore, shingles or tiles of varying widths may be used in any course without regard to the widths of other shingles or tiles in the course, or of the shingles or tiles in adjacent courses, so long as a breaking of joints is adhered to. In fact, a roof embodying the invention may be so constructed, not only as to the individual shingles or tiles, but as to the locating of same when laying it, as to secure a degree of irregularity which is highly desirable from the architectural standpoint, both as to the spacing, width and contour of the different shingles or tiles.

By reason of the beaded edges about each shingle or tile, the protective enamel surfacing thereof is continuous, and no appreciably exposed or poorly covered metal will be present in the entire roof structure.

When laying the second and succeeding courses, the roofer may, by a special tool, cut away a portion of the dam strip 27 to accommodate the troughed interlock portion of each shingle or tile as he sets it in position, allowing sufficient space for the adjustment of any shingle or tile of that course.

It will be noted that, with the exception of this dam strip, each course of shingles or tiles is secured to the roof entirely independently of every other course, and that the shingles or tiles of each course are so secured to the roof sheathing or decking, and so interlocked by the hooks 25, the extended portions 26 and the beads 16, as to practically preclude the lifting of any single shingle or tile by the wind, and any possibility of lifting of all of the shingles or tiles of a course.

The unobstructed top of the weather face 10 permits the use of shingles or tiles of different widths, and the breaking of joints in one course with relation to those of another course, without regard to the width of shingles or tiles in such other course.

The dam strips 27 will serve as an effective barrier to prevent water being forced by the wind between the shingles or tiles of succeeding courses where it may pass over the upper edge of the shingle or tile to upon the roof sheathing. The protection against leakage of a roof from this source is much augmented by the inclosure of the beaded upper edge 18 of the shingle or tile by the offset bulge 29 of the dam strip 27. Since the cutout portion of said strip 27 occurs between the troughed interlocked sections of the course of shingles or tiles with which it co-operates, the upstanding angle of said strip affords an effective barrier at the upper end of each trough across which it extends to the full height of the flange. Furthermore, the troughed portion of the shingle or tile adjacent this flange will have very little depth, possibly less than an eighth of an inch.

The main trough of each interlock, of course, is exposed to the elements and affords an effective drain for water falling thereinto or flowing from the shingle or tile face. The

pitch of the roof will take care of the flow of water from this trough. It is possible, however, particularly in a driving rainstorm, that some water may be forced below the various flanges 14 and upwardly between same and the walls 20 of the troughs with which they co-operate. Such water, however, if it passes across the top of the wall 20, will merely enter the auxiliary trough 21, egress from which to below the adjacent shingle or tile of the course will be prevented by the bead 22. This auxiliary trough 21 also interrupts any capillary ducts which might result in seepage of water from the trough of one shingle of tile to below the adjacent shingle or tile.

By the use of valley shingles or tiles, as shown in Fig. 7, and hip shingles or tiles, as shown in Fig. 8, except for the necessity for adjustments of the straightaway shingles or tiles upon opposite sides of such valley or hip shingles or tiles, each course may be a continuous course throughout the roof structure where permissible. Such valley or hip shingles or tiles are installed in the same condition as when leaving the factory, there being no possibility of injury to the protective surfacing thereon during installation.

In a completed roof, the valley or hip shingles or tiles resist the attack of the elements upon the roof in the same manner as the straightaway shingles or tiles.

The various beaded edges of each shingle or tile, and the word "beaded" is herein used as meaning edges, the metal of which is turned upon itself to form a rounded surface, not only ensure continuity in the surface finish and the absence of partially or wholly unprotected sharp edges, but avoid the possibility of a metal to enamel joint between the shingles or tiles of an upper course and the weather faces of a lower course.

With the construction herein described, a short lapping of the shingles or tiles of different courses is permitted without likelihood of resulting leakage in the roof structure.

It is not my intention to limit the invention to the precise details of construction and combination of parts shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A sheet metal roof embodying therein metallic shingles or tiles having a vitreous coating comprising a weather face portion having nail openings adjacent the upper edge thereof, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile the bottom of said trough being on substantially the same plane as said side edge flanges, and an auxiliary trough along one edge of said other trough positioned in its entirety above the bottom of the trough, and means co-operating with said trough for securing the shingle or tile to the decking adjacent said butt.

2. A sheet metal roof embodying therein metallic shingles or tiles comprising a weather face portion, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile, and means securing each of said shingles or tiles in position, including therein a member engaging the trough forming means of each shingle or tile, and co-operating engaging projections upon the trough forming means of one shingle or tile and the butt flange of an adjacent shingle or tile.

3. A sheet metal roof embodying therein metallic shingles or tiles having a continuous enamel surfacing throughout and comprising a weather face portion, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile, said butt flange and one of said side edge flanges having beaded edges, whereby an imperfect enamel surfacing of such edges is prevented, and an auxiliary trough along one edge of said other trough, the free edge of said auxiliary trough having a beaded edge, whereby an imperfect enamel surfacing at such edge is prevented, and means securing each of said shingles or tiles in position, including therein a hooked member adapted to be secured to the roof sheathing or decking adjacent the butt flange of each shingle or tile, and a projection upon said auxiliary trough adapted to interlock with the beaded edge of the butt flange of an adjacent shingle or tile.

4. A sheet metal roof embodying therein metallic shingles or tiles having a vitreous coating comprising a weather face portion having nail openings adjacent the upper edge thereof, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile the bottom of said trough being on substantially the same plane as said side edge flanges, and all other portions of said trough being spaced away from the bottom of said trough, means co-operating with said trough for securing the shingle or tile to the decking adjacent said butt, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having openings therein for the passage of the trough of a tile.

5. A sheet metal roof embodying therein

metallic shingles or tiles comprising a weather face portion having a beaded upper edge, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile.

6. A sheet metal roof embodying therein metallic shingles or tiles having a continuous enamel surfacing throughout and comprising a weather face portion having a beaded upper edge and nail openings adjacent the said upper edge, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile the bottom of said trough being on substantially the same plane as said side edge flanges, and all other portions of said trough being spaced away from the bottom of said trough, said butt flange and one of said side edge flanges having beaded edges, whereby an imperfect surfacing of such edges is prevented, means co-operating with said trough for securing the shingle or tile to the decking adjacent said butt and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile and openings therein for the passage of the trough of a tile.

7. A sheet metal roof embodying therein metallic shingles or tiles comprising a weather face portion having a beaded upper edge, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile, means securing each of said shingles or tiles in position, including therein a member engaging the trough forming means of each shingle or tile, and co-operating engaging projections upon the trough forming means of one shingle or tile and the butt flange of an adjacent shingle or tile, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile.

8. A sheet metal roof embodying therein metallic shingles or tiles having a continuous enamel surfacing throughout and comprising a weather face portion having a beaded upper edge, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile, said butt flange and one of said side edge flanges having beaded edges, whereby an imperfect enamel surfacing of such edges is prevented, and an auxiliary trough along one edge of said other trough, the free edge of said auxiliary trough having a beaded edge, whereby an imperfect enamel surfacing at such edge is prevented, means securing each of said shingles or tiles in position, including therein a hooked member adapted to be secured to the roof sheathing or decking adjacent the butt flange of each shingle or tile, and a projection upon said auxiliary trough adapted to interlock with the beaded edge of the butt flange of an adjacent shingle or tile, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile.

9. A sheet metal roof embodying therein metallic shingles or tiles having a continuous enamel surfacing throughout and comprising a weather face portion, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flanges of an adjacent shingle or tile, the upper edge of said weather face portion, said butt flange and one of said side edge flanges having beaded edges, whereby an imperfect enamel surfacing of such edges is prevented, and an auxiliary trough along one edge of said other trough, the free edge of said auxiliary trough having a beaded edge, and the juncture of said flanges and said weather face portion, and the bottom and top of said main trough, being curved, whereby an imperfect enamel surfacing at such edge and such juncture is prevented, means securing each of said shingles or tiles in position, including therein a hooked member adapted to be secured to the roof sheathing or decking adjacent the butt flange of each shingle or tile, and a projection upon said auxiliary trough adapted to interlock with the beaded edge of the butt flange of an adjacent shingle or tile, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile.

10. A sheet metal roof embodying therein metallic shingles or tiles having a continuous enamel surfacing throughout and comprising a weather face portion, a butt flange, side edge flanges, and means adjoining one of said side edge flanges forming a trough of a width to receive and permit lateral adjustment of the side edge flanges of an adjacent shingle or tile, the upper edge of said weather face

portion, said butt flange and one of said side edge flanges having beaded edges, whereby an imperfect enamel surfacing of such edges is prevented, and an auxiliary trough along one edge of said other trough, the free edge of said auxiliary trough having a beaded edge, and the juncture of said flanges and said weather face portion, and the bottom and top of said main trough, being curved, whereby an imperfect enamel surfacing at such edge and such juncture is prevented, said weather face portion adjacent the upper edge thereof, and adjacent said side edge flanges respectively, having nail openings therethrough, the metal about said nail openings being formed upon itself to afford a curved surface preventing an imperfect enamel surfacing about said nail openings, means securing each of said shingles or tiles in position, including therein a hooked member adapted to be secured to the roof sheathing or decking adjacent the butt flange of each shingle or tile, and a projection upon said auxiliary trough adapted to interlock with the beaded edge of the butt flange of an adjacent shingle or tile, and a dam strip extending across, and in abutting relation to, the upper edge of the shingles or tiles of a course, said dam strip having a bulging offset portion adapted to receive the beaded upper edge of the shingle or tile.

11. A sheet metal roof embodying therein rigid metallic shingles or tiles having a vitreous coating and comprising a weather face portion, a wide butt flange and side flanges of progressively increasing depth from the top of the weather face toward said butt flange, a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile formed of metal extending from and throughout the length of the lower edge of one of said side flanges, the bottom of the trough throughout being in the plane of the lower edge of the side flange, and a flange projecting laterally from the top edge of said trough member, whereby water overflowing from said trough is prevented from passing to the roof decking, means co-operating with said tile adjacent the top thereof for attaching the tile to the roof decking, and means co-operating with said trough and its laterally projecting flange preventing the lifting of the butt of the tile from the roof decking.

12. A sheet metal roof embodying therein rigid metallic shingles or tiles having a vitreous coating and comprising a weather face portion, a wide butt flange and side flanges of progressively increasing depth from the top of the weather face toward said butt flange, a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile formed of metal extending from and throughout the length of the lower edge of one of said side flanges, the bottom of the trough throughout being in the plane of the lower edge of the side flange, and a flange projecting laterally from the top edge of said trough member, whereby water overflowing from said trough is prevented from passing to the roof decking, the upper edge of said laterally projecting flange, said butt flange and one of said side flanges each having a beaded edge, whereby an imperfect enamelled surfacing of such edge is prevented, means co-operating with said tile adjacent the top thereof for attaching the tile to the roof decking, and means co-operating with said trough and its laterally projecting flange preventing the lifting of the butt of the tile from the roof decking.

13. A sheet metal roof embodying therein rigid metallic shingles or tiles having a vitreous coating and comprising a weather face portion, a wide butt flange and side flanges of progressively increasing depth from the top of the weather face toward said butt flange, a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile formed of metal extending from and throughout the length of the lower edge of one of said side flanges, the bottom of the trough throughout being in the plane of the lower edge of the side flange, and an auxiliary trough of substantially the same length as, and projecting laterally from the top edge of, said other troughed member, whereby water overflowing from said trough is prevented from passing to the roof decking, the upper edge of said auxiliary trough, said butt flange and one of said side flanges each having a beaded edge, whereby an imperfect enamelled surfacing of such edge is prevented, means co-operating with said tile adjacent the top thereof for attaching the tile to the roof decking, and means co-operating with said auxiliary trough preventing the lifting of the butt of the tile from the roof decking.

14. A sheet metal roof embodying therein rigid metallic shingles or tiles having a vitreous coating and comprising a weather face portion having a beaded upper edge, a wide butt flange and side flanges of progressively increasing depth from the top of the weather face toward said butt flange, a trough of a width to receive and permit lateral adjustment of the side edge flange of an adjacent shingle or tile formed of metal extending from and throughout the length of the lower edge of one of said side flanges, the bottom of the trough throughout being in the plane of the lower edge of the side flange, and an auxiliary trough of substantially the same length as, and projecting laterally from the top edge of, said other troughed member, whereby water overflowing from said trough is prevented from passing to the roof decking, the upper edge of said auxiliary trough,

said butt flange and one of said side flanges each having a beaded edge, whereby an imperfect enamelled surfacing of such edge is prevented, means co-operating with said tile adjacent the top thereof for attaching the tile to the roof decking, and means co-operating with said auxiliary trough preventing the lifting of the butt of the tile from the roof decking.

In witness whereof I have hereunto affixed my signature this 5th day of June, 1928.

GEORGE L. BENNETT.