Building Craftsmanship

IN BRICK AND TILE AND IN STONE SLATES

Nathaniel Lloyd

CAMBRIDGE

BUILDING CRAFTSMANSHIP
IN BRICK AND TILE
AND IN STONE SLATES

by

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PREFACE

I HOPE this little book may prove helpful to that daily increasing section of the public, lay and professional, which appreciates good craftsmanship.

I wish to express my profound gratitude to Sir Edwin Landseer Lutyens, R.A., who first inspired me to observe, practise and make known old and new ways of "right building"; also my sincere thanks to another friend, Mr H. Greville Montgomery, Hon. A.R.I.B.A., editor of *The Brick Builder*, etc., and to the Architectural Press, Ltd., whose loans of blocks have made possible the publication of this volume at a moderate price.

NATHANIEL LLOYD

GREAT DIXTER
NORTHIAM, SUSSEX
March 1929

CRAFTSMANSHIP

THERE are buildings which charm us: others leave us cold. Often we cannot detect the elements which produce results that fill us with a sense of delight and satisfaction or those which have the contrary effect or, at least, which fail to inspire pleasure. How often do old buildings appeal to us and how seldom new ones! Amongst architects whose works possess the charm of old work is Sir Edwin L. Lutyens, one of the few living men to have penetrated the veil and discovered for himself those qualities which make old buildings what they are and who has succeeded in applying the same principles to his own works. Such subtle qualities are particularly noticeable in domestic buildings, in which we are quick to see their influence upon the whole, although unable to see "how it is done". Even those who are able to refer to building textbooks get no assistance, for none of them enter into such refinements, nor, indeed, trouble to expound them. Yet the thirst for such knowledge is apparent in the young Architect who has passed through the schools with distinction, in the Estate Agent who has to design cottages and estate buildings, in the Builder who aspires to something beyond the common practice, and especially in the Layman who contemplates having a house built for his own occupation and would appreciate those little touches, not necessarily entailing increased expenditure, which in some mysterious way confer charm and distinction upon a home.

For each and all of these, this book has been written. It tells what the eighteenth century book-writers would have called the "secrets" of good building, few of which are to be found in other books. They include illustrations from works of Sir Edwin Lutyens and other architects as well as examples from works of the old builders, now forgotten. Many illustrations are by photographs taken "close up", showing each stage of the work as well as the completed job. Where it was thought that greater clearness could be secured by measured drawings, these have been added.

Briefly, this may claim to be the first technical work to take cognisance of those elements which produce charm of effect in building construction.

CONTENTS

I. TILED ROOFS

FEW, if any of us, can have failed to be captivated by the charm of old house roofs hung with plain tiles, the hips covered with "Granny" bonnets, set in mortar and crowned with semi-circular ridges. Time has done much for these roofs. He has softened their outlines, undulated their slopes and clothed them with lichens in his livery of green and purple and gold. There are, however, other factors, such as the materials of which the roofs are composed, and the manner in which they are constructed, which gave Time a good basis upon which to work. It may be of interest to consider exactly to what these old roofs owe their charm and how far it is possible to secure at least part of it for modern buildings.

PITCH

Many old roofs had a pitch of 60 deg., seldom less than 55 deg. That of the modern roof is generally 45 deg., which is the flattest pitch the textbooks allow for plain tiles. Unfortunately, a pitch of 45 deg. is the most unpleasing of all pitches. It is that which Sir Edwin Lutyens once described as "the ugly angle". A pitch of 30 deg. or less, for slates, if furnished with deep eaves, is satisfactory; 50 deg. for tiles is on the border line, but 45 deg. is anathema and must be avoided. A safe and pleasing pitch is 55 deg. Actually, 54 deg. 45 min. will be found practicable. This is an angle to which I shall refer again later, and is one for which it is convenient to have a set square made. It will be found that the other angle of this square, viz. 35 deg. 15 min., gives a good angle for the flatter pitch formed by the sprocket pieces (fig. 11) so the use of this square will facilitate quick, accurate and satisfactory detailing.

There is one detail which I have observed requires a pitch of 60 deg., and that is the little triangular gable, like that in fig. 3, where the pitch is 54 deg. 45 min., and is too squat entirely to please the eye. If the roof pitch were flatter still, the effect would be more unpleasing, just as the steeper pitch of 60 deg. is more charming. Gablets in old cottage roofs are generally found in roofs of this pitch.

In old farmhouses one frequently sees the main roof carried down at some point from second-floor to first-floor level, to cover an extension of the ground floor for scullery or other offices. Probably with a view to obtaining greater floor area for the ground floor extension and possibly, also, with an eye to effect, the roof pitch of such extensions was always a little flatter (5 deg. perhaps) than that of the main roof. This change of pitch produced a very pleasing angle in the roof slope, the value of which may be seen by comparing figs. 5 and 6. Such change of pitch would be less necessary, however, from the visual standpoint, had the eaves at the bottom of the roof extension been swept to a bellcast by the use of sprocket pieces, as in figs. 3 and 4.

EAVES

This device (figs. 1, 2 and 11) of producing that upward sweep at the eaves termed bellcast by means of an eaves lath or tilting fillet for a slight tilt and by nailing sprocket pieces on the rafters for a greater sweep, though not always employed, is an ancient one. By the use of sprocket pieces to produce deep eaves, the projection is obtained with economy of rafter length at the expense of short pieces of quartering. An excellent and economical bellcast is produced by the use of pieces of 4 in. × 2 in., cut diagonally out of 8 in. lengths. Sprocket pieces also facilitate the setting of the wall plate well within the centre line of the wall and the resulting change to flatter pitch towards the eaves has the effect of making the lower edges of tiles *bite* closely against the tiles under them, so securing closer union just where it is most wanted. Such bite of the lower edges is further accentuated

FIG. 1. Middlefield, Great Shelford, Cambs., by Sir E. L. Lutyens, R.A.

FIG. 2. Kitchingham Farm, Robertsbridge, Sussex. Old-fashioned roof treatment.

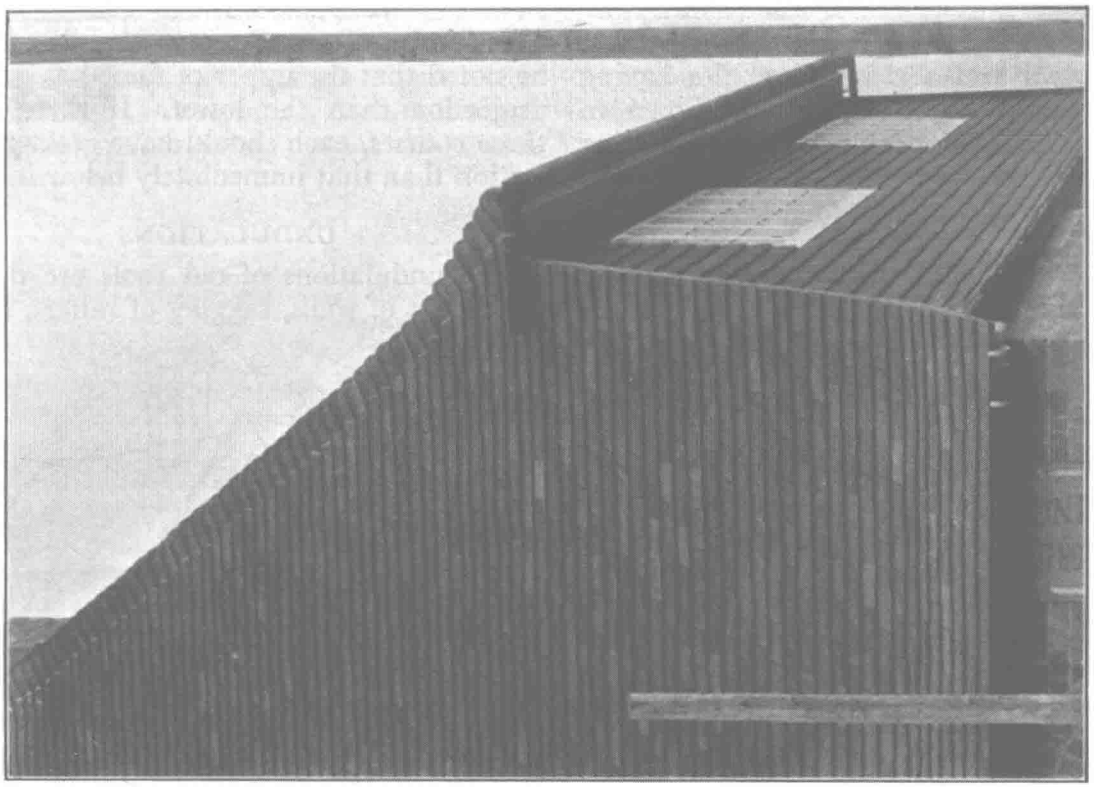

FIG. 4. Hip, verge and eaves.

FIG. 3. Gablet, hip and verge treatments.

by the eaves lath or tilting fillet and by the under-tile of the eaves course being bedded upside-down and also by these tiles having a pronounced set or curve, as shown in figs. 9, 11. The importance of the pleasing curve produced by such eaves-treatment can hardly be over-emphasised.

These unsymmetrical houses seldom had the eaves of all elevations at the same level (where there were angle posts, the wall plates met at different levels), nor were gables carried down exactly to meet the eaves. The treatment of fig. 7 is certainly more pleasing than that of the more conventional one in fig. 8, yet the former is seldom adopted in modern work.

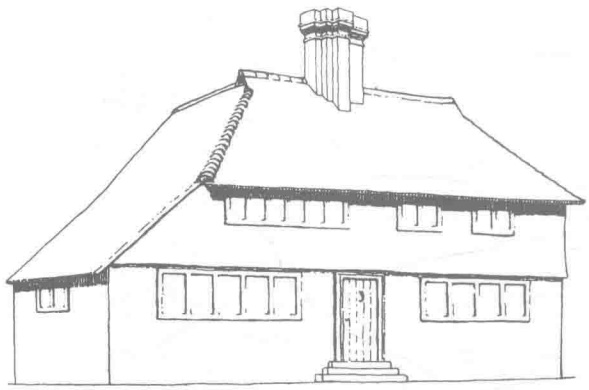

FIG. 5. Right.

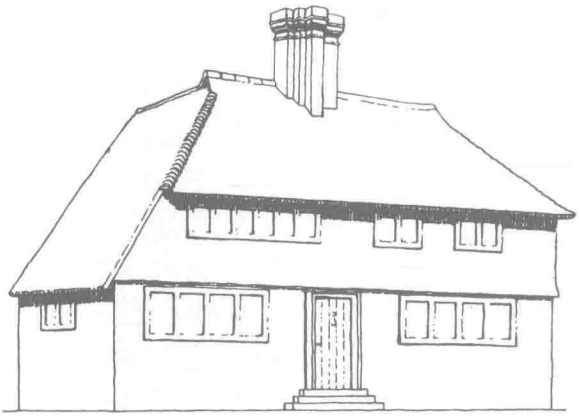

FIG. 6. Wrong.

In fig. 9 the facing of the 11 in. wall is finished with a three-course tile creasing. This rises the height of one brick course, but a single or double tile-creasing course is often conveniently introduced where something less than a whole brick course is required. In this drawing, also, a tile soffit is shown. This consists of two tile courses, and it should be noted that the upper of these has greater projection than the lower. If there were three courses, each should have greater projection than that immediately below it.

UNDULATIONS

The undulations of old roofs are due to settlement of walls, sagging of rafters, decay of rafter feet, sagging of tile laths or similar causes. Where a partition wall happens to have been carried up to the roof, the latter is supported at that point, though it may sink on each side and a hump is formed in the ridge and continued down the slope, as may be seen in the middle of the big roof of fig. 2. There is a limit to be observed in copying such effects, but the judicious use of 2 by 2 in. counter battens, nailed on the rafters at irregular intervals, before nailing the tile battens will prevent excessive uniformity.

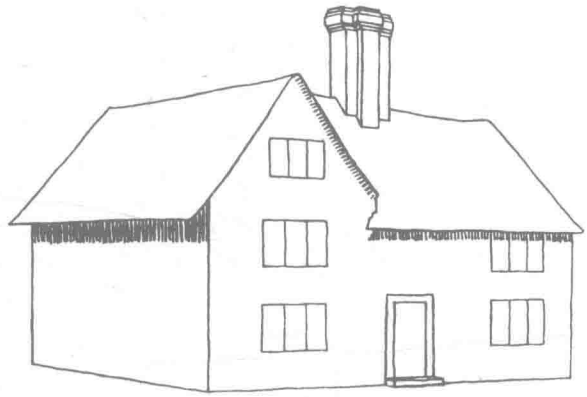

FIG. 7. Right.

FIG. 8. Wrong.

Where the line of an old roof is continued over a new addition it is particularly necessary to adopt such treatment, without which an extremely hard and ugly looking change of roof slope may result.

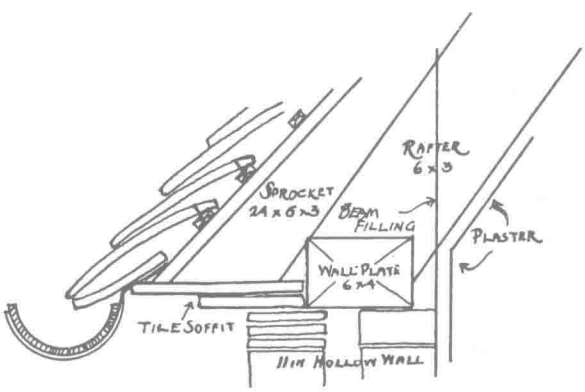

FIG. 9. Detail of eaves of a main roof.

Old tiles varied more than do even hand-made modern tiles, and the holes, with their wooden pins, were more irregular than nibs or nails. They were hung on riven oak laths, which were not precisely straight as are sawn battens. The combination of these factors produced variety which is much more pleasing than the mechanical accuracy of modern tiling. This, to some extent, may be overcome in marking off the gauge rod, which is a batten as long as the distance from ridge to eaves. Across it the tiler draws pencil lines the exact gauge his tiles are to be hung. If this is $3\frac{1}{2}$ in. gauge, the lines will be that distance apart, and this batten, laid on the roof, guides the nailing of the tile battens or laths. To direct the tilers to vary the gauge is inadvisable, but if the gauge rod be marked for them, they will follow it slavishly. Variety may be introduced into the marking of the gauge rod so that the gauge is often a little more or a little less than $3\frac{1}{2}$ in., thus, starting at the eaves: $3\frac{1}{2}$, $3\frac{1}{2}$, $3\frac{1}{4}$, $3\frac{3}{4}$, $3\frac{3}{4}$, $3\frac{1}{4}$, $3\frac{1}{2}$, etc. The same number of courses will result, without mechanical regularity and the efficiency of the roof covering will not be materially affected. The roof in figs. 3, 4, 12, was treated in this way.

Old tiles were never made flat, but were curved in their length and often in their width. This curving is sometimes called the "set" or "camber" of a tile, or a tile is said to have "housing" in its length or to be "hatched" in its breadth. The curve in length is valuable, as has already been pointed out, in causing the lower edge of a tile to bite down closely upon that under it, and so prevent driving rain or snow from blowing up underneath the tiles. The curve in width has a contrary effect: it is less common, but it does produce a happy effect of variety in the roof surface.

COLOUR AND TEXTURE

Perhaps the most important visual qualities in tiles are good colour and rough texture. No colours can compare with rich glowing reds. There is a large range of good reds, avoiding pale orange on the one hand, and bluish-purples on the other. What are

FIG. 10. Houses at Biddenden, Kent. Tile roof swept over oriel window.

called "antique" tiles (generally dull browns devised immediately to produce roofs of subdued colourings), are at their best when newly hung. As time passes, they become more and more sombre, and never assume the delightful colourings of the old roofs. If, however, red tiles (varying in tone according to the extent each has been fired) are used, the first rawness wears off in less than a couple of years; in five years they have acquired a beautiful variety of tones and colours, and each year thereafter (if their texture is good) they assume more variety of colour in browns, purples, golds, greens and greys of lichens and mosses—according to the aspect—through which the original reds of the burnt clay glow in the most delightful way.

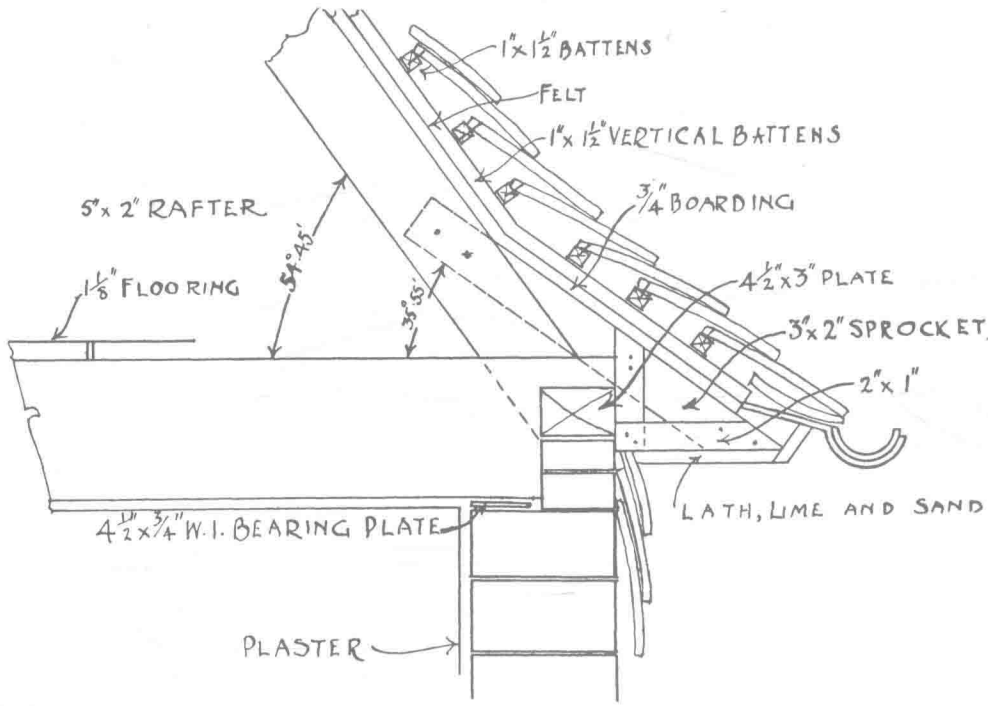

FIG. 11. The critical points of bellcast to roof and eaves treatment and finish of wall-tiling. To soften the angle at change of pitch, the fourth course bridges the angle.

To achieve such results, it is essential the tiles should have the right kind of surface upon which Time may do his beneficent work. This is so easy to obtain that it is surprising it should so often be lacking. The texture of the old tiles was got by the use of coarse sand for coating the clot of clay and sprinkling the mould. Often the sand contained tiny pebbles. In firing the tiles, the sand, which had become impressed into the surface of the clay, fell out, leaving just that roughness of surface which we call good texture and upon which lichens and mosses quickly grow. Such texture is incomparably superior to rough surfaces, such as are produced on bricks by scratching with wires and by other artificial devices.

The detail of eaves (fig. 11) shows 1 by 1½ in. counter battens on felt over rough boarding. An alternative is to substitute ordinary laths (which are cheaper) for these vertical battens as it is only necessary the tile (horizontal) battens should clear the felt that moisture may run down and out at the eaves.

Fig. 10 shows a practical and picturesque way of sweeping roof tiles over an oriel window.

VERGES

Modern practice is to use tile-and-a-half tiles in alternate courses at verges, etc., and certainly these produce a stronger result than the old method of employing half-tile "straights". When these tile-and-a-half tiles

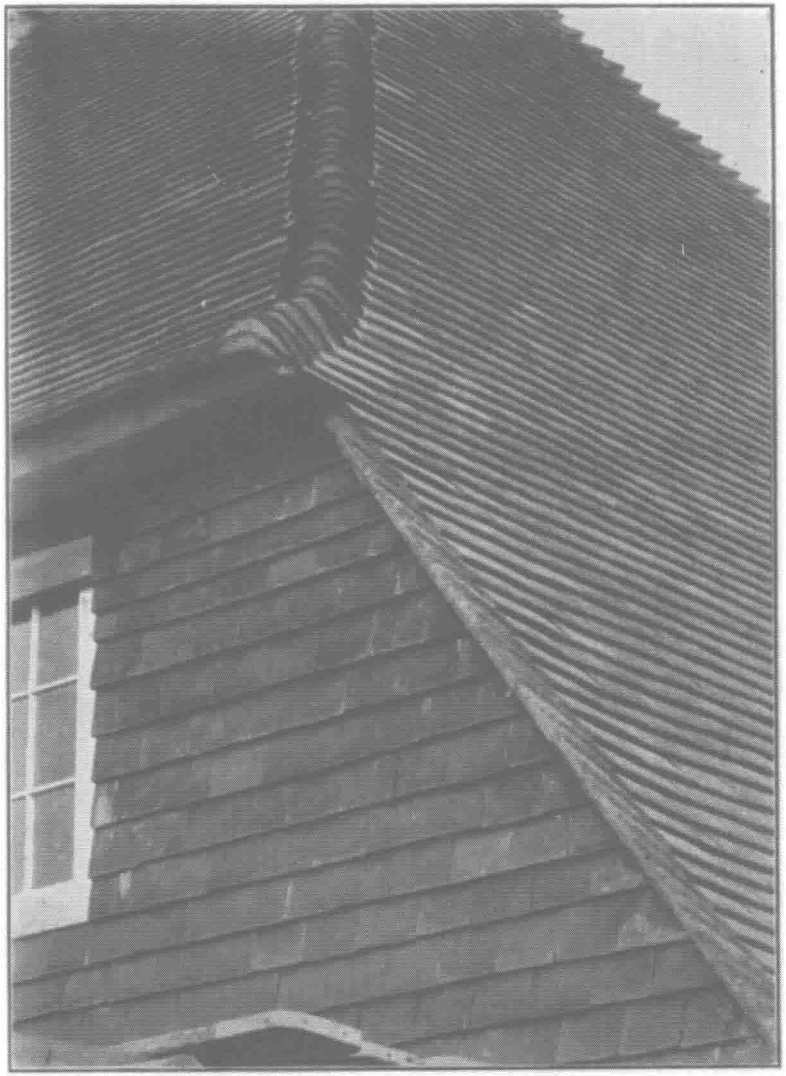

FIG. 12. (*a*) Right—and strong verge with undercloak tiles. (*b*) The board over the head of the window frame temporarily supports the heading course of wall tiles bedded in cement.

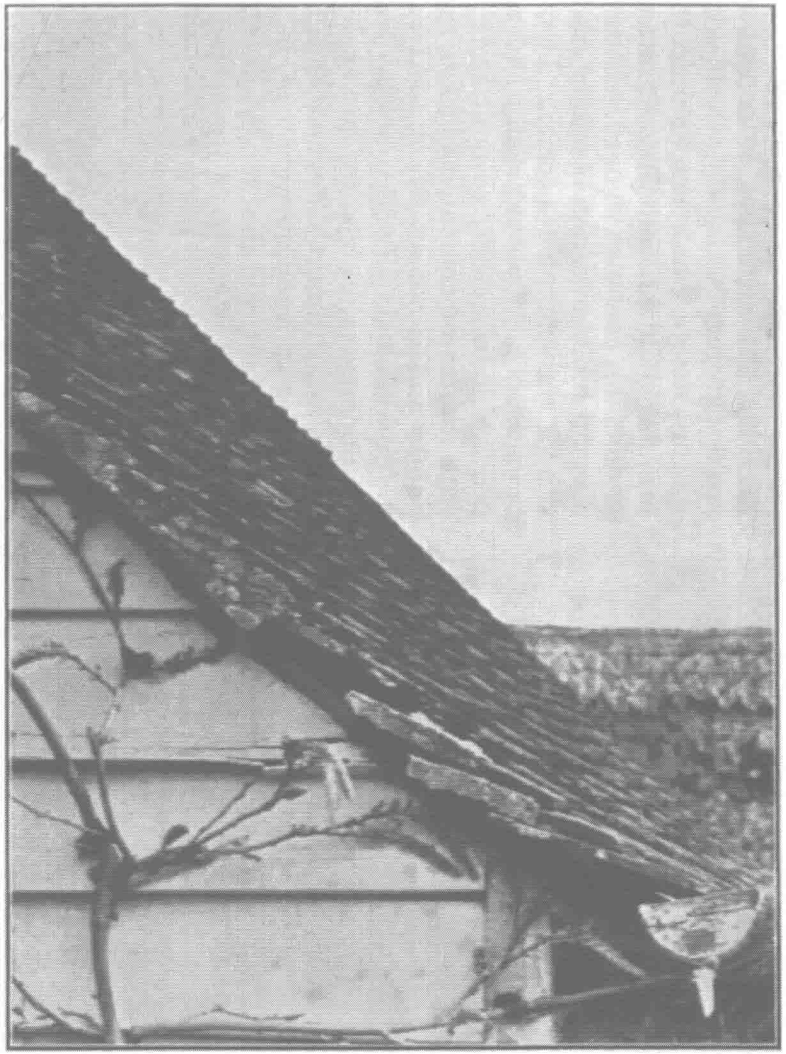

FIG. 13. Wrong—and weak verge without undercloak.

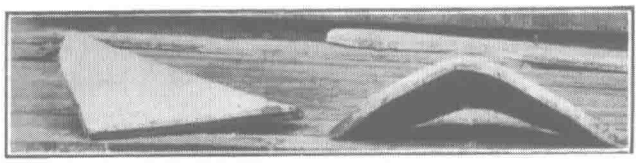

FIG. 14.

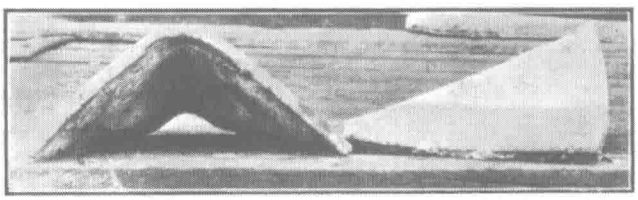

FIG. 15.

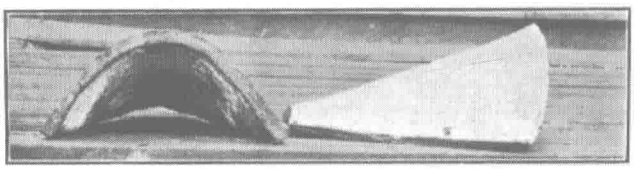

FIG. 16.

match the other tiles, as in fig. 4, they are tolerable, but when they do not match, they are disfiguring.

From no roof, however finely cut the job may be, should be omitted the use of a tile undercloak, as shown in fig. 12. The economy effected by its omission is trifling, the necessity for earlier repair is certain. The verge is a weak spot both structurally and as being penetrable by weather. Rendering the verge with mortar or cement, as in fig. 13, is unsightly and is not an efficient substitute for the undercloak. Besides strengthening it, the undercloak, by slightly raising the verge, throws away from it the water flowing down the roof, and so prevents it being driven by wind between the verge and the wall. Incidentally, it produces a graceful, though slight, upward sweep at the verge which the photographs do not clearly show.

Where the use of sprocket pieces or of an eaves lath produces an upward curve at the eaves, tiles having the same curve, when laid

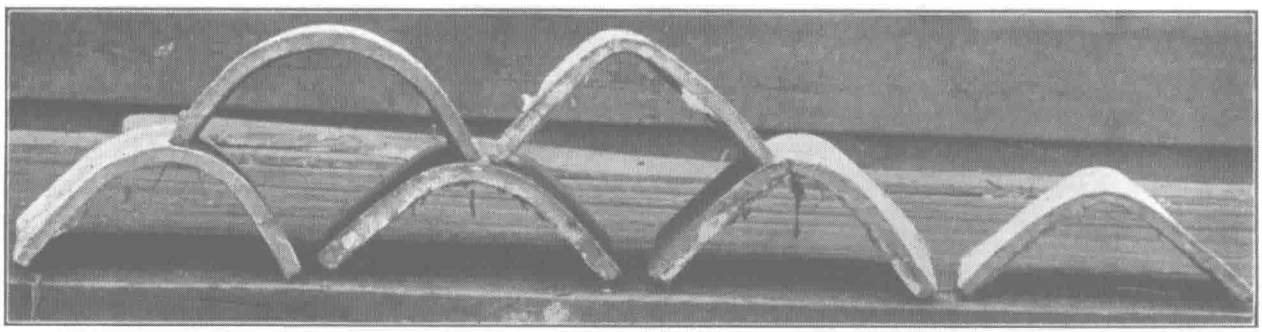

FIG. 17.

FIGS. 14–17. Various shapes of hip and ridge tiles.

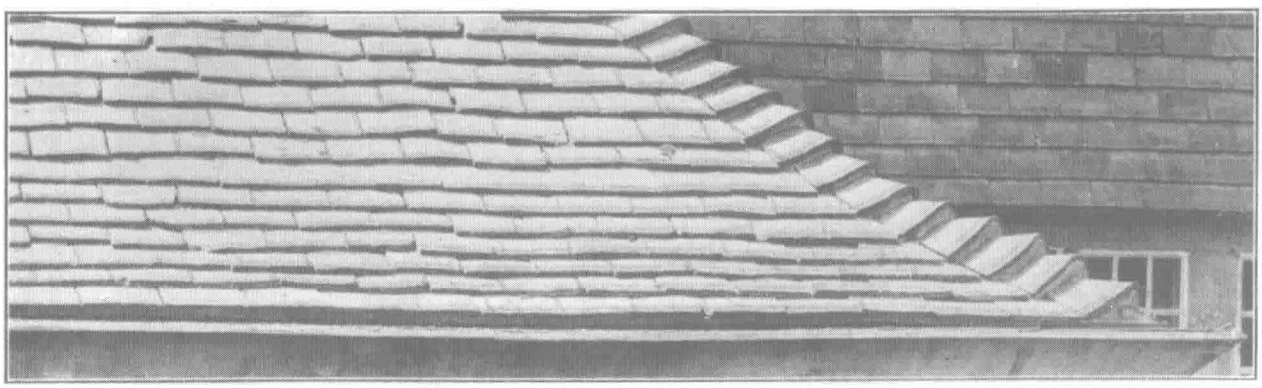

FIG. 18. "Granny" bonnet hip tiles well set up and swept to a good bellcast.

concave side up, should be used for the undercloak course, as may just be seen near the foot of the illustration in fig. 3.

Verge tiles should be bedded in hair mortar or cement as they are laid, and care taken that the mortar does not soil the tile edges, which should be left clean and red. To secure complete union between mortar and tiles, the tiles at eaves, hips, verges and ridges should be saturated with water when bedded, but it is always difficult to get workmen to do this. The verge of a large gable may project fully 3 in. beyond the wall face, i.e. about half the width of a tile. Of course, small gables, as of dormers, will require less projection and, in practice, it will be found that, where walls are hung with weather tiling, the thickness of this reduces the effective projection of the roof verge to less than 2 in.

HIP TILES

The current practice of making hip tiles exactly to the pitch of the roof, robs it of much of the charm imparted by the old-fashioned "Granny" bonnet hip tiles. Figs. 14 and 16 show front and side views of each type. Fig. 15 is a hip tile, of curve between the two. Figs. 3, 4, 12 show "Granny" bonnets on a roof, which has deep sprocketed eaves over the first floor windows in front, but where the side roof is continued down over the ground floor. As the sprocket pieces can only be nailed to the front rafters, the hip tiles must sweep round from the hip rafter to the front, as shown in figs. 3, 12. This particular case often proves puzzling both to carpenters and tilers, who, if allowed to do so, would bring the hip tiles down the hip rafter to its foot and cobble the return of the eaves as

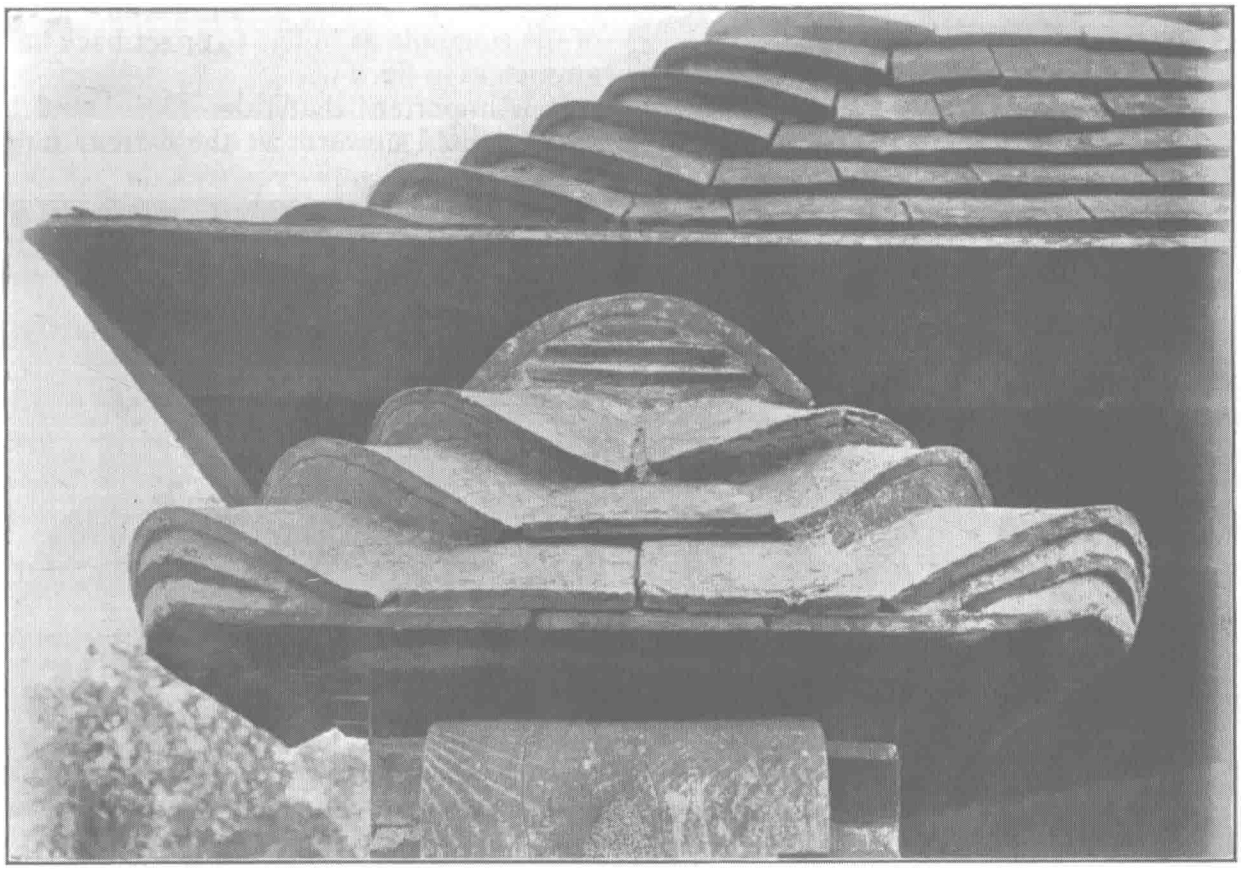

FIG. 19. Double hip, showing filling of ridge tile and of lowest hip tiles.

best they could. The unsightly appearance of a double depth of mortar under the lowest hip tile may be avoided by the insertion of a small curved piece of hip tile, dividing it into two, as shown in figs. 3, 4, 12, 19. Another finish is by the use of a tile tongue 2 in. wide, which protrudes over the angle, and this is particularly suitable when the junction of the under-eaves-course tiles forms a sharp angle, as in fig. 18, instead of being rounded as in fig. 19.

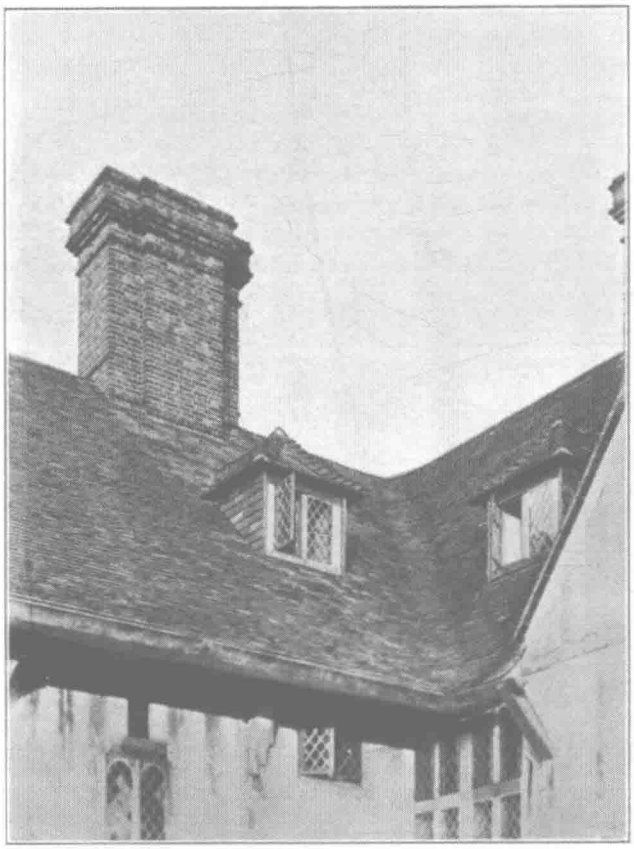

FIG. 20. Swept valley-tiles cut to wedge shapes.

RIDGE TILES

The half-round ridge tile and its variants, as shown in fig. 17, are unsurpassed, and serrated or crested ridges may be left to such speculative builders as may still think them beautiful. For some positions the segmental ridge tile, as in fig. 19, is better suited than the full half-round, especially where it is desired this should bed down closely. There are several devices for filling in the open end of the ridge tile at hipped gables. If mortar only is used, the face of this should be kept back $\frac{1}{2}$ in. from the end of the ridge tile, so leaving a projecting margin of tile, as in fig. 51, which casts a pleasing shadow. Another method is to fill in the space with the butt of a wine or beer bottle, or a piece of plain tile may be cut to a semicircle, so as (with a $\frac{1}{2}$ in. joint all round) exactly to fill the opening, but best of all, perhaps, is to fill with plain tiles, laid flat with $\frac{1}{2}$ in. joints, as in fig. 19. These may be flush with the end of the ridge tile as in fig. 19 or set back half-an-inch as in fig. 25.

It is important that ridge tiles should be slightly tilted upwards at the extremities of

FIG. 21. Two faults are here illustrated. (1) The ridge tiles are not bedded down sufficiently closely. (2) The heading course of plain tiles and the hip tile of that course dip downwards instead of being tilted up slightly (as are those in the two courses below) to help the tilting of the end ridge tile.

a ridge, whether these occur at the junction with chimneys, as in figs. 3, 10, or at the apices of gables. The improved appearance as compared with a perfectly straight line is obvious; water is thrown off from vulnerable points, and as the last ridge is usually wedged in tightly against the brickwork, greater strength is secured.

Ridge tiles should be well and carefully bedded in hair mortar or cement, which should not be visible, even from below. A slight upward tilt of the end ridge tiles is sound construction as well as pleasing in appearance, but this must be obtained without showing the mortar on which the ridge is

bedded. The dip of the hip tile of the heading course in fig. 21 should have been a slight rise. The more closely ridge tiles "sit down" on the heading courses of plain tiles the more secure they are likely to be. In a very exposed situation or where the lead of a flat roof finishes under one side of the ridge, lead tacks or clips may be brought through between the ridge tiles and turned 1½ in. over them. These tacks may be provided between every ridge tile or at such intervals as may seem necessary.

VALLEYS

The purpose-made valley tile is convenient and inexpensive, but it cannot compare for appearance with a swept valley, where an easy curve has been formed by the use of a wide valley board and the plain tiles cut to the necessary shapes. Such valleys do not require lead, but the tile cutting is slow work and very trying to the tilers' hands. Fig. 20 shows tile swept valleys in a main roof and at the junction of dormers with the main roof.

Another valley treatment, not so widely known, is what has been named the "Laced Valley", as shown in fig. 22, together with a drawing showing the construction, fig. 23. The foundation is an 11 in. valley board on the hip rafter. Upon this board tile-and-a-half tiles are laid diagonally. Up to the two lower edges of these the courses of plain tiles sweep. The photograph is of a roof in a housing scheme at Eltham. Similar valleys were adopted in the housing scheme at Stanmore, Hants. The operation is inexpensive and easily learned by workmen, who in time become so skilful as to lace main-roof valleys without cutting or shaping a single tile.

Pantiles form a good wall coping, which effectually protects peach and other fruit trees trained against the wall below. Fig. 24 shows one method of stopping an end which, however, is not so good a finish as the more elaborate hipped treatment illustrated in fig. 25. These two figures show also the effects at external angles, while fig. 26 is a large detail of an internal angle, the treatment of which will vary as the points at which the pantiles happen to intersect. The drawing, fig. 27, is a section of this coping. It will be found convenient first to cast the breeze concrete to the desired triangular section, in 2 or 3 ft. lengths, and then to bed these on the wall ready to receive the pantiles.

When pantiles are very hard (and generally they seem to be much harder and tougher than plain tiles) they are difficult to cut to

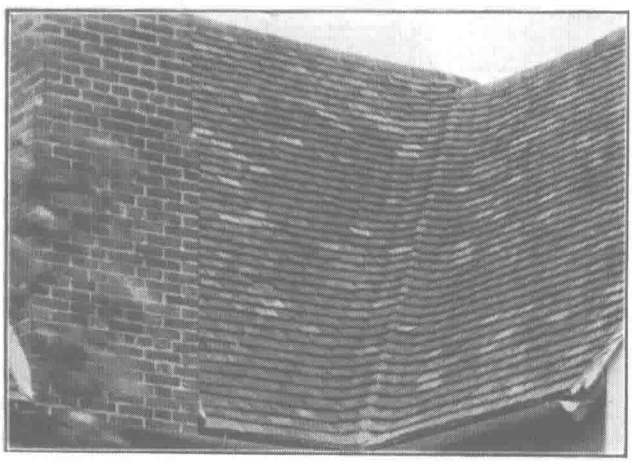

FIG. 22. Laced valley in a housing scheme.

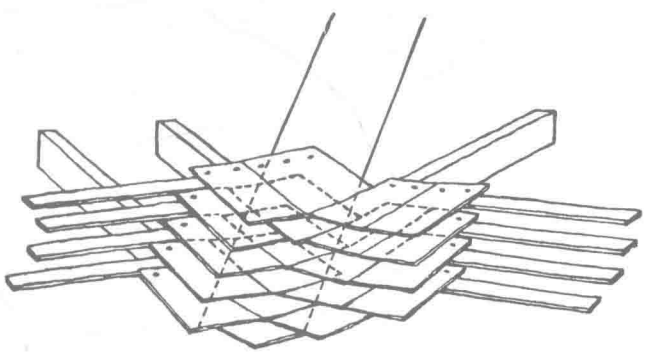

FIG. 23. Method of working laced valley.

a mitre: hence the relatively wide joints seen in figs. 25 and 26. There is, however, something very attractive in the curves of these external angles, as may be seen in figs. 24 and 25. Indeed, without any intention to do so, they recall features with which one is familiar in illustrations of Chinese roofs. They also suggest that other uses may be found for pantiles, which would prove equally pleasing, provided they were used structurally and not as mere ornaments. One legitimate