Society for the Protection of Ancient Buildings

# Panel infillings to timber-framed buildings

Technical pamphlet 11 by Kenneth Reid RIBA

Contents



**This pamphlet deals with the infill panels that form the walling between structural members in a timber-framed building. Firstly, repair methods are suggested, but where replacement cannot be avoided and reconstruction with wattle and daub presents insuperable difficulties, some non-traditional methods have been included. These come within the principles of repair advocated by the Society.**

**The illustrations indicate methods of repair and renewal but should not be regarded as working drawings. Many routine items have not been commented upon.**

Lavenham, Suffolk

# 1 History

The prevalent form of construction for infill panels to timber-framed structures was wattle and daub. Its origins lie in prehistory in the craft of hurdle making. One of the earliest authenticated examples of wattle and daub in England comes from the noted Iron Age excavations at Glastonbury[1]. Here the walling had vertical staves that were interwoven horizontally with hazel wands and threaded around upright posts; similar examples are shown in Figs. 2 and 3. This Romano British practice seems to have been a precursor of what became the traditional practice with reinforced mesh spanning between structural posts. Examples of wattle and daub, seemingly of great age, can rarely be dated precisely because there may have been identical repairs carried out during subsequent centuries.

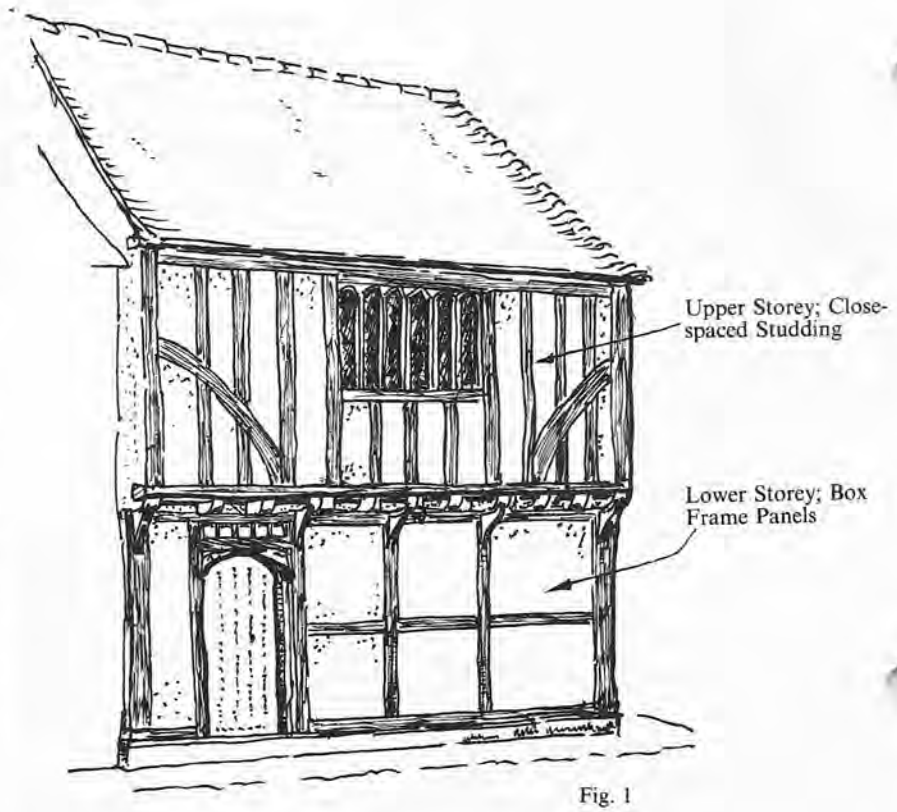


Fig. 1

The traditional method conveyed by the term 'wattle and daub' was ubiquitous. For example records of expenses incurred for the Almshouses at Stratford-on-Avon in the 15th century mention a 'wattelar' and 'litter', i.e. the material for 'daubing'[2]. It is surprising how few of the records pertaining to the craft survive, such as the usual payments to workmen and for constituent materials, in comparison to the recorded costings for masons and carpenters[3]. These 'wattlars and daubers' used the technique for as long as timber-framing continued. When bricks and sawn pine became readily available from circa 1700 onwards these materials gradually replaced wattle and daub although the latter has been found in pine framing in early 19th century buildings.

# 2 Panel infill types

During repairs to timber-framed buildings it will be found that much variation in quality prevailed in details of panel construction and finish. Some of the work was that of highly competent craftsmen in both major and minor works. Other panels were obviously from the hands of the unskilled, carried out to a somewhat rudimentary standard, particularly in the often termed 'scat' cottages of the peasants, and in the fewer surviving minor structures built for farm use. This sort of differentiation might be expected, as it would have corresponded to the two parallel streams of skill and sophistication found across the whole range of mediaeval building.

Fig. 2: Typical *wattle and daub* found in most places, including the many-storied structures that once filled towns like mediaeval London and Bristol. Numerous panels have also been found where the staves of the 'basket weave' have been fitted horizontally (instead of vertically) between posts.

The staves, or stakes, were of riven oak, ash, or occasionally beech; they were sometimes debarked. Each stave was sharpened at one end to a point and slotted into an auger-bored hole in the top (or underside) of the cross rail or sill beam. The other end was tapered and sprung into a trenched groove cut into the underside (or top) of the horizontal frame member.

The cross slats or laths were of riven oak or hazel; or large hazel unbarked twigs (wandys). They were interwoven between stakes and the ends were slotted into trenched and grooved recesses in the upright posts of the framing.

The daub infilling consisted of 'cats', i.e. slightly damp balls of clay mixed with a small proportion of cow dung, choped straw, flax sticks or coarse animal hair (obtained from skins in lime vats at a tannery). The mix was pressed into, and around, the wattle to form a homogeneous mass. Once the daub had hardened the surface was slightly wetted before receiving the plaster rendering.

The rendering was made of lime, sand and a small proportion of cow dung mixed with chopped straw or hair. In some areas gypsum or a clay daub were used in place of the lime render. Panels were finished flush with the framing or slightly recessed. Occasionally the surface was lightly combed before being given coats of limewash that were repeated over the years.

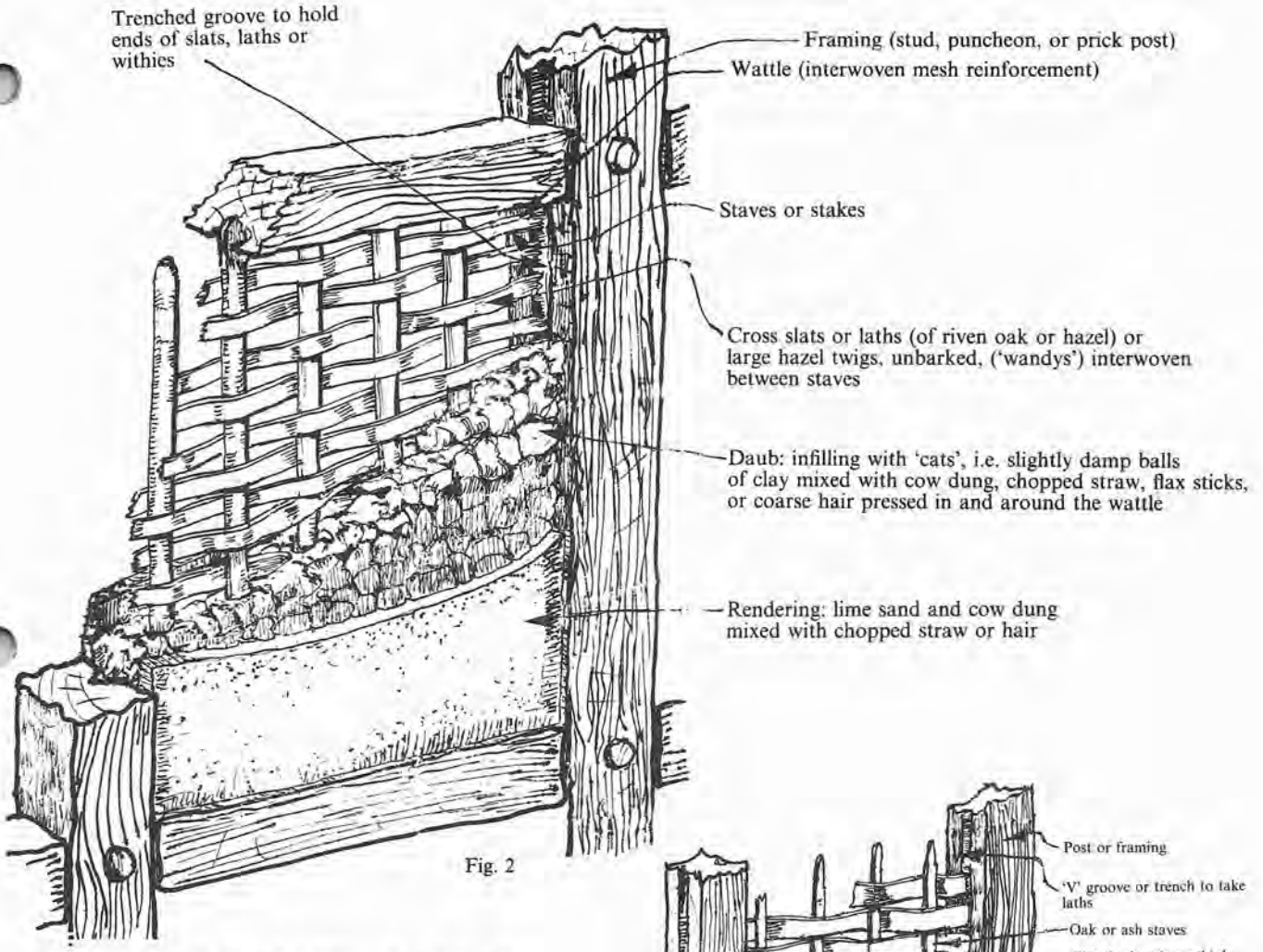



Fig. 2

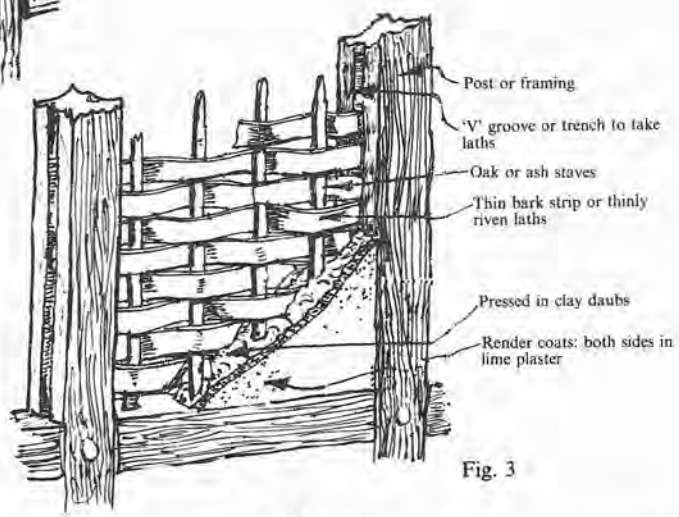



Fig. 3

Fig. 3: Panel infilling found in the Hereford-Shropshire area. (In barns they were often without render coats to form ventilation panels).

Fig. 4: A traditional method of infilling closely spaced timber-framing, known as '*close studding*', as shown in the upper storey of Fig. 1. In many cases fillets, to which the laths were nailed, were pinned to posts; in such examples the clay daubing would usually be omitted. Where the vertical studs were narrow, about 3½in. × 7in. (90mm × 175mm), the laths were sprung into grooves cut in the studs. Clay daub was pressed against and through the laths from either side. In some early examples the daub was strengthened by mixing in flax stems from which the outer fibres had been removed. External lime plaster was usually about ⅝in. (15.8mm) thick, but often less. In many cases the render appears to be no more than layers of accumulated limewash applied over the years.

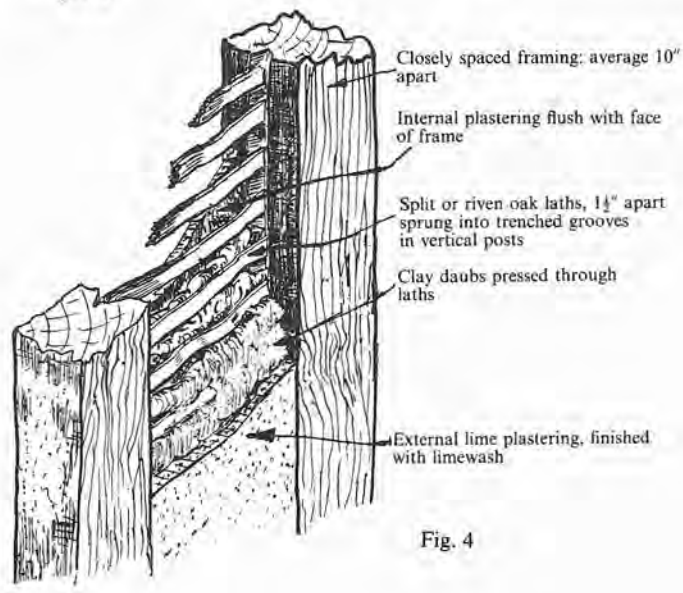



Fig. 4


Fig. 5

Fig. 5: *Brick nogging panel.* The practice did not become common until the latter part of the 16th century by which time brick making had become widely established.* In some areas the courses were at first laid at an approximate angle of 45 degrees, but later they were laid horizontally. The great majority of brick panels are later replacements of wattle and daub.

The method was never a satisfactory one in Britain even in less exposed situations. Joints between the brick panel and timber frame constitute a perennial problem and seldom remain watertight.

The unavoidable slight dimensional changes and movements, inseparable from oak framing, combined with the weight and lack of flexibility of the brick panel itself, increase the likelihood of penetrable cracks. Hence many brick panels were subsequently rendered over.

*(*See* paper by John McCann published in Transaction of Ancient Monuments Society Vol. 31 1987).

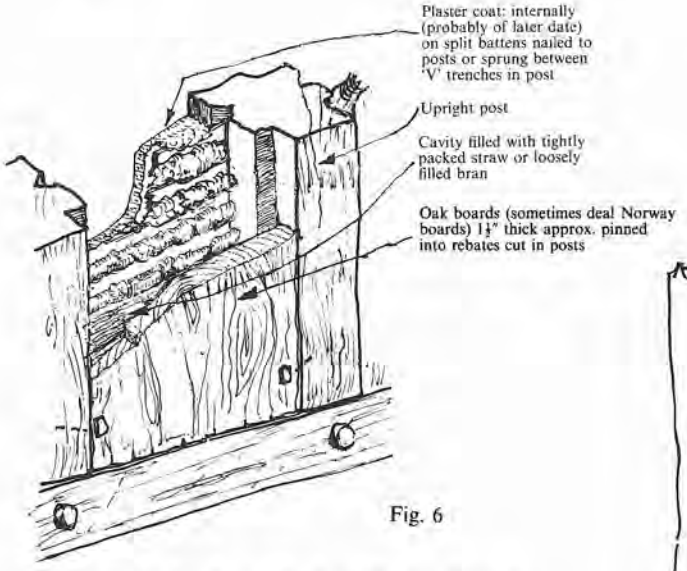



Fig. 6

Fig. 6: A method with no known complete surviving examples in England, although traces in the grooves of reveals remain,* but indicated in illuminated manuscripts. Once found in Normandy and those towns involved in the Hansa trade e.g. Baltic and Scandinavia seaboards. This '*plank technique*' can also be seen as vertical weatherboarding pinned to the framing: in this case it will be close-butted with the joint strip covered; the frame panel behind being filled with wattle and daub or with packed straw.

*(*See* R. A. Meeson in Vernacular Architecture 14.29).

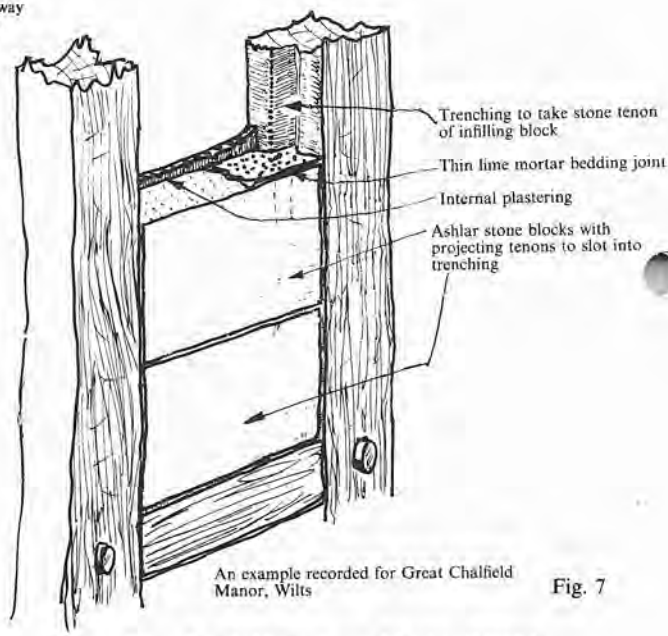



Fig. 7

Fig. 7: *Ashlar stone blocks* slotted into trenching in the timber framing. Also, in Yorkshire, irregular stone blocks were jammed in and filled with plaster. Forms of construction that would have given low standards of insulation and the joints would have been vulnerable to rain penetration.

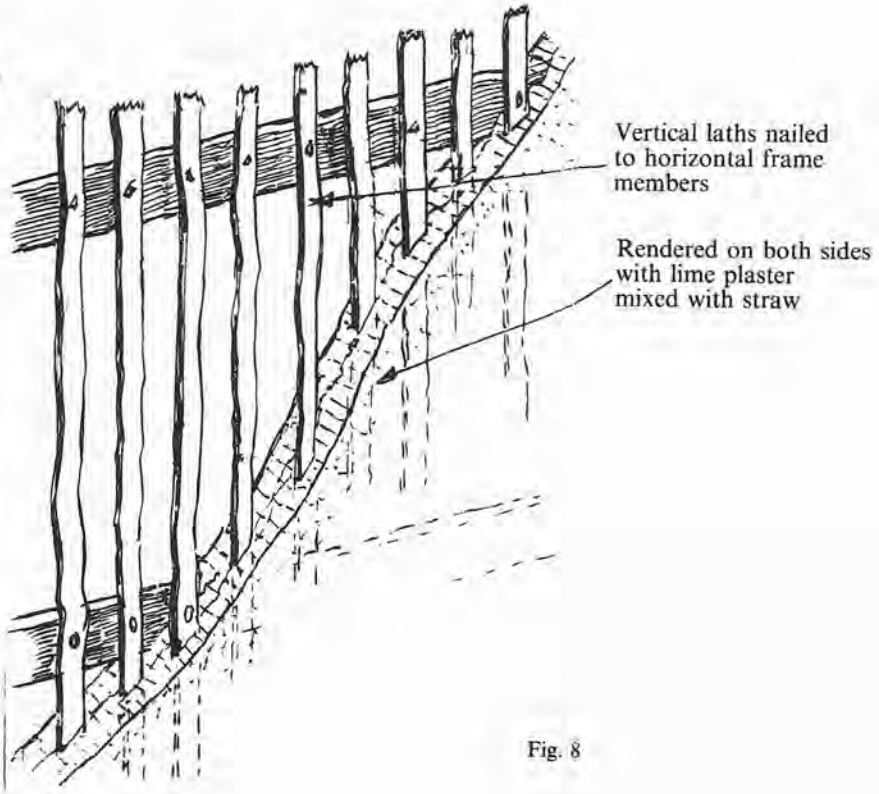



Fig. 8

Fig. 8: This occurs in manuscripts and paintings of the mediaeval centuries for light partitions and farm buildings. It also approximates to the crude and irregular 'mud and stud' technique found in houses in Lincolnshire and Lancashire. The framework of hoods and flues to fireplaces (which would have been rendered in gypsum plaster) followed the same construction elsewhere.

Panels using *flints bedded in mortar* can be found in England. One of these rare survivals could be seen at Shere in Surrey. Some panels using roughly knapped flints, likewise bedded in lime mortar, exist on a 16th century dwelling at Bignor, Sussex. Here the face would probably have been limewashed and this repeated over the years would have resulted in a thick protective coat.

2. *Wattle and daub*

Wattle and daub may not have been the most rigid or robust of building techniques yet many examples survive, obviously of great age, and not always in sheltered situations. However, in highly exposed coastal areas it was rarely used. Carew mentions that where masonry was not possible, or desired, slate hanging covered timber framework.[1] For one, that oft overrated expert, Vitruvius, was not impressed and referred to the practice of wattle and daub as that of 'mud stickers'. He writes on:–

> '... As for "wattle and daub" I could wish that it had never been invented. The more it saves in time and gains in space, the greater and the more general is the disaster that it may cause; for it is made to catch fire, like torches. It seems better, therefore, to spend on walls of burnt brick, and be at expense, than to save with "wattle and daub", and be in danger. And, in the stucco covering, too, it makes cracks from the inside by the arrangement of its studs and girts. For these swell with moisture as they are daubed, and then contract as they dry, and, by their shrinking, cause the solid stucco to split. But since some are obliged to use it either to save time or money, or for partitions on an unsupported span, the proper method of construction is as follows. Give it a high foundation so that it may nowhere come in contact with broken stone-work composing the floor; for if it is sunk in this, it rots in course of time, then settles and sags forward, and so breaks through the surface of the stucco covering...'

One circumstance which favoured the continued use of wattle and daub panel infilling lay in jettied construction. The overhanging projection afforded a certain protection from weather, particularly to the upper panels of the frame below. A cumulative protection was afforded by the regularly applied coats of limewash, an important custom in the agricultural years of pre-industrial communities.

In moderate and sheltered conditions, and if well maintained, a wattle and daub panel should last indefinitely. The materials are light and flexible and move with the timber framing. Cracks in the joints are minimal and the insulation superior to most of the materials later used in panels.

*Gypsum and lime plasters*

In some areas, such as Purbeck, Robertsbridge in the Sussex Weald and also in the vicinity of Nottingham, where gypsum was mined and easily available, plasterers would make use of it. Gypsum based plasters would last longer and be stronger than those using only lime; it could give greater protection to the staves and laths embedded in the clay 'cats'. Such rendering had a greater fire resistance which was an important consideration when half-timber built storeys stood close together and rose higher. The one defect of gypsum plasters lay in the low resistance to water penetration but it is possible that in areas of extensive use, the plasterers added alum, soda or varieties of tallow to minimise this defect. Surviving records are too meagre to provide precise or useful information. Its use in England came in the 13th century—limited to the more ambitious schemes of kings and bishops and in the 17th century in a wide range of buildings.

*Lime plaster*

For lesser buildings the use of all-over external lime plastered wall surfaces did not prevail until c. 1560 onwards. The impetus, it has been claimed, came from the vast amount of stone rubble available for lime burning from demolished monastic structures.

# 3 General repairs

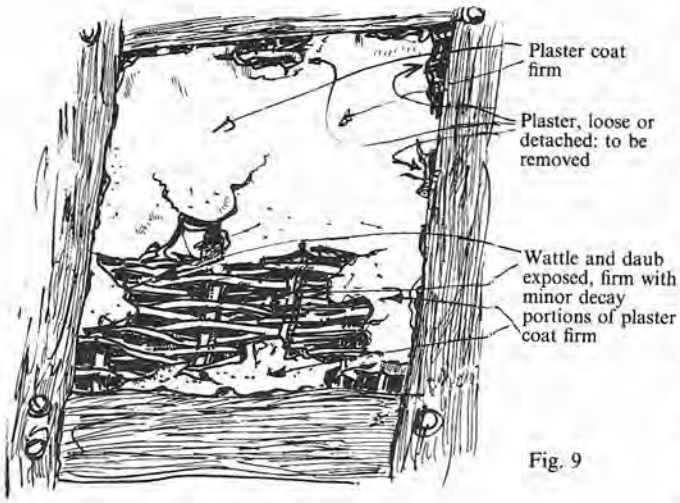



Fig. 9

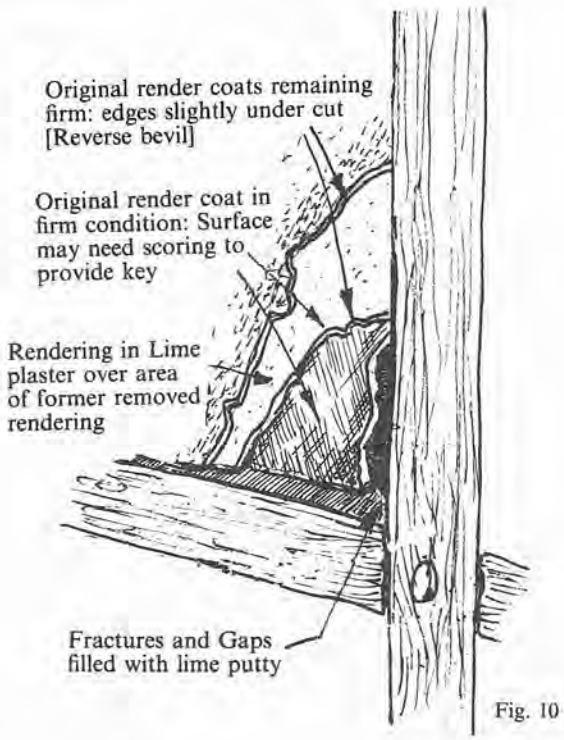



Fig. 10

3.1 *Introduction*
Many *wattle and daub panels*, particularly in minor buildings, are cleared away often unnecessarily, or even as a less bothersome expedient, when they could have been repaired and retained.

A rough guide would be that if a large portion, say half of the panel remains sound, repair or part renewal of the remainder should be practicable. Description is, however, a poor substitute for expert advice given following an on-site examination.

The special character and authenticity of these buildings can only be protected by retaining as much as possible of their fabric. Repairing a partly defective panel or having to replace it does not always present a straightforward choice. Figure 9 shows the sort of difficulties that occur. Carrying out repairs often brings to light a range of panel infillings, sometimes of very good workmanship and at other times a collection of staves, laths, withies, lumps of chalk, or clay; even blackberry branches and sizeable flat stones.

3.2 *Failure in the render*
Small areas of the outer setting or float coats may have peeled off, but the basic undercoat may be firm and substantial enough to receive a fresh coat of lime plaster.

Where the outer coats of a lime plaster or render have become detached while the undercoat remains in a firm condition the surface of the latter can be scored as a key for the renewal coat. Fig. 10 shows the firm top coat having been undercut (reverse bevel) to key in a renewed coat.

Usually making good should be done using a cross-grained wooden float to produce a surface texture equal to medium sandpaper. A trowelled finish generally gives a too-smooth and mechanical surface which can provide an unsympathetic contrast with the adjacent old plaster. Typical mixes are given in Section 5. In Western Counties roughcast is also found.*

*(*See* S.P.A.B. Information Sheet No. 11. Roughcast for Historic Buildings).

Detached render can sometimes be re-secured to the building by a system of screws and washers or wire ties.* Sometimes loose areas can be held by making good around the edges or by capping the top.

*(*See* Mortars, Plasters and Renders in Conservation by John Ashurst).

When patching renders care needs to be taken to dampen the background thoroughly using mist sprays to overcome suction. Render coats need to be built up in layers not exceeding ½in. or to match existing coat thicknesses.

If the render is applied directly to daub and the surface of this is crumbling it can be consolidated prior to patching by damping down with mist sprays and working in lime putty

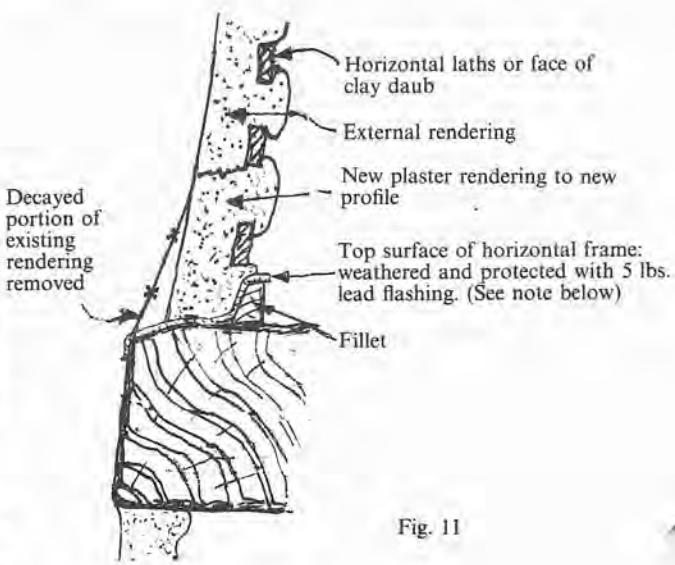



Fig. 11

Fig. 11: shows where movement in the structural frame has brought about a failure in the rendering. The lower portion has suffered a more continuous wetting than the rest of the panel and, as it seldom dries out, this leads to disintegration of the plaster. The repair shown illustrates a partial remedy. With this treatment the new surface would be kept as near vertical as conditions allow.

N.B. Although a lead flashing should overcome weathering of the sill there is a danger of water penetration through the render in exposed locations; moisture could run down the back of the lath and plaster and be trapped by the batten and lead flashing. It may be preferable, under certain conditions, to accept the alternative of renewal of the render at the base of the panel from time to time.

If the *existing rendering* dates from later than, say, 1870, the chances are that it will be one of the strong mortars (1 cement : 3 sand) that became the custom after Portland cement became readily available. The surface may look sound except for a few cracks; these would have been sufficient to allow rain to penetrate but the overall density of the render would have inhibited evaporation of moisture which in turn could cause havoc to the wooden components of the infill panel. In addition this type of dense rendering, for all its apparent strength, can in large areas cease to adhere to its backing and become detached. The extent of the hazard will be a matter for judgment on site. Often the rendering can be removed without damaging the existing panel infilling.

After necessary repair, a new lime or earth-based rendering can be applied. (*See* Section 5).

3.3 *Deterioration of daub*

1) Surface decay

Where small areas of daub have fallen away or been damaged the material can be patched. It is essential that the patches are no denser than the original material. Adhesion of the patch can also be difficult—the old panel needs to be dampened thoroughly using mist sprays and any friable material on the surface consolidated with lime putty. Suitable mixes for patching are given in Section 5 (daub mixes *not* renders). Shrinkage needs to be controlled by keeping the mix as dry as possible, adding more than the usual quantity of straw and controlling drying.

2) Loss of areas of daub

Cases are met where significant portions of the filling survive and, following treatment, may only need patching with a new clay daub which is pressed into the sound wattle and the external rendering is made good.

The wattle staves and mesh need not be absolutely rigid, but should be sufficiently firm to carry a fresh rendering. Suitable mixes are given in Section 5.

3) Cracking of daub

Whenever cracking occurs it is important to establish and remedy the cause. Structural movement, changes in moisture content, decay of wattle mesh or loss of key are some of the more common problems.

Cracks may be made good with lime putty or a lime and hair plaster mix.

4) Loss of key

The daub may become detached from the wattle supports, depending upon the original method of application.

In some cases it can be re-supported using non-ferrous wire ties. (A method is illustrated in Mortars, Plasters and Renders in Conservation by John Ashurst.)

3.4 *Decay of wattle mesh*

Usually deterioration will be found in the wattle mesh, this being more vulnerable to beetle attack than the enclosing frame members. This may, of course, decrease the strength of the wattle though, after insecticide treatment, the staves can often be saved as well as much of the infilling. New staves, slats, laths or withies can be slotted into the existing holes or grooves in the frame following existing patterns.

Decay of the wattle mesh, particularly the interwoven mesh, may not affect the fixing of the daub panel (which relies on the staves) but can sometimes lead to splitting of the daub and separation of external from internal faces.

(A detail showing tying of a split daub panel is given in Mortars, Plasters and Renders in Conservation by John Ashurst).

3.5 *Deterioration of the building structure—Effects on infill panels*

Deterioration of the building structure can often affect infill panels and it is essential that the root cause of any problem is identified and remedied.

Failures in the panel face can sometimes be attributed to dimensional changes which can be due to the oak members suffering movement due to changes in moisture content, shrinkage through seasoning, or tenons weakened through rot or insect attack or to the loss of joint pins. Cracks open up in the rendering particularly at the edges. Moisture then penetrates causing deterioration of the render or infill or wattle mesh.

The reveals and edges of the timber-frame members should be examined, as here can be found areas of oak that have become subject to insect attack and have perished. This infection is usually called 'frass'.[1] It can be scraped down to the heartwood. If left it will conduct moisture to the vulnerable components of the infill panel. However, where the 'frass' constitutes too large a proportion of the oak member, removal can affect both the structural strength as well as the appearance of the timber-framing and expert advice should be sought.

[1]Recognized by the honeycombed or powdered residue of the woods. For further information see "Timber Treatment—a warning about the defrassing of timbers" by Peter Locke. S.P.A.B. Information Sheet 2.

3.6 *Brick infill panels*

Repairs to *brick infill panels* present another range of problems. Mortar joints may be fractured, some of the pointing missing individual bricks perished and the general surface out of true. Where a few decayed bricks are to be released with matching new ones this together with suitable repointing will suffice.

If the whole brick panel is to be replaced adapted wall ties may be pinned to the reveals of the framing and fixed into the courses and perpends of the brickwork as it is being built up in lime mortar. Visually, it is essential that the new brickwork is built to the deformation of the

building—brick courses running with the slope of supporting framing members—it requires a good eye, not a line and level.

In some cases the weight of brick infilling (which usually replaced older types of panel infill) has caused severe distress to the supporting frame. In such circumstances replacement with alternative materials may need to be considered.

3.7 *Routine maintenance*

1) Inspection

Annual inspection of timber-framed buildings with exposed infill panels is essential. Minor repairs or redecoration need to be undertaken regularly. Neglect will lead to unnecessary decay and premature failure.

2) Movement at panel edges

A general problem with infill panels is that they are prone to cracking around the edges at the junction with framing members. Traditionally such cracks were made good with a lime hair plaster. The current practice of using mastic is contentious due to the possibility of this trapping moisture and to its relatively short life.

3) Limewash

The limewash covering to wattle and daub and earth rendered buildings needs to be kept in good condition. This can often be achieved by regular patching of the more exposed areas which are subject to decay. (*See* Information Sheet No. 1).

# 4 Renewal and replacement

During building work on timber-framed buildings many original wattle and daub panels have been destroyed that were not beyond repair. However, where repair is plainly impracticable and complete renewal has to be conceded, choices do exist for alternative methods. Figs. 11 to 20 illustrate some examples. Permutations of the components are feasible but should be done under expert guidance. No really definitive information is available setting out the long term performance of the various new materials now available.

Traditional wattle and daub has stood the test of time well. New panels can be constructed copying the old work. Brick is a particularly poor substitute for wattle and daub because of the seemingly erratic resistance of brick panels to rain penetration and the inadequate thermal insulation provided.

When replacing panels with another material a difficulty can arise from the varying thicknesses of the containing frame members. This was originally overcome with a skimped daub and plaster. The use of new materials, with the need to maintain a flush internal face can, in some cases, limit the possible thickness of the infilling to no more than 90mm. This can impose severe constraints.

Some of the illustrations include the use of lead trays at the bottom edge of the panel. There appears to be two schools of thought on this practice. An argument against the trays is that, though properly shaped and positioned to prevent moisture penetrating through the joint between panel and frame, there is uncertainty as to the life of the protective undercoat of bitumastic paint which is applied to prevent tannin from the oak leaching through to the underside of the lead flashing. Also moisture can become trapped under the lead resulting in decay of the timber. (This may also apply to mastic/gaskets). An absorbent panel such as wattle and daub would soak this up and allow water to evaporate. There is also the criticism that a led tray can be a disruptive note in an otherwise unspoiled elevation.

Another practice which has been challenged is placing an impermeable plastic sheet behind the rendering to act as a vapour barrier. Though the inclusion of this component should halt the ingress of damp, there is also the view that such a member could encourage interstitial condensation that may not be detectable until after a long time has elapsed. The use of foil-backed plaster board or building paper might be considered as alternatives.

Attention should be drawn to the not infrequent yet important occasions when the internal face of a panel carries a contemporary wall painting or design. Whenever considering the removal of a wattle and daub panel it is essential to be aware of the possibility of wall paintings or patterns hidden beneath subsequent layers of limewash, plaster or studding. Expert advice should be sought before embarking on any renewal.

The following examples suggest methods for a panel infilling that has to be wholly renewed when it is beyond repair.

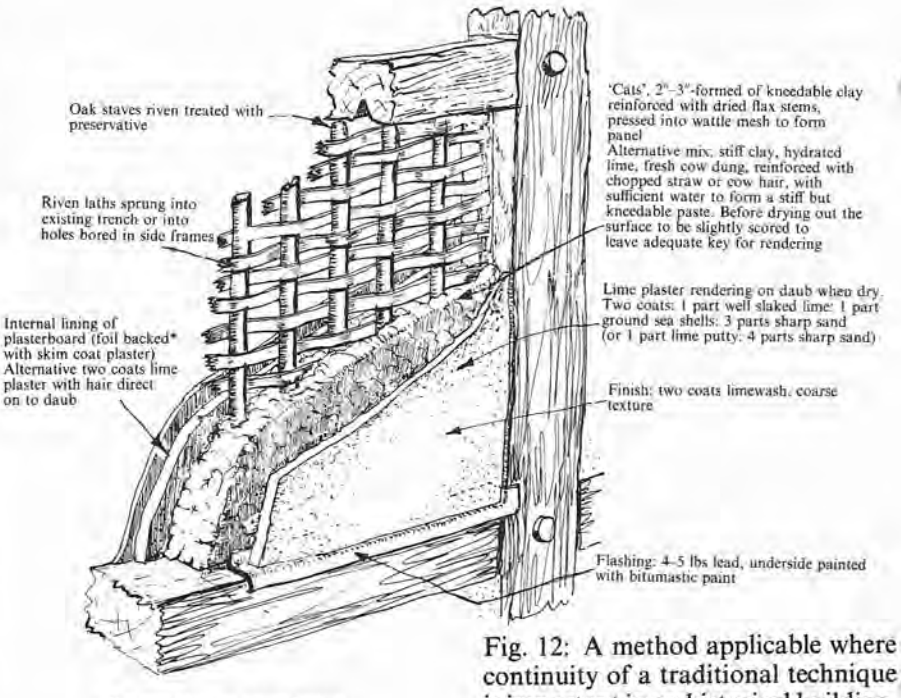



Fig. 12: A method applicable where continuity of a traditional technique is important in an historical building.

Fig. 13: A method that has been used where the renewed panels were sited adjacent to existing original wattle and daub panels that are still fit to be retained. (Donald W. Insall and Associates)

Fig. 14: A method that has been used successfully for the renewal of infill panels to timber-framed buildings in the East Midlands. (Rodney Melville MSc, ARIBA)

Fig. 15: This method, (untried), follows closely the tradition of wattle and daub but incorporates vermiculite granules in the daub to provide improved insulation. (John Schofield)

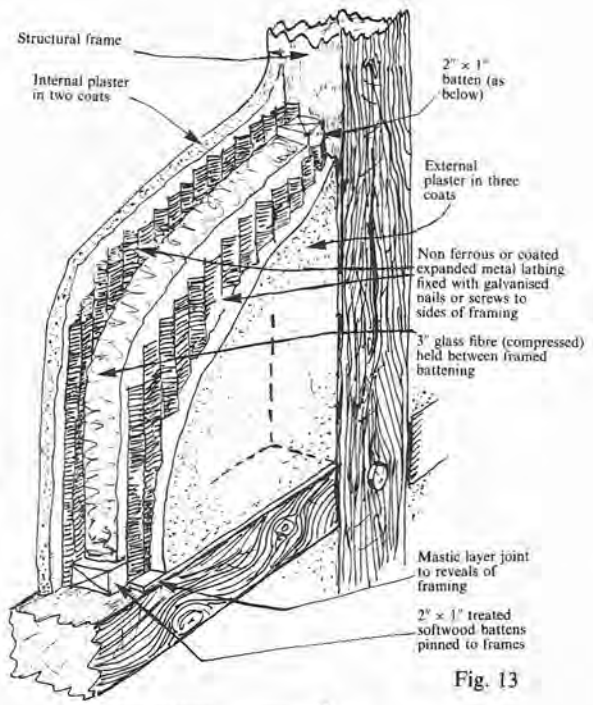



Fig. 13

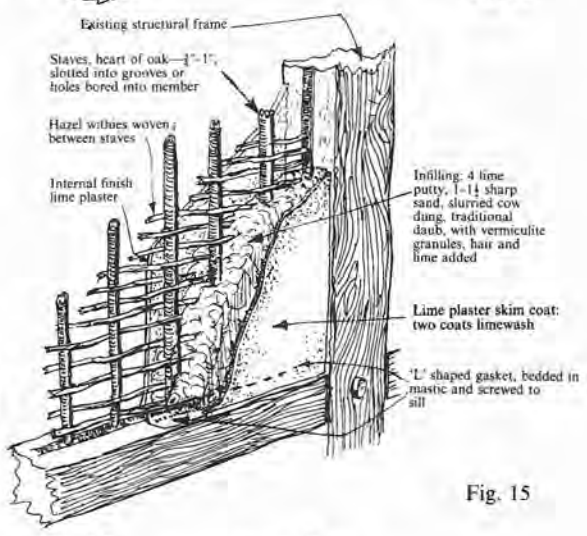



Fig. 15

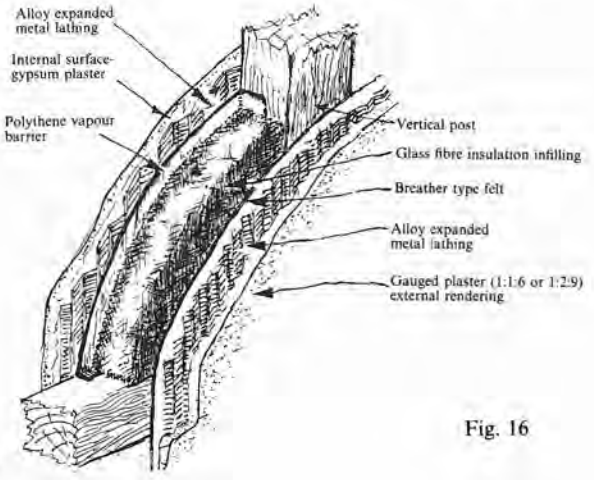



Fig. 16

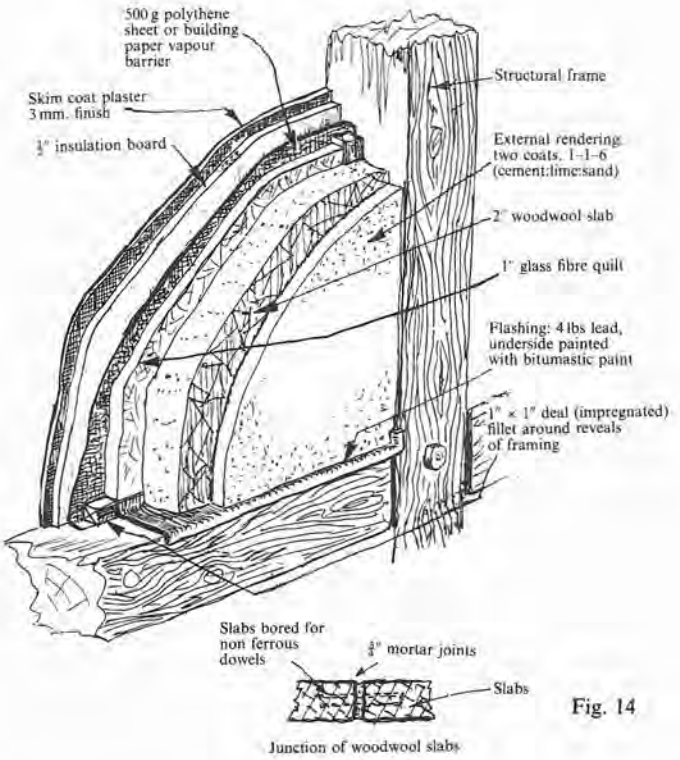



Fig. 14

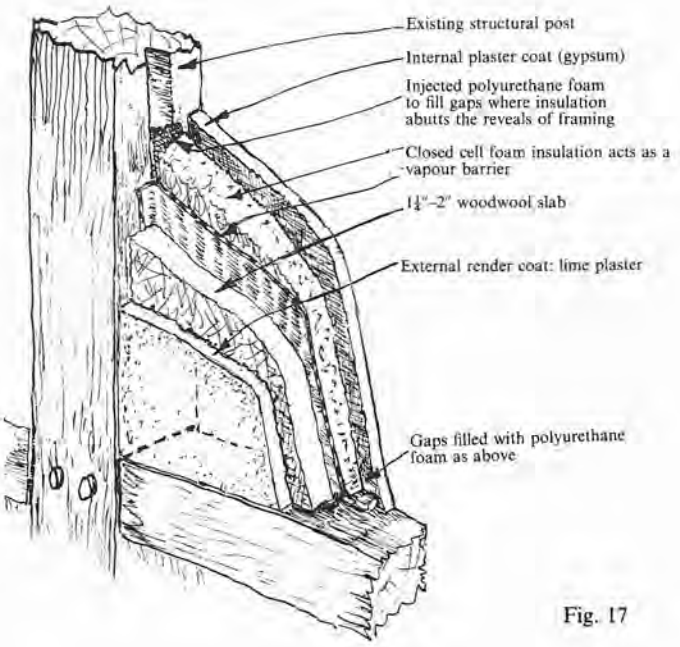



Fig. 17

Fig. 16: This method would be acceptable where the surface elevation is one of overall rendering and for reasons of decay the existing panel infills behind it have to be replaced. It has been devised by the Architects of the Essex County Council for the characteristic timber-framed buildings of the county.

Fig. 17: Illustrates a method that has been used in the Hereford area for renewing panels. (Andrew Thomas, RIBA). (*See* S.P.A.B. *News* Vol. 3, No. 3 for further information)

Fig. 18: Where a brick nogging panel has survived, with the face of the brickwork and most of the joints sound it might be possible to upgrade the deficient insulation provided by the half-brick thickness as shown in the illustration. *(After Andrew Thomas RIBA) (1)

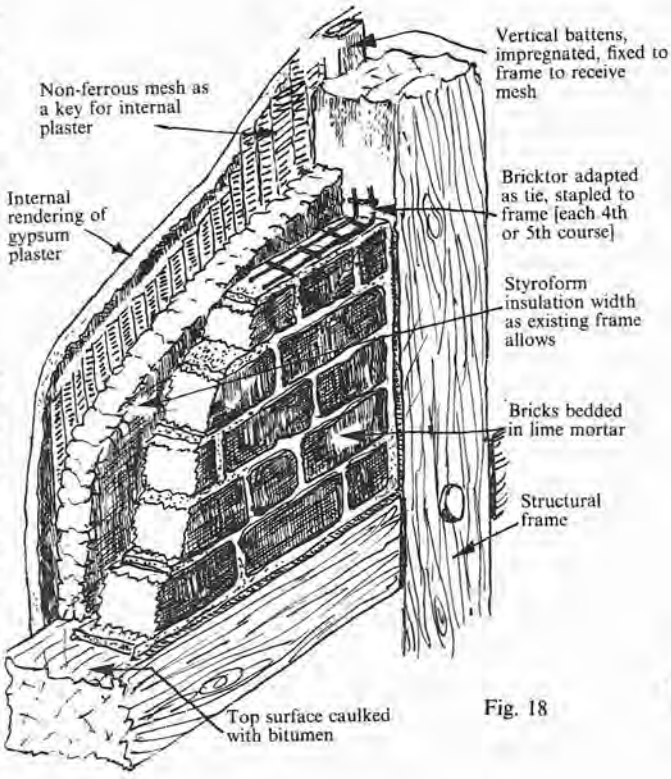



Fig. 18

If pointing at the perimeter joints has perished, or is missing, the opportunity can be taken to rake out the joints to an approximate depth of 2in (50mm), then fill in and plug with a suitable mastic but leaving 1in (25mm) for repointing in lime mortar between the edge of the brickwork and the structural frame. Alternatively use a lime/hair mortar mix (which will help to soak up moisture and allow it to evaporate freely without danger of becoming trapped). Where complete rebuilding of the panel cannot be avoided, bricks, bond and mortar should be matched. Stainless-steel or non-ferrous ties can be bent and pinned to the containing frames and built into the courses and perpends of the reinstated brickwork.

If the brick nogging is decorative (i.e. laid in herring-bone or chequer-board pattern) the panel should be recorded and the new work carried out to match the old.

Fig. 19: The foregoing examples have assumed panels of familiar rectangular shapes, but there will be others such as those abutting curved struts. Here the staves are placed radially from a lower corner and the withies of laths interwoven to produce an approximately even mesh. Where the staves remain firmly in position, and provided that beetle infestation is no longer active, freshly riven and treated laths can again be interwoven between the staves, and fresh clay 'cats' (slightly damp balls of clay mixed with a small proportion of cow-dung, chopped straw, flax stems or animal hair) 'puddled' in as in the case of normal panel shapes. Where existing staves and wattle are beyond repair, renewal can follow methods previously described.

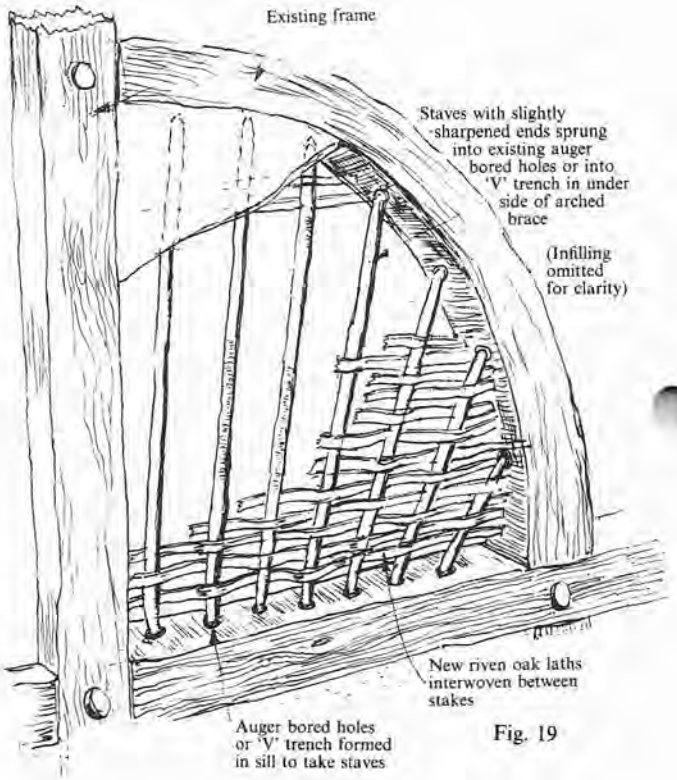



Fig. 19

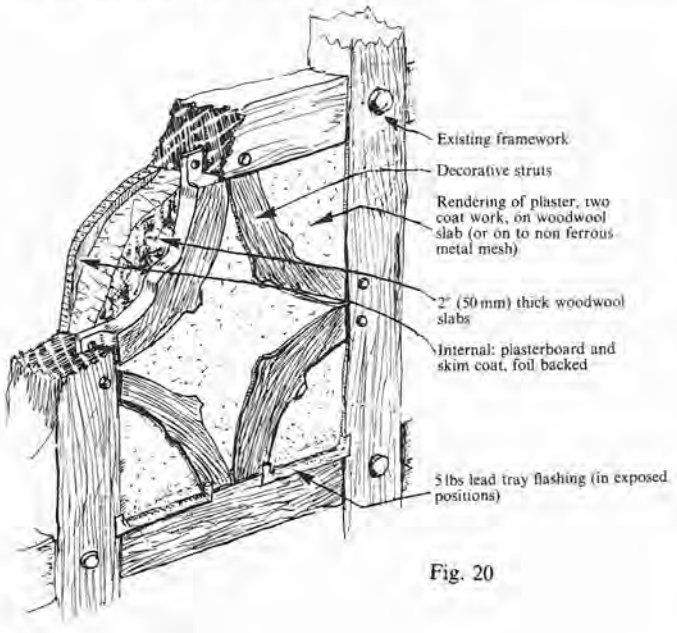



Fig. 20

Fig. 20: Buildings c. 1540 to 1650 often included panels of a more decorative nature with patterns formed by the struts. It is sometimes found that plaster and sections of thin dau

have fallen out and the oak pieces have decayed tenons which do not lend themselves to straightforward refixing. These struts and braces are not always of the same thickness as the enclosing post and sill; they are often only 1in.–1½in (25mm–38mm) thick. With the repeat proviso of each case on its merit, it may be found practicable, after refixing the oak members, to build in with woodwool or other equally suitable blocks. New plaster rendering can then be applied direct. *(*See* S.P.A.B. *News* Vol. 3 No. 2 article by Andrew Thomas)

# 5 Renders, Daub, Pargetting and Limewash

Mixes for renderings seem as varied as the places from which they came. They range from a mix of gauged lime and sand, with the addition of hair, to the multifarious mixes of daubs (earth-based renders) that were protected with one or more coats of limewash. The aggregate constituent could also be varied by the addition of crushed brick, tile, stone or shell. Strong mixes, such as 1 cement: 3 sand, should NEVER be used.

5.1 *Gauged lime plaster*

Suggested mix:

1 part lime putty: 1–3 parts sharp sand: 1 part cow dung (fresh and of slurry consistency). Chopped straw in 4–7in (100–180mm) lengths; (not included in the finishing coat).

The components should be as dry as possible consistent with being well mixed. The plaster is applied in one or more coats using a wooden float. Limewash is applied after the plaster has set. If shrinkage cracks occur they can be filled with a mix of lime putty and fine sharp sand and the limewash coat touched up.

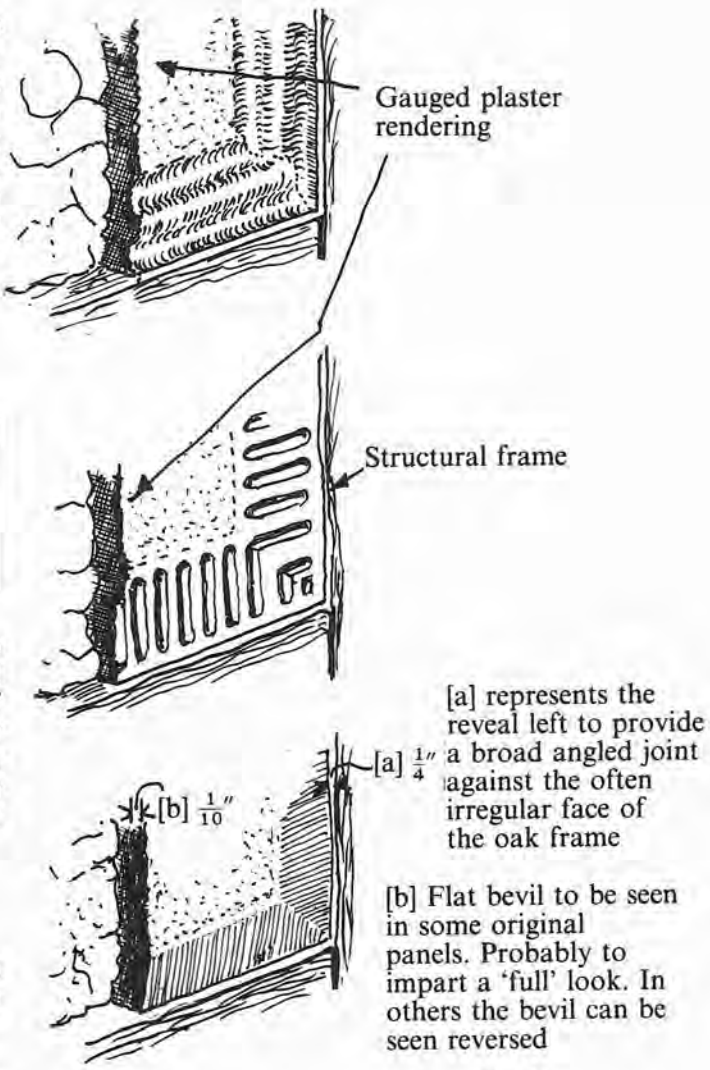
Where the renewed infilling has made use of new materials, such as block or woodwool slabs a suggested mix might be: ½ or 1 cement: 3 lime: 12 sand for moderate exposure. (See also mixes used in examples shown in Section 4.)

*Removal of overall rendering*

Examples can often be seen where an overall rendering to a half-timbered elevation has been removed to display the beams. This practice is dubious; it usually exposes a poorly patched up set of studs and infilling of impoverished appearance that was never intended to be seen. Parts of the framing and infilling may need replacing. Later applied renders may also mask alterations from a time when new windows were inserted.

Framing freshly exposed to the weather is likely to develop signs of movement. The insulating properties may also be reduced.

The S.P.A.B. is opposed to removing an overall render except where the frame and infilling have seriously deteriorated and the sole means of access lies in stripping off the rendering.




[a] represents the reveal left to provide a broad angled joint against the often irregular face of the oak frame

[b] Flat bevil to be seen in some original panels. Probably to impart a 'full' look. In others the bevil can be seen reversed

Fig. 21

Mention should also be made of the traditional plastering technique by which the edge of a rendered panel was finished off by providing a slightly concave or convex section where it is recessed behind the face of the timber-frame by ⅛in to ⅜in (2mm to 9mm). Another method was to form bands 1in to 2in (25mm to 50mm) wide at the perimeter; these carried a simple decoration of closely spaced shallow strokes or a continuous moulding as shown in Fig. 21.

Feather edging should be avoided, particularly where the render butts up against a decayed or fractured portion of the oak frame. Also, the plaster coat should never finish proud of the oak.

5.2 *Daub*

(See also Section 3 General Repairs, sub-section 3.3 Deterioration of Daub.

The basic ingredients for the daub applied to the wattle framework or laths were clay/earth, or soft chalk, with the addition of cow dung, lime, mud, sand or stone dust strengthened with chopped straw or flax. Proportions varied according to the clay, sand or chalk content of the subsoil in a particular locality. Where the percentage of clay is high this may result in shrinkage cracks. Some examples of mixes that have been used are listed below. It is important that tests should be made to analyse the soil to determine its suitability. Simple soil composition tests are usually

sufficient. (See 'Building With Earth' by John Norton, Intermediate Technology or 'Practical Building Conservation' Vol 2 by John and Nicola Ashurst. Gower Technical Press).

*1. 8 parts stiff sandy clay soil: 1 part lime: 1 part cow dung: 1 part straw.
*2. 4 parts sandy clay soil: 1 part dow dung: 1 part lime plus chopped hair.
*3. 6 clay soil: 6 sharp sand: 1 fresh cow dung: 2 chopped straw.
*4. 1 clay soil: 2 slaked lime: 1 sand: 3 chalk granules: 1 cut straw.
*5. Reconstituted decayed daub: 3 daub: 1 lime putty with 1lb hair per 3 cu. ft. added to external mix.

5.3 *Pargetting an external wall*
The term was originally applied to all forms of external rendering but today it usually refers to decorative plasterwork. The craft reached a height of popularity in the 17th century, most notably in Essex and Suffolk. A revival of the technique, executed in hard cement/sand mixes is associated with the Arts and Crafts Movement circa 1900. Most of the earlier incised work was simple in design and achieved with basic tools such as a stick, or sticks tied together in the form of a fan or a wooden comb.

The Society's advice in principle is that where a section of pargetting is in a poor state of repair specialist advice should be sought. S.P.A.B. may be able to suggest names of conservators. Where patching renewal is inevitable it is preferable not to attempt to reproduce the original pattern. A simple design to a scale similar to the original and using old type wooden tools produces a less precise finish and one nearer in feeling to the older tradition.

5.4 *Limewash*
Throughout the foregoing pages mention has been frequently made of the use of limewash to external rendered surfaces as being a traditional means of protection to the panels of timber-framed structures. Records dating from mediaeval and succeeding centuries are patchy but widespread enough to prove a well established custom. William Horman's words written in 1519 'wallys being whytlymed'[1] bears this out. It has long been the S.P.A.B.'s view that limewash treatment, if carried out proficiently, remains the best.

Cement and plastic based paints and coverings may be more readily obtainable, but apart from uncertain physical effects, (see S.P.A.B. information sheet No 4 'The need for old buildings to breathe') their use will result in a harsher and less sympathetic look than with properly applied limewash whose more subtle appearance accords better with the overall texture of a half-timber elevation. Numerous recipes can be found for preparing limewash; (see S.P.A.B. information sheet No 1 'Basic Limewash' by Jane Schofield.) It requires experience in the application of limewash to be sure of its reliability. The preferential choice of limewash for the range of buildings considered in these pages cannot be too strongly stressed.

REFERENCES AND FOOTNOTES

Refs. to Chapter 1.

(1) N. Davey. A History of Building Materials.
(2) Levi Fox, Borough Town of Stratford-on-Avon. p.40. 'Daubing' and its root form were used both for putting on the clay and producing a plaster finish.
(3) L. F. Salzman. Building in England down to 1540, pp.188–191.

Refs. to Chapter 2.

(1) Richard Carew, Survey of Cornwall 1602.
(2) For types of panel infill see C.B.A. Glossary 'Recording Timber-framed Buildings' and 'Timber-Building in Britain' by R. W. Brunskill pp.152–156; Victor Gollancz 1985.

Ref. & Footnote for Chapter 5

(*See* 'Building with Earth' by John Norton, Intermediate Technology or 'Practical Building Conservation' Vol. 2 by John and Nicola Ashurst. Gower Technical Press).

(1) W. Horman, Vulgaria, 1519.

We wish to thank members of the Committee and Technical Panel and Dr N Alcock for their comments on the original draft of this pamphlet.

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