FLAT ROOFS MADE TIGHT ROOFS,

OR,

THE YOUNG BUILDER'S ASSISTANT,

IN WHICH IS EXHIBITED THE

BEST METHOD OF PREPARING

AND

COVERING ROOFS,

ALSO,

HOW TO PREPARE CEMENT

FOR SLATING AND OTHER COVERING,

WATER PROOF, AND TESTED IN REGARD TO ITS DURATION.

IN THREE PARTS.

TOGETHER WITH

MUCH MISCELLANEOUS INSTRUCTION,

USEFUL ESPECIALLY TO THE INEXPERIENCED,

The results of Practice for more than Thirty Years

NORFOLK:

PRINTED BY T. G. BROUGHTON & SON.

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INTRODUCTION.

The proprietor of this work contemplates procuring letters patent for *particular points* herein contained, but has concluded to defer for the present, as the patent laws allow two years priviledge to use and permit to be used by others. Therefore, all purchases shall be entitled to the full use, should a patent be obtained, the same as if the purchase was made after a patent is granted. Let it be understood that all purchases will be registered, and that a transfer will not be permitted except to heirs of deceased purchasers.

When a patent is obtained it will be divided into three separate parts. First part.—Roofs, stucco, outside and imitation stone steps. Second part.—All inside works, all domestic moveable articles, and floors. Third part.—For all uses, in and on water craft.

"No patent shall be held invalid by reason of the purchase, sale or use, (of the invention,) prior to application for a patent as aforesaid, except on proof of abandonment of such invention to the public; or that such purchase, sale or public use, has been for more than two years prior to such application for a patent." Act, March 3d, 1839.

No. 18

RECEIVED *of* *of*
State of *the sum of* *in*
consideration of the above mentioned contract; also, for some one model of, or imitation sample of cemented work accompanying the same.

WITNESS,

(SEAL.)

FIRST PRINCIPLES IN ROOFING.

When a roof, for instance, is commenced in the building department, and in a proper manner, agreeable to the very letter, of the instructions herein given, *are carried out*, the roof will be free from leak, at the expense of only five or six dollars for one hundred square feet, for the covering part; but not in so durable a manner as when proceeded with further; *no undoing is ever required.* The application of paint brush and sand every four years will preserve and add to its solidity. When slate or window glass is added, the expense is increased, and the necessity of any repairs are extended in due proportion. All of which are fire-proof.

There can be no good and lasting work done unless it is commenced properly, and proceeded with faithfully.

There are three particular grounds for receiving the covers, and three different covers; when each, or either are properly attended to, the result is all the same, in due proportion to the expense as above stated.

The proprietor has tested what he terms double slate for fifteen years without any repairs, nor any are now required. This test has been on his own buildings, as an experiment here, in the city of Norfolk.

Sickly locations are frequently caused by vitiated air; the causes are all concealed from view, created by decaying wood and damp walls. There are two things necessary to *avoid*, that originate the malady. Unseasoned timber, laid in the walls, say joist; also, a leaking roof by improper copings of the brick work that rise above the roof.

The main object of this work is to communicate the knowledge of a simple and valuable water-proof Cement, and the manner of its application to roofs of buildings, whether flat or otherwise, and equally suited to wood buildings, slated or tinned, which will effectually prevent leaking and its attendant injuries.

Added to this, instruction is given in relation to the proper methods of building and repairing roofs, miscellaneous information

tables of measures, &c., useful to the young or inexperienced builder, free from technical and wordy difficulties, easy to be understood and easy of application.

No crude theory, no plausible, but untried propositions have been allowed here. What is presented is the result of the experience of the Author, a practical builder for more than 40 years; and all the confidence due to the test of experiment may be given with safety.

Nothing is more common, in planning for buildings, either from motives of taste or convenience, than to desire a flat roof, and yet every one knows the difficulty of effecting the object. Much money has been expended, much labor performed, and still the roof will leak and be subject to quick decay. The instructions here given will remove the difficulty, and at small cost obtain for every form and grade of roof, permanent freedom from the evils which have been found so unmanageable.

The directions for the right preparation of a roof are few and simple, yet a great deal depends upon a close attention to them. Erect your building by the ordinary rules. Frame your roof as usual, except so far as special direction is herein otherwise given. Joists or Rafters should be not more than 16 inches apart from centre to centre. Sheeting should not be more than 6 nor less than 3 inches in width to prevent warping.

The great difficulty in making a flat roof water-proof is at the edges, whether the edge be where the water drips at the eaves, or where the roof comes up to a wall. Unless these are made secure all else will be of no avail. The grade of a flat roof should be 2 inches fall for every 10 feet. In order to secure the drip edge, the sheeting must rest solidly on the wall of the building and be carried out even with the outside. When the wall rises above the roof as in the case of fire walls separating different tenements in the same building, when of brick, there must be a groove cut in the wall 2 inches deep and 5 inches wide,* so that the sheeting may pass beyond the joist and rest on the wall itself, otherwise the roof will spring; when the building is of wood, the sheeting must rest on the plates which must have sufficient substance to allow the

* On *old* brick buildings this groove *may be* dispensed with, and a stone imitation coping substituted, covering the brick fire wall and roof edging.

joist to be let into them so as not to rise above the plates. In a word, on all sides of the roof the sheeting must be supported by the wall of the building and not be dependent on the joist. When finished with cornice, architrave, balustrade, &c., a timber 3x6 must be placed upon the sheeting, even with the outside of the wall and firmly secured to receive posts for balustrade, &c.

The common method of preventing leaks at the edges of roofs, and round chimneys, is as follows, viz: Take an inch board 4 or 6 inches wide, make it in the form of a wedge placing the thick edge against the wall or chimney as the case may be, which will give a cant or descent. This method will answer for chimneys, provided the roof connects with the chimney by projecting bricks under the rafter or joist. If no such provision is made, iron spikes can be used to secure the sheeting and joists to the chimney so as to prevent the sheeting from settling.

No. 1.—RECIPE FOR MAKING OIL CEMENT.

Prepare a box, 4 1-2 feet long, 2 feet wide and 1 foot deep, have it made strong and tight. This size suits the proportions below and for convenient use. To 9 gallons pure Linseed Oil, (no kind of animal Oil can be substituted) add 1 lb. ground Verdigris and 5 pints of Japan Varnish, work all well together in a box with a hoe; when thoroughly mixed, add 1 keg, 25 lbs. White Lead, 25 lbs. dry Yellow Ochre, with sufficient Lamp-black to make a slate color, work all well together, take fine sand, perfectly dry and sift on, until when thoroughly mixed it forms a very thick paste. After standing for two hours, if the oil rises to the top add more sand and work it in as before, it is then ready for use.

☞ As this cement is the main thing to be relied on for a tight and enduring roof, its proper preparation is very important. Varnishes and Oils vary much in their character, therefore proportions as given here cannot always be relied on. What you want to effect by the Japan in this cement is to procure a stickiness or tack, as the painters call it; so in order not to be deceived in results—take of the oil and varnish which you intend to use, and mix a small quantity in the same proportions as given in the same recipe (i. e. 72 parts Oil and 5 parts of Varnish) and apply as paint with a brush

to any wood; if it dries you must increase the proportion of Varnish until, when thus applied it remains tacky, without drying; then make your cement with the ascertained quantity of Varnish as before directed.

No. 2.—RECIPE FOR CEMENT USED AS THE OUTTER, OR FINISHING COATING, TO STAND EXPOSED TO THE ATMOSPHERE.

Take fine sand and pure Linseed Oil, in proportions to make when mixed a thick paste, to which add, for every gallon of Oil, 1-2 lb. Litharge, and any kind of paint to give the color required.

No. 3.—RECIPE FOR COAL TAR CEMENT.

Take equal parts of fine sand, and dry fine sifted clay, and mix up with a sufficient quantity of Coal Tar to form a thick paste. The Tar should be worked in a warm state, say at 80 degrees Farenheit.

☞ Coal Tar is a cheap article and by experience it is not affected by frost; it never blisters by the hot rays of the sun, it melts and gravitates by heat, never rises in blisters like pine Tar, therefore it requires all preparations requisite to retain it; a level surface, with an edging to keep it within bounds, are necessary.

DIRECTIONS FOR COVERING A FLAT ROOF WITH SLATE, IN OIL CEMENT, (DOUBLE THICKNESS OF SLATE.)

(Sheeting from three to four inches wide.)

Lay the sheeting open, say 1-2 half inch between each, course, and nail strong, following directions for edges already given.—Prepare good lime mortar, well haired and very stiff; bed the slate in this mortar close together, but without lapping, and break the joints every course. When dry, take Oil Cement, (Recipe, No. 1.) and spread over the layer of Slate a sufficient quantity to fill all cavities and make an even surface. Rub the Slate for the second layer into this Cement until no more can be pressed out, breaking joints with the first layer. Clean off all surplus Cement,

filling the joints so as to present an even surface, and the work is done. See note A.

☞ Common window glass, say 6x8, may be substituted for slate and laid in the same way, and will make a very firm and good covering. When Glass is used, take any kind of cheap paint and coat it over, sifting on sand as you proceed. White Lead mixed with Verdigris is the most permanent for the first coat. The sand should be sifted on each coat until a solid body is obtained.

TO COVER FLAT ROOFS WITH SINGLE LAYER OF SLATE.

Take cheap Cotton Cloth and coat it with a preparation of Linseed Oil, Verdigris and Yellow Ochre; 1-4 lb. Verdigris and 1 lb. Ochre to a gallon Oil. When perfectly dry, nail to the sheeting, then apply the Oil Cement, and proceed as above directed for the second layer, being careful to place the smooth sides and edges next to the sheeting, and breaking joints as before.

TO SECURE THE DRIP EDGE FROM LEAKING.

The sheeting being brought out even with the outside of the wall, as before directed, take strips of copper, 4 inches wide, locked together at the ends, and screw down to the sheeting, giving a lap of 1 1-2 inch, thiswill leave a projection of 2 1-2 inch copper; bend this copper down in an easy curve for the escape of the water; and finish the outside edge of the sheeting with slate, &c., as other parts of the roof.

☞ Instead of a drip edge as above, the joists may be graded in such a manner as to throw the water off through a copper tube, leading into a perpendicular conductor outside of the building, and thus all four sides of the roof present the same appearance—as follows, viz:—

In grading the joist, let one corner of the roof be 3 inches lower than the other three corners; at the low corner, insert an oblong square copper pipe, say 2 by 4 inches, and straight; the end next to the roof will then admit of being turned and secured by screws to the sheeting and cant board (as it will pass through the cant

board) before the slate is laid. When a straght pipe is thus laid, having a proper descent, it is not liable to be clogged or choaked with dirt that may accumulate upon a roof.

TO SECURE FROM LEAKING WHERE THE ROOF COMES UP TO A PARAPET OR FIRE WALL.

The sheeting being properly let in the groove in the wall, and resting firmly as before directed, an inch board, 4 1-2 inches wide, called a cant board, must be prepared like a bed mould or cornice, and placed within the groove, so that the upper edge will meet with the upper back corner of the groove and the other edge project and rest upon the sheeting, making the cant board an inclined plane. Fasten this board firmly, and nail a strip of canvass on the sheeting, and continue up to the top edge of the cant board, and lay with slate in Oil Cement to the top edge of the board, being careful to have the slating, when finished, meet evenly with the slating on the roof.

COAL TAR AND SLATE FOR ROOF.

Let the joists be graded on a perfect level; sheet as before; carry the cant board entirely around the four sides, forming a perfect tray; and at one corner, or as you may wish for convenience, insert a copper pipe as before directed to carry off the water, nail cotton cloth upon the sheeting and up the cant board, lay the cant board with narrow slate in *Oil Cement*. Take Coal Tar Cement and cover the roof in the same manner as directed when double slate and mortar is used, only lay both coats of slate with the smooth side and edge down. Lay over all a thick coat of clear Tar, and sift on sand and clay, half of each, as much or more than the Tar will absorb, so as to form a solid body. See note B.

TO COVER FLAT ROOFS WITH CEMENT ONLY.

Lay the Joists lengthwise, with the drip 12 inches from centre to centre; the outside joist must be bedded in the wall, so as to form the bottom of the 2 inch groove, that is mentioned elsewhere,

provided a fire-wall is to become the finish. If otherwise, the outside joist should be bedded flush with the top of the wall, that the covering can butt up against the before mentioned 3x6 timber (as mentioned elsewhere for securing posts for balustrade.)—To commence the covering, take sawed laths, not exceeding 3-4 inch in width and 1-2 inch in thickness, straight, sawed, rough edges put together, well nailed on the joists with small nails, plentifully used. When thus nailed on, paint over with a very thick coat, prepared in the following manner, viz: Best linseed oil for the fluid part, 2 lbs. verdigris to one keg, (25 lbs.) of common white lead, 25 lbs of dry yellow clay or ochre finely pulverised and sifted through a fine sifter, and 2 lbs. litharge—after the first coat add two pints Japan varnish, as a dryer. As you proceed in painting, have on hand a quantity of fine dry sifted sand, sprinkle enough on the paint to show itself as a thin even coating, perform this with a tin box similar to a pepper castor; when dry lay the cant boards around the edges (as described elsewhere) with the difference of embeding them in oil cement, and screw them on with suitable wood screws. Then a second, third and fourth coat of paint, as the first, laid on very thick and all openings well filled, including the cant board, all plentifully sanded as the first coat; at the expiration of six months, leak or no leak, repeat the process of paint and sand, one good coat. All future repairs are managed in the same way.

NOTE.—Lath should be made with a circular saw, from 3-4 or 1 inch board, that have had an exposure of at least two years to the open air. White Pine, Cypress or Chesnut, all should be straight rift and no sap wood used, neither any resinous wood.—The drip edge finished as the slated roofs are described.

COST OF ROOF WITH SQUARE LATH.

Square lath for sheeting and used for cement only,	$ 6,00
Deduct from, for common sheeting, not now required,	3,00
	3,00
Slate and cementing to cover,	6,00
Whole cost,	$9,00

Square lath, as above stated, with mineral veneer, will cost nine dollars per square, then three dollars may be deducted for sheeting, (which must be done for common slating or tining,) which brings the difference, say nett cost at $6,00.

REMARKS ON THE USE OF LATH FOR A GROUND WORK.

The application of lath and only oil cement for roofs has only been tested two years. According to the experiment thus far, there remains no doubt of the practicability. *Certain precautions are necessary.* In the first instance, it being well ascertained that oil cement is one of the most durable compositions now extant, when affixed on any substance to hold upon. In a decaying state it is only necessary in renewing the life and solidity of it without the loss of substance, by the application of the paint brush, and without any mechanical genius to affect the cure.

☞ Lath 3-4 or an inch thick, say square, secured to joist only, is the best method to pursue. The first precaution is to use narrow laths. The second is to form the lath from the outer part of the log; for instance, when a log is squared, suitable for making square edged boards, the first boards that are free from sap are only suitable for laths. The boards of themselves, are the most liable to shrink, and also to warp, as the grains of them shew a feather print; those prints are composed of a hard horney fibre that oil cannot penetrate; but when the saw makes the lath from such boards, those fibres form but a small part of the surface, and the softer, more yielding pores pass through the lath, giving the oil a greater tenacity than is otherwise possible to be obtained. A third precaution, kiln dry the laths, the surest seasoning. There is one object surely to be obtained by the above experiment. It will form the most suitable ground for receiving slate or glass covering, and is recommended for such an application, and will diminish very materially the expense. Small sized slate are to be preferred rather than large, also the same precaution for glass, one layer on the above mentioned ground is considered sufficient.—Cheapening the expense has been the only motive of the above mentioned experiment. Note E.

FOR PLASTERING LATH.

The cheapest lathing and also the best for a plain surface is the following, viz: Take boards sawed from quarter stuff, as elsewhere described, say 3-8 or 1-2 inch thick, the width immaterial, check them with an axe or other machine, made for that purpose, at a width not exceeding 3-4 of an inch at short intervals, not leting the splits run into each other, when it can be avoided. Use Cypress or Chesnut.

TO CEMENT COMMON PITCHED ROOFS.

When one course of slate is nailed on in the ordinary way, take Cement, (Recipe, No. 2,) and fill all the joints and nail holes that are to be covered by the next course of slate and thus proceed until all the roof is covered, leaving the joints open that are exposed to the weather. When this is done begin with the top course and fill all down to the drip; let it not be disturbed in any way until it becomes hard. The advantages of this plan are that cemented slates will not be driven off by the wind or loosened in the nail holes. Whenever any decay appears, make use of any common slate colour paint, draw the joints with a sash tool, when dry apply a second coat and sift fine sand on it as you proceed and the cement becomes perfectly renewed as when first put on. See note E.

REPAIRING.

The following course is practicable in repairing, both old and new slate roofs, where slates are missing, &c. The bare, open joints are filled with oil cement, also, cement put upon the slates each side of the joints, a sufficient quantity to hold the slate that is required to fill the vacancy, then rub the slate firmly down, no nails being used or required, the cement being a substitute. Then all the joints leading up and down, the roof must be well filled with the cement and when filling, thrust as much as you can under the covering slates, that being the most critical part to perform;

'n this way you find the leaks that are not discernable, miss none of the joints and you will make sure work. The tool used is a spring steal glazing knife, drawing the knife with a curving stroke upwards assists in throwing the cement well under the covering slate. The horizontal joints are all to be left open that the water may run off freely. When the cement becomes dry you may walk on the roof without any fear of breaking the slates, it will then be as firm as a pavement. You will frequently discover fine cracks in the cemented joints, but these are not caused by the contraction of the slate, but by the cement not receiving sufficient pressure, when layed and from other couses, as when one or both edges of the slate at the joints are square, it prevents a proper pressure with the knife, when the meeting edges are levelled as they mostly are, a counterstink groove is formed and gives a fair opportunity to fill the cavity solid. Such crevices are no detriment, provided a little attention is given by the workman, only apply the oil cement, reduced with oil with a sash tool, and all will become solid. A common slated roof by the above process is guarded against the difficuities to which they are commonly liable, as when the slate becomes loose by nail rust, when they are cracked or missing in whole or in part, or when the workman has not given sufficient lap, which is sometimes done in order to save a few shillings in the cost of slates. See note D.

TO POINT ROUND CHIMNEYS.

Fill between the slate or glass as the case may be, and the chimney somewhat rising on the chimney side, wet the chimney thoroughly, apply good strong lime water, about six inches up the chimney, leaving it about 5-8 of an inch next the roof, and gradually inclining to not over 1-8 of an inch at the upper edge.—When the first coat is dry, wet thoroughly again, and apply a second thin coat, well wet and rubbed on with both brush and trowel; This last coat to be hydraulic cement; two parts hydraulic and three parts coarse sand. When a chimney is to be stuccoed, the stucco itself will answer instead of the above mentioned second coating.

In all pointing, where large cavities are to fill, after the mortar is applied, fill in with small brick pebbles as long as there is space

to receive them, when dry, finish with hydraulic as above described. Hydraulic should never exceed 1-4 inch in thickness and at top let it come to a perfect edge. N. B.—Apply as above described to fill the brick groove above the cant board on fire walls.

When the carpenter has completed the sheeting, the cant boards on all the edges, and levelled the sheeting suitable for laying a roof of one thickness of slate or glass, it will be well to count the cost for 100 feet, that being a square by term.

12 yds. cotton Cloth, 1 of do. for strips under nail head,	$ 0.75.
1 m: 14 oz Tacks, 2 galls. Linseed Oil, for Cement,	1.60
2-5 square Slate, as sold for common lap covering,	2.50
Labor, &c. - - - -	2.00
Nett cost for slate, - -	$6.85
Deduct cost of Slate as above, - -	2.50
	$ 4.50
Cost of Glass instead of Slate, - -	5.00
Nett cost for Glass covering, - -	$ 9.35

For double Slate—4-5 square of lap slate as sold, -	$5.00
2 bushels Mortar, 75c.; Japan 50c.	1.25
2 gallons Oil, for Cement, 75c.	1.50
Labor, - - -	4.00
Nett cost for double Slate, - -	$ 11.75

For Coal Tar Cement—Cotton cloth and Tacks, -	0 87
Slate, 2.50, - -	2.50
Coal Tar, 3 galls. for Cement,	0.50
Labor for single layer, -	1.50
Nett cost for single Slate, - -	$ 5.37

Second hand Slates are as good as new when they are bedded in Cement. Nail holes are no detriment whatever. For edging slates, covering the cant board are best secured by screws, so that they may not get out of place before dry.

A flat roof is not only frequently preferred for its appearance, but can always be built at much less cost. This will be evident from the following estimate:—

For convenience, base your calculations on a building 24 feet square. In a roof of common pitch for a house of that size, there will be 192 feet more than in a flat roof, not reckoning any projection for the eaves.

The surface of common roof to be covered is 768 feet. The gable ends 252 feet, in all 1020 feet.

Lumber for roof, wastage included, may be estimated at 3 times 768 feet, say 2304 feet, $15 per M.,	$ 34.56
Labor, hauling and nails, equal to lumber, -	34.56
Materials for slating, Gables, Labor, &c., counting 1020 feet, $10 per square in gross, -	102.00
Estimate per cost of pitch roof, -	$171.12

As in a flat roof you employ no labor or material but what must be also in a pitch roof you have only to estimate the cost of the covering, viz:—

The square of 24 is 576 feet, which is the surface of flat roof to be covered, which at the cost of $10 per square for materials and labor, amounts to - - 57.60

This deducted from cost of pitched roof shows a difference in favor of flat roof, same size of . - $113.52

☞ The meaning is thus—Tne garret floor that is necessary for a pitch roof, forms the sheathing for a flat roof.

HOW TO SECURE A HOUSE FROM DAMAGE BY WATER WHEN A PITCH ROOF IS TAKEN OFF AND ONE STORY ADDED WITH A FLAT ROOF.

It may be be done by carpeting the garret floor, rough cast only when perfectly dry and hard, lay boards on it loose, when all is completed, take away the rough boards, and lay on a polishing

coat, (*a temporary* combing may be laid round the stair. Refer to Appendix.

When the owner of a house of the above size with a pitch roof wishes to add a story and finish with a flat roof, what will be the expense?

Allowing for the joists, they being let into the wall, the height of the back and front walls will be 9 feet—therefore, twice 24 is 48 feet, by 9 gives 432 feet, and the gable ends, 20 by 9 gives 180 feet, making a total of brick work, 1 brick thick, 612 feet; 80 feet being calculated to the 1000 at $8 per M., or what is equivalent, 10c. per foot is - - - - $ 61.20

There being neither slate boards nor timber to be purchased in alteringa pitch roof to a flat one, you only have cost of labor in taking down one and repairing the other —say - - - 40.00

Covering 576 feet the square of the building with slate and oil cement, 10c. per foot. - 57.60

6 Windows, 12 lights, 10x14, $5, blinds not included, 30.00

$ 188.80

Deduct for price of Slate, (as the above is calculated at full prices and the old slate is used.) 11.52

$ 177.28

Add 1-4 for detention from weather. &c., Scaffold &c. 44.25

$ 221.53

If a house be 30x26 how much more brick wall would be required, the pitch being the same as the house 24x24?

Ans: 36 feet only.

In a flat roof 30x26 there is 204 feet more than a roof 24x24.

The difference between the area of a building 10 feet square and one 20 feet square is 300 feet.

What are the superficial contents of the two buildings each 10 feet high?

Ans: The 20 feet building is 800, and area 400—1200.
The 10 " " is 400, " 100— 500.

Thus it will be seen that a building 20 feet gives an area of 3 times more than a building 10 feet, although the enclosure is only 7-12th more for the one than the other.

Examples, showing how to calculate for Rafters and to obtain number of feet in a roof of given size.

In a building the span of 24 feet, where the rafter is two thirds the span, or 16 feet, its double multipled by the span gives its superficial contents, thus—

Two sevenths of the base line is a good height for the pitch of a roof. Rafters about 14 ft. long for 24 span and 2-7ths in height is 6 feet, 10 in's.

16
2
—
32x24
32
—
48
72
—

768 superficies of pitched roof.

For flat roof same size—

24x24
24
—
96
48
—

576 superficies of flat roof.

In a building 30x26. Length of rafter 20 feet, thus—

20
2
—
40x26
40
—

1040 superficies of pitched roof.

For flat roof, same size—

30x26
30
—

780 superficies of flat roof.

To estimate the lumber required in a wood building, for frame weather boarding, flooring and roofing:—First, find the accurate

superficies of the whole building intended; multiply it by three, and it will come very near the quantity required. The framing laid out in all its parts of distances of 16 inches from centre to centre.

TO MEASURE PLASTERING.

Say the wall of a room is 20 feet, 7-10ths long, 8 feet, 5-10ths high, how many feet does it contain? Example—

```
20 7
  85
-----
 1035
1656
-----
175 95 Ans. 175 feet—95-100.
```

To get the number of yards, divide the product by 9, the number of square feet in a yard, as

```
9)175.95(19 yds. & 4 feet 95-100.
  9
-----
  85
  81
-----
   4
```

Or take a measuring rod, 3 feet in length, space it off in ten equal parts, and each tenth in ten parts, or hundreth's, like Federal money, so that your yard will count as a dollar, tenths as dimes and the 100 as cents.

Example, the wall of a room measures 6.45 long and 2.65 high. What is the number of yards?

```
  645
  265
-----
 3225
3870
1290
-----
17.09.25
```

Ans. 17 yds; 9-100; 25-100

A space, 4 yds. and 75-100 long, and 2 yards 85-100 high, what is the measurement?

475
285
2375
3800
950
13.53.75

This rule applies to the smallest spaces, as where less than a yard, as if 1 yard, 20-100 one way and 95-100 the other, thus—

120
95
600
1080
1.14.00

SIMPLE TABLE FOR CHANGING INCH MEASURE INTO DECIMALS.

In.	*Dec.*
3	2 1-2 10
6	5 10
9	7 1-2 10
12	10 10

FOR CHANGING INCHES IN YARD MEASURE INTO DECIMALS YARD MEASURE, (NEARLY.)

Inch.		*Dec.*	*Inch.*		*Dec.*
1 3-4	is	5-100	19 3-4	is	55-100
3 5-8	is	10-100	21 5-8	is	60-100
5 3-8	is	15-100	23 1-4	is	65-100
7 1-4	is	20-100	25 1-8	is	70-100
9	is	25-100	26 7-8	is	75-100
10 7-8	is	30-100	28 3-4	is	80-100
12 3-4	is	35-100	30 1-2	is	85-100
14 1-2	is	40-100	32 3-8	is	90-100
16 1-4	is	45-100	34 1-8	is	95-100
18	is	50-100	36	is	100

A TRYING SQUARE CORRECTOR.

A builder of any department requires three main helps, or rather standards as correct guides, that gives strength to the edifice and beauty, with ease to the eye of the beholder. Those are the plumb, rule, level and the square; this last mentioned, the square, is of the utmost importance in the wood department, particularly in the finishing parts.

It is considered by some employers to be a duty to themselves, when a new hand enters their service, to cast an eye at their implements, and as the trying square is a principal governor of all dressed frame work, the inner joints are liable to be open; he will of course look to the correctness of the trying square. As this implement commonly, or we may say, is generally corrected by reversing the guard on a straight edge, until the blade will form a perpendicular line. When thus done, take a block of suitable size for the length of the blade, then try up this block on all sides, following up all one way with the guard; then reverse the guard and the blade will not fit down to the block next to the guard, then alter the blade, until it will fit a block on every two sides when the guard is reversed, and all frame work joints will be perfect, according to the dressing of the stuff.

ECONOMY IN TIMBER.

In common sized dwellings, a saving of timber, and at the same time strength to the edifice, is gained by sizeing the timber, viz: For sills, 3x8 for posts, 5x5 or 6x6 for studs, 2x5 or 2x6 to match the posts: for joists 2x8, and 2x6 for upper, with ⋈ bracing laths at the centre of the span nailed in; Girders, 2x5 let in the studs, flush inside; the studs being whole height of a two story dwelling, braces same size, let in flush outside. Plates 4x6; Rafters 2x5.

DRY MEASURE.

The following measurement of dry measure is at the rate of 2160 cubic inches to the bushel, being 17 inches less than what is termed the Winchester bushel, and nearly 10 inches more than

the standard, or the cylindrical measure, as commonly used, that being 18 1-2 inches diameter, and 8 inches deep, contents are 2150 inches, calculated as follows, viz:

18 1-2
18 1-2

144 the 1-2 inches are 18 on two sides, make
18 18 whole inches.
18

342 inches the superficial contents, except the
8 deep, 8 1-2 inch at the corner, that being 1-4
2736 cubic only, and to be brought in here-
after.

2736
The eight 1-4 is 2 whole inches.

Whole contents, 2738
Multiply by 7854 The arbitrary numbers shewing the capacity of any
10952 circle within any cube
13690 or cylindrical body.
21904
19166

2150,42,52

The following table is made out on a square box, principal being plain to comprehend, and to apply practically. 2160 cubic inches make one cubic foot and one quarter.

	Qts.	*Pts.*	*In.*	*In.*	
2160 inches,	32	00 a box	12 broad	15	deep, 1 bus.
1080 do.	16	00 do.	12 do	7 1-2	do do.
540 do.	8	00 do.	12 do	3 3-4	do 1 peck
270 do.	4	00 do.	6	7 1-2	do 1-2 do.
135 do.	2	00 do.	6	3 3-4	do 1-4 do.
67 1-2 do.	1	00 do.	6	1 7-8	do 1 quart.
34 3-4 do.	1	1 do.	6	15,16ths	do 1 pint.

What are the contents, in dry measure, of a cart body, 7 feet long, 3 feet 6 inches wide, 18 inches deep.

3 feet, 6 inches wide is		42	inches.
1 " 6 " deep		18	"
		336	
		42	
		756	
Multiply by length is		84	inches.
		3024	
		6048	
Divide by	2160)	63504	(29 bushels, 1 peck, 4 quarts
		4320	
		20304	
		19440	
		864	
		540	is 1 peck.
		324	
		270	is 1-2 peck.
Remainder,		54	is less than 1 qrt, 13 1-2 inches.

A METHOD TO APPLY DECIMALS FOR MEASURING TIMBER AND BOARDS, MAKING USE OF WHOLE NUMBERS.

Take a two foot rule, on one edge, of one foot, space it in ten parts, then each part in tens, thus—10, 20, 30, 40, 50, 60, 70, 80, 90, 100. Make use of this part of the rule for all fractional parts of a foot, then all your workings are in whole numbers.

EXAMPLE.—A stock 12 feet, 6 inches long, and 1 foot, 6 inches square, the cubic feet are required, also the superficial inch measure, (say inch thick.)

Length,	125	
Square	15	one side.
	625	
	125	
	1875	
Square of	15	the second side.
	9375	
	1875	
Cubic.	28,1,25,1000	
	12	
	56250	
	28125	
Superficial,	337,5,00-1000	

Read 28 cubic, one hundred, 25 thousandths, 337 feet, 5 tenths superficial measure.

A mathematical foot, linear, is divided into 1000 parts, and represents one foot the figure 0001 at your right hand represents one thousandth part of a foot, which is decimals.

When the allowance is made for saw calf, of one-fifth, the cubic feet and parts will be the superficial inch measure.

Thus 281 feet, 25, 100 or one quarter of a foot without any further working than to the cubic foot.

BOARD MEASURE.

A KEY TO THE ANNEXED TABLE.

A board is 17 feet long, and 8 inches wide, contains 11 feet, 4 twelfth's of a foot, or say 4 inches. If the board was 16 inches wide, say 11-4—11-4 is 22 feet 8 inches.

A board 21 feet long, and 21 inches wide, take the inches, 10 and 11 make 21, add both of their contents together thus 17.6

19.3

36.9

Make 36 feet, 9 inches.

This table for whole feet in length, and whole inches in width, giving the *contents*, including the fractional parts—by twelfths. When there is fractional parts in length or width, divide the contents of the given feet or inches, as may be, with the contents beyond at the next foot or inch as the case may be, as for,—Example. If a board is 8 feet 6 inches long, and ten inches wide, the answer is found on the table 6 feet 8, the next below is 7 feet 6, the difference is *ten* inches, the one half must be added to the 6 feet 8, and will make the contents as required, *seven feet, one inch.*

When this table becomes familiar to any one, scantling and timber can be measured—finding the accurate fractional parts with about one half, or less work in the casting up, than is common ly done without it. Also to obtain the fractional parts of feet in yard measure, when worked by feet and inches.

Inches in width.

Feet in Length.	1	2	3	4	5	6	7	8	9	10	11	12
1	—	1-12	—	2-12	—	3-12	—	4-12	—	5-12	—	6-12	—	7-12	—	8-12	—	9-12	—	10-12	—	11-12	1
2	—	2-12	—	4-12	—	6-12	—	8-12	—	10-12	1	——	1	2-12	1	4-12	1	6-12	1	8-12	1	10-12	2
3	—	3-12	—	6-12	—	9-12	1	——	1	3-12	1	6-12	1	9-12	2	——	2	3-12	2	6-12	2	9-12	3
4	—	4-12	—	8-12	1	——	1	4-12	1	8-12	2	——	2	4-12	2	8-12	3	——	3	4-12	3	8-12	4
5	—	5-12	—	10-12	1	3-12	1	8-12	2	1-12	2	6-12	2	11-12	3	4-12	3	9-12	4	2-12	4	7-12	5
6	—	6-12	1	——	1	6-12	2	——	2	6-12	3	——	3	6-12	4	——	4	6-12	5	——	5	6-12	6
7	—	7-12	1	2-12	1	9-12	2	4-12	2	11-12	3	6-12	4	1-12	4	8-12	5	3-12	5	10-12	6	5-12	7
8	—	8-12	1	4-12	2	——	2	8-12	3	4-12	4	——	4	8-12	5	4-12	6	——	6	8-12	7	4-12	8
9	—	9-12	1	6-12	2	3-12	3	——	3	9-12	4	6-12	5	3-12	6	——	6	9-12	7	6-12	8	3-12	9
10	—	10-12	1	8-12	2	6-12	3	4-12	4	2-12	5	——	5	10-12	6	8-12	7	6-12	8	4-12	9	2-12	10
11	—	11-12	1	10-12	2	9-12	3	8-12	4	7-12	5	6-12	6	5-12	7	4-12	8	3-12	9	2-12	10	1-12	11
12	1	——	2	——	3	——	4	——	5	——	6	——	7	——	8	——	9	——	10	——	11	——	12
13	1	1-12	2	2-12	3	3-12	4	4-12	5	5-12	6	6-12	7	7-12	8	8-12	9	9-12	10	10-12	11	11-12	13
14	1	2-12	2	4-12	3	6-12	4	8-12	5	10-12	7	——	8	2-12	9	4-12	10	6-12	11	8-12	12	10-12	14
15	1	3-12	2	6-12	3	9-12	5	——	6	3-12	7	6-12	8	9-12	10	——	11	3-12	12	6-12	13	9-12	15
16	1	4-12	2	8-12	4	——	5	4-12	6	8-12	8	——	9	4-12	10	8-12	12	— —	13	4-12	14	8-12	16
17	1	5-12	2	10-12	4	3-12	5	8-12	7	1-12	8	6-12	9	11-12	11	4-12	12	9-12	14	2-12	15	7-12	17
18	1	6-12	3	——	4	6-12	6	——	7	6-12	9	——	10	6-12	12	——	13	6-12	15	——	16	6-12	18
19	1	7-12	3	2-12	4	9-12	6	4-12	7	11-12	9	6-12	11	1-12	12	8-12	14	3-12	15	10-12	17	5-12	19
20	1	8-12	3	4-12	5	——	6	8-12	8	4-12	10	— —	11	8-12	13	4-12	15	——	16	8-12	18	4-12	20
21	1	9-12	3	6-12	5	3-12	7	——	8	9-12	10	6-12	12	3-12	14	——	15	9-12	17	6-12	19	3-12	21
22	1	10-12	3	8-12	5	6-12	7	4-12	9	2-12	11	——	12	10-12	14	8-12	16	6-12	18	4-12	20	2-12	22
23	1	11-12	3	10-12	5	9-12	7	8-12	9	7-12	11	6-12	13	5-12	15	4-12	17	3-12	19	2-12	21	1-12	23
24	2	——	4	——	6	——	8	——	10	——	12	——	14	——	16	——	18	——	20	——	22	——	24

TO FIND THE CIRCUMFERENCE OF A CIRCLE.

The diameter being 12 inches, what is the circumference?

EXAMPLE.

As 7 is to 22 what is 12?

12
22

24
24
---
7)264($37\frac{5}{7}$ in. ans.
21

54
49
---
5 remainder.

Or as 113 is to 355 what is 12?

12
355

60
60
36
---
113)4260($37\frac{79}{113}$ ans.
339

870
791
---
79 remainder.

The inverse rule—A circumference is found, find the diameter—circumference is 42

Say 7 22 42

7
---
22)294($13\frac{8}{22}$ ans.
22

74
66
---
8 remainder.

A circle—The diameter being twelve inches, what is its outer square?

12
12

24
12
---
144 ans.

What is the inner square of a 12 inch circle? Answer: 8 1-2 inches. How is it produced? that being the hypothenuse of a right angle tri-angle, the legs of the right angle being equal in

length, say 6 inches; for example say 6 times 6 is 36, being the square of each leg, added together make 72 inches.

The nearest square to be equal is 8 1-2 inches.

Multiplied 8 1-2

64

The 8 half inches 8 on each side make

out an equal square 72 but there is yet a remainder of the 1-2 inch at the corner, being only 1-4 of a square inch, and allowance is made to work or practice by.

There are numbers that have no remainder, and are accurate, making a long and a short leg to form the right angle and accurate hypothenuse.

Leg.	Leg.	Hypot.	Leg.	Leg.	Hypot.	Leg.	Leg.	Hypot.
3	4	5	6	8	10	18	24	30
3	4	5	6	8	10	18	24	30
9	16	25	36	64	100	144	96	900
						18	48	
	25			100		324	576	
							900	

TO FIND THE CONTENTS OF A ROUND TAPER BUCKET.

Diameter at the top 12 inches, diameter at the bottom 8 inches, perpendicular height 10 do.

Centre diameter,	10	do. being the middle of the taper.
In diamater is	10	do. multiplied.
	100	
	10	do. the height.
Answer	1000	Square inches whole conten's.
Multiply by	7854	Being the arbritrary numbers in all cases of round or cylindrical bodies.
	4000	
	5000	
	8000	
	7000	
	785,4000	
One peck is	540	inches
	245	remainder
2 qts. or 1-2 peck is	135	inch 2 quarts
	110	remainder
	$67\frac{1}{2}$	inches 1 quart
	$42\frac{1}{2}$	remainder
1 pint	$33\frac{3}{4}$	inches 1 pint
	$8\frac{3}{4}$	remainder

Allowing 29 cubic inches for one pint, *wine* measure, what is the contents of the above mentioned bucket? 785 inches the capacity.

29)785(27 pints is 3 gallons, 3 pints.
58

205
203

2

Beer measure, allowing 35 cubic inches for one pint, is 2 gallons, 3 quarts and 1-2 pint, nearly.

The above mentioned rule is applicable to find the contents of barrels.

HYDRAULIC.

When Jets are executed in the best manner, the resistance of of the air only will cause them to fall short of the height of their reservoirs in the following proportions:

From these facts, it is determined that as often as a five foot jet shall be contained in the height of any jet proposed, by so many inches, multiplied or squared, the surface of water in the reservoir which supplies it should exceed that jet in height.

Jet. Feet.	Resv. Feet.	Inch.
5	5	1
10	10	4
15	15	9
25	27	1
35	39	1
45	51	9
55	65	1
65	79	1
75	93	9
85	109	1
95	125	1
100	133	4

N. B.—To multiply it, say once 5 in 5 is 1 inch, two fives in 10, say 2 times 2 is 4, three fives in 15, say 3 times 3 is 9, five fives in 25, say 5 times 5 is 25 inches added to 25 feet is 27 feet 1 in.

[*Domestic Cyclopœdia.*

Specific gravity of water is about 28 cubic inches to the pound.

Do. do. iron do. 4 do. do. do.

A firm piece of white pine wood, pattern for iron casting, the weight may be nearly ascertained thus,—one oz. of pattern to make one one lb. of iron.

A cubic foot of foot of water is nearly 1000 oz.

A gentleman has a tract of land, containing ten thousand, five hundred, sixty two and one half acres in a square body, he calls on a carpenter to inclose the same, he desires to know what it will cost per panel, and how many panels it will require to inclose it, at the same time observing that one panel or less of eight feet, three inches in length must inclose an acre.

An acre contains $10,562\frac{1}{2}$ 160 Rods.

633720
10562
80 Rods the half acre.

The exact root of 1,690,000 is 1300 when multiplied.
1300

By itself is the area 390000
1300

1,690.000 thus agrees.

Thus 1300 includes one side.
4

5.200 Rods.
2

Ans. 10,400 half rods, 8 ft., 3 in.

Suppose the Earth to be a round body 8000 miles in diameter, how many cubic miles does it contain?

EXAMPLE.

8000
8000

0000
0000
0000
6400

64,000,000 sqr. sur.
8000

00000000
00000000
00000000
512,000,0000

Cubic 512,000,000000 square
Arbitrary Nos. 5236

30720000000000
1536000000000
1024000000000
2560000000000

268,083,200,000(0000

The Earth as considered by Astronomers to be 7930 miles in diamter, and to contain 261,170,000,000 cubic miles.

For answer,—read two hundred and sixty eight billions, eighty three millions, two hundred thousand cubic miles.

Linear Measures.
12 inches—1 foot.
3 feet—1 yard.
6 feet—1 fathom.
16½ feet—1 rod.
5½ yards—1 rod.
4 rods—1 chain.
40 rods—1 furlong.
320 rods—1 mile.

Root.				Square.	Cube.
2	times	2	is	4	8
3	"	3	is	9	27
4	"	4	is	16	64
5	"	5	is	25	125
6	"	6	is	36	216
7	"	7	is	49	343
8	"	8	is	64	512
9	"	9	is	81	729
10	"	10	is	100	1000

Square Measures.
144 inches—1 foot.
9 feet—1 yard.
36 feet—1 fathom.
272¼ feet—1 rod.
30¼ yards—1 rod.
16 rods—1 chain.
1600 rods—1 furlong.
102400 rods—1 mile.
10 chains—1 acre.
640 acres—1 mile.

Squares applicable for Roots.			
4	is		16
9	is		81
16	is		256
25	is		625
36	is	cubes of	1296
49	is		2401
64	is		4996
81	is		6561
100	is		10000

Solid Measure.

1728 cubic inches, 1 cubic foot.
27 cubic feet, 1 cubic yard.
4492⅛ cubic feet, 1 cubic rod.
282 cubic inches, 1 ale gallon.
231 cubic inches, 1 wine gallon.

1 is a cube, as 1 inch or foot; 8 is a cube by compact equals, for instance, a cubic inch has 8 half inch cubes, also, 64 quarter inch cubes.

A LEAKY BRICK WALL

Can easily be made tight by the following methods, unless the wall is cracked, viz:—Procure an iron plate, two inches wide, 1-4 of an inch thick, about 6 inches long, one end to form an angle of about 22 degress, the point of this angle to be hardened steel, the faulty places will be found at the end of the brick; take the point of this plate, (which we will now term punch,) at the top of the

joint, then give a moderate stroke with a hammer, the punch will enter the wall, leaving an aperture to be filled with good pointing mortar.

THE BEST MANNER OF FILLING FAULTY JOINTS IN BRICK WORK, ALSO, TO THROW OIL CEMENT UNDER THE COVERING SLATE AT THE JOINTS, WHEN REPAIRING OLD SLATED ROOFS.

Take a hand bellows, cut off the pipe about one inch from the band that binds it to the wood, have shifting pipes that will shut tight on the stump pipe, the points made to suit the cavities,—fill the shifting pipe with fine mortar or cement, as may be required, and place it on the stump pipe of the bellows, then throw in and fill the cavities to your liking.

If the wall is thoroughly wet, the pointing can be done with a a small pointing trowel very neatly by a careful hand, dispensing with the use of the bellows.

APPENDIX.

The first and only motive of this small work was to communicate to the public what practical experience had arrived at, and thoroughly tested by time. But just in the act of putting it to press many inducements presented themselves to secure all by patent that was patentable, making additions by way of Appendix, which are presented as follows:

In review first, the intention was to give light to the inexperienced builder, at the commencement, to form a permanent roof that could be conveniently repaired whenever it was found in a decayed state.

The second was, that a trifle extra expense, at the first onset in covering a roof in a permanent manner was money well invested. The third was, to give unto him, whose money was expended to hold in his hand a partial guide to know how the work should be performed, and the materials necessary to become most durable. The fourth is intended to give some light on the qualities of painters' colors as to their tenacity. Verdigris stands No. 1; is of a thin transparent body, and when properly applied has the greatest tenacity and durability. As a paint, it is apt to become too dark by age to please the eye; but in some measure this is obviated, in reducing it for use with ochre, and it requires two substantial coats (three is better) of lead paint, tinged with black and ochre, before the Verdigris is applied.

Spanish Brown and French Ochre rank next, as a weather paint. American Ochre is a fine searching material, to penetrate the pores of the wood; but it does not possess that lasting quality of the mineral particles that are in the French Ochre. Spanish Brown possesses the mineral, though of a coarser texture. White Lead, the base of mostly all painting, decays by exposure the soonest of any colour in use, notwithstanding it is the best preservative for wood under other colours of any, red lead excepted.

The above observations are made to shew the utility of a mineral that is not ductile, except by the influence of a powerful heat; neither is it malleable or corrosive. White sand is the mineral referred to. It is of the diamond class, it absorbs but a small quantity of oil, and therefore requires little to hold it together, or to renew its life, when in a decaying state. Copper, Lead, Iron and Tin, all of them have their corroding qualities. The two first mentioned in paint composition, are in application, particles of the finest texture that art can make them; and as the oil imperceptibly leaves, so the body as imperceptibly leaves and washes off. Iron and Tin corrode, decay, and are soon among the missing, unless a constant covering protects them. Sand is viewed in a different light. Its particles being of a diagonal form, permits an embedment; and as they possess no corroding properties, they unavoidably must retain their fixed abode much longer than a fine texture possibly could. See note E.

It will be observed that all outside coating in this main work, are sand, linseed oil, and a dryer—sand alone will apparently be porous, which is readily admitted; but the under coat is not so; the outside pores are soon, in a great measure, filled by the dust that naturally collects on the roof.

When sand cement is used, where a smooth, hard pressure can be made by the trowel or knife; and 1-4 of an inch in thickness, there are no pores open for water to pass, provided the cement is perfectly dry, a small proportion of sand ground to dust would be a benefit; marsh mud dried and powdered has frequently been applied, also coarse brick clay.

THE EXPENSE FOR, AND THE MANNER OF COVERING A COMMON PITCH ROOF WITH LATH AND SLATE WHEN THE ROOF IS ALREADY SHEETED, MEANING AN OLD ROOF.

After the roof is divested of the old slates or shingles, as may be, secure the rafters adjoining the wall permanently and re-nail the sheeting. Make use of common sawed lath, such as are used for plastering, firstly cleet, or say fur over the sheeting, up and down, with lath as furings, at distances asunder, that each 4 foot

lath will receive 6 nails. The lath that is from 1 1-4 to 1 1-2 inch wide make two of one by means of a cutting gage, causing them to be 5-8 or 3-4 of an inch in width, nail them on the furings rough, edge to edge. Prime them with two good coats of paint; when dry, take Cement, No. 1, and bed the slate, as described elsewhere, with one thickness of slate only, with the additional labour of drilling the drip edge slate one tier, and fasten them with suitable wood screws and with a small thin copper plate, say 2 inches wide and 4 long at and under every joint to carry out the water beyond the sheeting or cornice even with the slate.

Cost of one square by estimate—

Three bundles of lath and proportion of copper and nails included,	$ 100
Cement and priming,	400
Labour,	300
	$ 800

If second hand slates are used, that were taken off, we will make no charge for them, as there will remain enough for a roof, same size and to spare; square the slate that have broken corners; nail holes are no detriment; be sure the lath is well seasoned; *kiln dried is the surest way.*

COPING FOR FIRE WALLS, OR FOR IMITATION OF GRANITE.

Firstly, prepare the inner and outter facia the width necessarily required, of clear stuff and smoothly sawed from quarter stuff, the same as flooring; the grains of the wood passing through the boards when to their proper width, leaving the sides rough from the saw; then rabbit the top edge down the thickness of the lath, say 1-2 inch thick; place the boards at the proper distance apart from each other, then cut the lath the proper length, and nail them in the rabbit, making flush work with the before mentioned standing square. When the laths are all nailed on, in the centre there should be a small thin furing to nail the lath to, that it may be firm; also set the coping at a trifle slope toward the roof, for the water to fall on the roof. The before-mentioned squares of 1-4 inch be-

ing the top corners of the coping, give them a gentle quarter round. Then apply the paint and sand, as directed, for lath and cement for roofing only.

NOTE.—All ends of wood, or say the lath for holding Cement should be avoided as to coming in contact with the cement. Also square corners should never be left to cement over. Imitation granite steps can be made after the above model, the corners rounded in like manner, provided the ends of the steps are made in two parts, and put together similar to a rosett that is formed by mitreing up a moulding. Thus the top and front of the step will have no end wood. End wood and square corners will not hold the cement so long as side wood. Feather print faceing is not good for holding, also warps, contracts and expands similar to sap wood.

DIRECTIONS TO FORM STEPS EASY OF ASCENT.

The riser not less than 8, nor more than 8 1-2 inches in height The plat or tread from 10 to 12 inches in width, the less the rise, the wider the plat may be made.

THE FORMATION OF IMITATION GRANITE, OR FREE STONE STEPS.

Firstly, take smooth sawed boards, the grain as elsewhere described, leaving the outter side undressed; square the plat and riser the length desired; nail them together to form a right angle, then halve in the oblong square (rosett like) as above described for ends; then round the top front, and end corners, as directed elsewhere.

SETTING THE ABOVE MENTIONED STEPS.

When the landing is firmly fixed at top, a ground step of stone would greatly add to the durability, but in case that is dispensed with, take two short posts, either red cedar or other lasting wood, set them in the ground at least two feet with a level horrizontal top, elevated a trifle above the surrounding ground or pavement, as it may be, the centre of which should be 12 inches within the end of the

steps, then place the sleepers, say string pieces, on the posts and let them be well secured, particularly at the top, leaving the ends of the steps to project ten inches, allowing room for a 9 inch brick wall to be set up after the steps are secured to the sleepers.

Then paint, cement and sand. If the exposure is northerly, a thick coating, with cement, can be applied with a trowel and polished to imitate marble, as fancy may dictate. Be sure and not to hurry on the coats before the first is perfectly hard—a caution in all cases. Also, prime with one coat before sanding.

TO SEASON WOOD EFFECTUALLY.

Boil the wood in fresh water for the space of one hour, or put it into fresh water and let it remain one week; then bake it thoroughly as possible, not to burn or char it. Green wood can be perfectly seasoned, fit for immediate use by the above process.—The natural life of the wood must be divested entirely before cemented; make suitable preparations, and the desired object is soon accomplished.

The above prescription is in reference particularly for the preservation of the lath, and must not be neglected, except old weather beaten wood can be obtained.

There are various ways of baking. A brick oven is preferable to one made of sheet iron. When made of brick and the heat applied by a stove and pipe, set in the brick work, is considered the best method.

TWO ESSENTIAL POINTS NOT TO BE OMITTED.

The first is, lath for cemented roofs only, should be as thick as they are wide,—say 3-4 of an inch square—two advantages are thus obtained, more security in fastening on, and a square of this dimension will not warp. *Experience.*

The second is—all cloth that is used where an *angle is made,* apply two extra coatings of the cement, say about one half inch in width each side of the angle. *Experience.*

It is generally known that most builders have their own ways or their particular attachments to perform their work, all aiming

at one and the same thing as to the result. It is therefore considered harmless to point out in general terms, the main object intended in the formation of flat roofs under consideration, which have been heretofore pointed out, giving latitude to the builder, provided it terminates with the desired effect.

The formation of roofs should resemble a tea tray, with an edging raised three or four inches, firmly connected, with the sheeting graded at one side only, sufficient for the water to drain off very moderately, led off through an oblong square tube inserted through the before mentioned edging; or it may be led off by a projecting metalic curved drip; in this last mentioned, the edging will be reversed and turned downwards on the drip side of the roof. The before mentioned edging to be covered by a coping that will lap over both that and the outside body of the building on the other three sides.

There are frequently locations that are considered unhealthy, and the cause unknown; every thing around the premises appears fair and free from generating noxious air which may proceed from damp brick walls or decaying wood, all of which may entirely be concealed from the eye, notwithstanding it infects the atmosphere there always are vents for its escapement into all parts of a dwelling.

A tight roof with an imitation stone coping, will prove more effectual in producing a cure than a physician possibly can with his materia medica.

Various are the methods pointed out in the forepart of this work for flat roofs--all are admirable, all is of one and the same ingredients, yet may be applied to different grounds for combination, provided the ground be a fixed one, not liable to contract or expand. In this extensive country, the interior parts, some articles are more difficult to obtain than others, and the procuring them might thwart the desired effect. Also, cheapening the expenditure has induced the proprietor to form different modes.

Two methods are found to require the least attention after the work is done, viz: coal tar and slate the cheapest, but *it colors the water.* The second is double thickness of slate, the first thickness bedded in strong lime mortar, and the second thickness bedded in oil cement, the slate 4-8 or half inch, particularly the last thick-

ness or tier, as it gives more solidity to the joints. Tar and slate has been tested about ten years; the oil cement, double thickness, about fourteen years, no attention to either has been required or apparently any required at this time. Imitation stone is to be preferred to real stone coping for the following reasons,—viz: The stone coping continues permanent but a short time, they move and leak at the joints. The imitation coping has no joints exposed; they are a one continued whole, with the addition of a projecting lath on both sides, of whatever they cover.

AN IMPROVEMENT NOT BEFORE POINTED OUT.

In covering flat roofs with slate or glass, let all edgings be first laid before the main surface is covered, practical experience and reason combined, shew that an open joint fills more sure by gravitation than by a horizontal flow.

When cloth is used as a substitute for receiving the cement for roofs, or inside sheeting of vessels as a safety for preserving goods from damage, and also as a protection against founder at sea, the following method is recommended to pursue in preparing the cloth for use. First have a plating (roller) mill like stand over a box or vat of linseed oil, let the cloth be dampened as a laundress would require clothes for ironing, or a trifle more damp, all moistened with fair water, then put the cloth into the vat of oil, then draw the cloth through the rollers, closely set, then suspend the cloth on tenter hooks until perfectly dry.—Let there be a sufficient quantity of verdigris incorporated with the oil to guard against insects. When applied on shipboard, the cloth to be nailed on ceiling bulkheads, &c. After cemented, sheet it over with thin narrow boards so as to prevent chafing the cement—discretion must be used as to the number of layers according to the exposure of the element it has to contend with; be sure and let every layer be dry and hard before the next is applied, and if polished let it be the last coat or layer intended. In placing the cloth, (say duck,) lock the edges with a half inch turn, the tacks (say nails) will then pass through four thicknesses of cloth, exclusive of a binding strip that receives the nail-heads. The thin wood sheeting over the cement be, narrow and secured with wood screws, the holes

for the screws should be filled with white lead paint, before the screws enter. This is intended to apply to ship work on or under the deck.

NOTE.—It has been found that a soft wood taper plug drove into the white lead, then a small sized nail with a broad flat head drove into the centre of the plug, is preferable to screws.

The foregoing recommendation of oil cement for ship use we wish to be understood that no practical experience is here submitted. In making the experiments for lath roofs, copings, &c., in order to obtain the feasibility of such, boxes, batteaus, and the like forms were used to prove a cohesion on laths, over open joints by a combination, and also for coating lime mortar by cementing the outer side, then putting them in water to float a reasonable time as a test. On seeing them all unharmed, as to leaks or inside moisture, it was that which led to the idea for vessel use.—It is now submitted to ship owners and masters of vessels to approve or disapprove. Also, for covering decks.

TO CARPET A FLOOR.

It is always desirable to have a tight floor to a room, particularly so to a lodging room, and in most cases they being very deficient, forming hiding places for insects, caused by the joists and washboard contraction, leaving an open space between the washboard and floor. To remedy this, take of the oil cloth that has been before described and cover the floor, nailing it on with tacks plentifully used and draw the cloth as tight as possible. When thus done, take a narrow strip of the same material, about two inches in width, a moiety of which nail on the wash board, the remainder on the floor, then prime all over preparatory (to the first square, or say the whole of the wash board) to receive the cement, then when perfectly dry, commence the coats of cement until a sufficient quantity is applied, then polish as elsewhere described, and grain or marble as fancy may dictate; be sure that every layer is perfectly hard, before the next is applied.

NOTE.—When a floor has been well seasoned, say an old floor, clear from knots, level off the ridges, and veneer, mosiac work or plain.

STUCCO FOR RECEIVING OIL CEMENT.

First, sheet the outside of a frame building with narrow boards, firmly nailed, use sawed laths not exceeding 3-4 of an inch wide and leave the openings 3-4 of an inch, put furings, lath thickness, 12 inches asunder to nail the laths upon, leaving an open space between the laths and sheeting, break joints regularly with every lath.

Let every casing to door or window (caps excepted) be half laped over the stucco work ½ inch, the caps worked down to a feather edge, extending up 2 inches, projecting the same on the thickness to correspond with the furings that the lath is nailed on.

When all preparation is made, above described, make use of well made strong lime mortar, with double the quantity of hair as commonly used for room plastering; apply an even coat that will cover the lath rather more than 1-4 of an inch, hard pressed on. In the drying, follow up with wet brush and float (to keep all the cracks closed) and lay off in stone work, when well dryed, it is suitable for the oil cement. Furings should not be of greater distance than 12 inches.

The lath over the caps, let it break over the joint transversely, in this case if the cap contracts, it will not draw the plaster with it to harm anything.

The stucco may be flush with the casings when finished, and no halvings made; a moulding can be laid on as a substitute by projecting 1-2 an inch.

One coat of good lime mortar on a brick wall, all edgings secured properly and proceeded with as above described, to prevent water from undermining the mortar, is practicable.

NOTES.

NOTE A.—In the year '35 the proprietor covered a small flat roof over a passage between two buildings; the cement was made as per recipe No. 1, the slates imbedded and double. It never leaked since, and no repairs are required. In '36 a common sized house was covered in like manner, only the Japan was omitted, two coats of slate, best linseed oil, sand and clay, equal parts, litharge as a dryer. It remains perfect, now '49.

NOTE B.—In '38 an open deck floor, unjointed boards was laid on a perfect level, thin cloth was nailed on with 12 oz. tacks; then a paste made with sand, clay and coal tar, one thickness of slate; it has since proved tight. A short time since, the cloth was examined by enlarging a joint underneath; the cloth was found bright and sound, as when first laid. It stains the water.

NOTE E.—In the year '39, a pitch roof was covered with second hand slate, nailed on as common; the angle about 30 degrees of altitude; a common laborer performed the work, also cemented the joints. The slates were from 1-4 to 1-2 inch thick—and width from 4 to 8 inches; before cemented it leaked like a sifter; it now continues perfect.

All the above mentioned experiments are on the proprietor's buildings, at Brigg's Point, and are free for examination. Also, others more recently done.

NOTE D.—The repairing as mentioned herein is more fully described at the last page of book keeping, showing a diversity of repairs as practiced by the proprietor about 12 years in this city, with favorable and satisfactory results, (all experimentally, in order to test the durability of material.) But it must be well known that a proper beginning and preparation for the ground work is necessary to become effectual.

LITHARGE AS A DRYER.

NOTE E.—Have it finely powered before the paint is reduced for use, sprinkle the powder on top of stiff paint,—then pour on spirits of turpentine sufficiently to wet it thoroughly; stir it well with a spatula, then reduce with oil as you desire for use.

JAPAN AS A DRYER.

Japan, a name given to shellack Varnish, alias Lacker. It is the best dryer in use, when used by an experienced painter. It should not be used in priming, unless for some household utensils, where it is not exposed to the weather. In outside painting for the second or after coats, add to the litharge as a dryer, one gill of the varnish to one gallon of oil at one and the same time that the

spirits of turpentine is applied to the litharge, it incorporates more thoroughly. This direction is particularly intended for application on the lath roofs before mentioned.

In making use of this paint on lath, apply a coating at each time twice the quantity that could be used on the side of a building, in the common way of house painting, and as much sand as it will take, and not shew the oil through after it is put on. And when a polish is required on an article handily moved, let it stand five minutes or the like, then give it a gentle cant for all loose sand to fall off; then add the graining colours and polish with a trowel before dry.

When an article cannot be moved, apply the sand as even as possible. All graining colours are mixed with the finest sand and applied from a castor in a dry state, they then form a deep shading not like paint, but shews in a decayed state.

ON BOOK KEEPING.

System is the handmaid of uninterrupted prosperity,—a system in all temporal affairs is necessary, particularly for a man to keep a fair Journal of his monetary affairs, and also is a preventative against law suits, and a protection when plunged inadvertently into that perplexing business.

He that keeps fair books, can at all times shew a true statement of his business, which a fluctuation of the times frequently requires the most prudent calculations; a man that can make a fair journal of his business transactions, will find it greatly in his favor towards a disentanglement.

The following form of book keeping the proprietor has practiced in small business,as well as business somewhat extended, without depending too much on a clerk, having found previous to this method, frequent errors that required much time to correct. The ledger is composed only of small scraps of paper ruled as the annexed will show. If necessary, look over every month, or oftener, and when an account is settled, enter the settlement how made on the journal, or note it settled on the margin at the last charge.—No business is too small for keeping correct accounts. A scrap of this ledger paper, with but one name on it, and that name run

through with at a time, has been the practice: it prevents as before was frequently the case, articles put to the wrong name. This method has been practised in a business of rising two hundred and fifty open accounts, and no expense for clerk hire. The marks on the line, separating Dols. and Cents, shews it scrapt off. The marks on the margin line, shews that a regular bill has been made out.

FORM OF A DAY BOOK

ELIJAH H. BRUNSON, NORFOLK, *September 1st*, 1849.

PETER PAYWELL,	Dr.	$	
To 1 M. clear boards, - - -		35	00
2			
JOHN HAMTON, Suffolk.	Dr.		
To 100 lbs. of Middling Bacon, -	8.00		
" 50 do. of hams, *a* 10-100 -	5.00	13	00
"			
SAM'L. HATCH,	Dr.		
To 1 keg White Lead, - - -	2.25		
" 1-2 gallon Linseed Oil, *a* 1-100	0.50	2	75
6			
JOHN HURON,	Dr.		
To 500 feet Merchantable Boards, *a* 150-100		7	50
"			
JOHN HAMTON,	Dr.		
To 500 feet 3x4 Scantling, *a* 1.50-100 -		7	
"			
SAM'L. HATCH,	Dr.		
To sundry refuse Paints and Oil, as agreed,		12	50
8			
PETER PAYWELL,	Dr.		
To 500 feet clear boards *a* 350-100	17.50		
" 1 cask 10d. Nails, 100 lbs. *a* 4½-100,	4.50	22	00

September 12th, 1849.

JOHN HAMTON,	Dr.	$	
To 50 lbs. Bacon, assorted, *a* 9-100	4.50		
" 150 feet clear Boards, *a* 3.50-100	5.25	9	75
"			
SAM'L. HATCH,	Dr.		
To 1000 feet refuse boards, -	15.00		
" 1 cask 8d nails, 100 lbs· *a* 4½-100	4.50		
" 500 Bricks, *a* $5 per M. - -	2.50	22	00
13			
JOHN HURON,	Dr.		
To 50 lbs. Nails, assorted, *a* 5-100 -	2.50		
" 1 door Lock, *a* 75-100, do. do. *a* 50-100	1.25	3	75
"			
SAM'L. HATCH,	Dr.		
To 1 gallon Linseed Oil, (best) -	1.12½		
" 1-2 do. Spirits Turpentine, *a* 75-100	0.37½		
" 2 kegs White Lead, (common) *a* 175-100	3.50	5	00
14			
PETER PAYWELL,	Dr.		
To 2 M. Bricks, *a* $5, - -	10.00		
" 2 casks Lime, *a* $1 - -	2.00		
" 10 bundles Lath, *a* 12½-100	1.25	13	25
"			
JOHN HURON,	Dr.		
To 1000 feet Merchantable Boards,	20.00		
" 50 lbs. 12d Nails, *a* 5-100 -	2.50	22	50

Oct. 1st. By his Bill rendered and Cash to bl's.	PETER PAYWELL, Dr.	$	
	To repairing the roof of the dwelling he occupies, viz:—repairing the stucco on the fire-walls and pointing the slate with oil cement, next the wall, before the stucco was applied, chimneys included, - - $25.00		
	" cementing the outer joints on 16 sqrs. on a pitch slated roof, *a* $3,00, - - 48.00	73	00
	19		
Sep. 29. By cash, in full.	SAM'L. HATCH, Dr.		
	To repairing the Brick Walls, east, west and north sides of the dwelling he occupies, as follows viz:—punching and filling all faulty open joints at the ends of the bricks, and rounds windows with oil and water cement, and slate chips as agreed. Warranted free from leak,	65	00
	21		
Oct. 4. Paid in Full.	JOHN HURON, Dr.		
	To repairing the slate on, and adjoining four Dormer Windows, with oil cement on the house he occupies, warranted not to leak for a reasonable time, *a* $5.00 - -	20	00
	25		
Oct. 30. Settled to This day.	JOHN HAMTON, Dr.		
	To repairing the covering of the front Portico, next the wall of the house occupied by Jos. Sharp, with oil cement, and two coats of thin cement on the tin covering as agreed, -	6	00

When accounts are journalized in the foregoing manner, it is well to keep a bloter, when any one that delivers an article they can note it down, or in case of not having sufficient time to enter it on the Journal as neatly as would be desired.

SCRAP.

PETER PAYWELL,

Sep. 1st,	35.00
	22.00
	13.25
	73.00
Sep. 18th,	$143.25

JOHN HAMTON,

Sep. 2d,	13.00
	7.50
	9.75
	6.00
Sep. 25th,	$36.25

SCRAP.

SAM'L. HATCH,

Sep. 2d,	2.75
	12.50
	22.00
	5.00
	65.00
Sep. 19th,	$107.00

JOHN HURON,

Sep. 6th,	7.50
	3.75
	22.50
	20.00
Sep. 21st,	$53.75

PRIVATE JOURNAL.

DR. ELIJAH H. BRUNSON, NORFOLK, *September* 1*st*, 1849.

	$	
To Peter Paywell, for Cash, - -	35	00
"		
To John Hamton, of Suffolk, for Cash,	10	00
2		
To Sam'l. Hatch, for Cash, - -	7	50
6		
To John Huron, for Cash, $4; Fire-wood, $2,	6	00
8		
To Peter Paywell, for the payment of my order,	15	00
"		
To Sam'l. Hatch, for the labour of 4 of his men, three days each, *a* $7 per day,	21	00
14		
To John Hamton, for Cash, as pr. my receipt,	15	00
"		
To John Huron, for his acct. Oct. 4th, ren'd. in full,		
7		
To Wm. Hardware, of New York, for his bill of Goods, *a* 6 mos: - -	500	84
10		
To John Sargent, for his bill of Brick and Lime, *a* 90 days, - - -	250	75
15		
To Sam'l. Pearsons, of Augusta, (Me.) for his bill of Lumber, *a* 30 days. - -	341	64

INDEX.

ERRATA.—14 page, 10th line from the bottom, read lime mortar.
31 page,—instead of 3,206, read 5,200.
47 page, 5th entry, read 7,50.

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TO MAKE OIL CEMENT WITHOUT VERDIGRIS OR WHITE LEAD.

Take the purest dredgings from the bottom of *salt water* harbours that the Mud Machines drag up to deeped the channels, particularly where a clay soil is adjoining, dry the *salt clay*—then calcine and grind it to a fine powder and use this powder, instead of *verdigris, white lead and ochre* for Recipe No. 1.

Also—Take common brown sand, calcine and grind it to a powder, add a moiety of each, finely ground, when it will form a good and lasting paint

Where the salt clay is not to be had, take bank blue clay and salt it for a number of weeks, with good pickle frequently stirring it—add some rusty iron, then make use as above described in lieu of harbour clay.

THE CHEAPEST AND BEST METHOD OF BUILDING A BRICK OVEN TO KILN DRY WOOD.

First, build it to stand erect, say of a circular form, six feet in diameter and ten feet in height, open at the top to receive the lath or boards, with sheet iron covers to fit closely.

The flue to rise above one foot or more, and placed in the centre, connected with four partition walls, leading to the outside wall.

Size of the flue, four and one half inches square—the flue will connect with a box stove set in the brick work at the bottom, the door only to appear outside for feeding with fuel, the width of a brick is sufficiently thick for the walls throughout; 1,500 bricks will build it of sufficient height for eight feet boards.

A CHEAP METHOD OF CEMENTING SLATES ON A ROOF.

First, prepare the ground as heretofore described, oil paint and sanded, left rough.—then take fine ground strong lime mortar, and bed the slate, using as small a quantity as will make the slate lay firm. Clear the mortar out of the joints that can be conveniently

done, the mortar will dry very soon, then fill all the joints with oil cement, No. 1, even with, and flush with the slate, forming an even surface.

The only gain by this method is this,—The proprietor, by making use of course thick slate, it required a large quantity of oil cement, which induced him to adopt the above method on one part of a roof, about eight feet square, there is no apparent difference now —the work was performed in 1838. It would be well to look to the joints and draw them with a good coat of paint within 8 or ten months, and fill all sunken cavities with sand cement.

Let it be perfectly understood throughout the whole of this work that a permanent water tight immovable ground is first to be formed, then to be covered and protected by such bodies as are most suitable to stand the test against exposure, and atmospherical changes.