THE

ORCHARD HOUSE;

OR,

CULTURE OF FRUIT-TREES IN POTS UNDER GLASS.

CONTAINING

PLANS AND ESTIMATES FOR CONSTRUCTION, DETAILS OF MANAGEMENT AND CULTURE, AND A LIST OF FRUITS BEST ADAPTED TO THE PURPOSE.

BY THOMAS RIVERS,

SAWBRIDGEWORTH, ENGLAND.

ALSO AN APPENDIX,

CONTAINING ADDITIONAL DIRECTIONS FOR

Growing Trees & Vines in Orchard Houses.

BY WILLIAM SAUNDERS,

LANDSCAPE GARDENER, GERMANTOWN, PA.,

With Illustrations.

NEW YORK:

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CONTENTS.

APPENDIX.

EDWARD O. JENKINS,
Printer & Stereotyper,
No. 26 Frankfort Street.

THE ORCHARD HOUSE.

A few words of preface and apology to the first edition.—It has been, and is, too often the custom of writers on horticulture and agriculture, to write first and practice afterwards,—in other words, to promulgate a pretty theory, and then reduce it to practice: I have not been "to this manner given," for in this, as well as in other instances, I have reduced my practice to writing. The method of culture given in the following pages, has been to me a pleasant relaxation from the cares of an extensive business; and I feel convinced that it may be made equally agreeable to a numerous class of busy men, who make their gardens a source of untiring, quiet enjoyment.

It is very probable that some who may be tempted to read the following pages will feel surprised that I have made a separate publication on so trifling a subject, when so many horticultural periodicals are open to those who cannot write a large book. They may say, "Why not occupy a few columns in the 'Gardeners' Chronicle,' or a few pages in the 'Cottage Gardener?'" My motive must be my apology.

For many years our parish church, from causes not proper to be mentioned here, was in a fearfully dilapidated state: a partial repair has rescued it from serious consequences; still, much more is required. A hint from one warmly and actively interested in its restoration has induced me to dedicate the profits resulting from this little publication towards such a sacred and, I trust, praiseworthy object. I hope not to be misunderstood. It is not ostentation that has tempted me to this; no love of fame, but purely the wish to disseminate a taste for refined horticultural pursuits, and a hope that I, a humble agent, may be, through this, enabled to contribute a trifle towards the restoration of the church of my forefathers, and, I trust, of my children's children.

The same to the fifth edition.—When I ventured to publish the first edition of this little work, I scarcely dared to hope that it would meet with a reception so favorable, and fulfil so quickly the purpose to which it was dedicated. Orchard houses are now familiar things: hundreds are rising up all over the face of the country: no garden structures have ever so rapidly advanced in popularity. That they deserve to be popular, I am more than ever convinced; and I cannot help feeling grateful that, through the exercise of my humble literary ability, so much good, because so much intellectual pleasure, has been derived from this new mode of cultivating fruit trees. In the following pages it will be seen that the idea has not "grown with my growth,"—for I am old and grey-headed,—but rather with my age.

We are, however, as yet only children in orchard-house culture. Every moderate sized garden in England—more particularly in the North—and in Scotland, will, in the course of a few years, have its orchard house. They will glisten on highland and lowland, and gladden many a garden-lover with their genial climate and varied produce.

In the present edition it will be seen that I recommend top-dressing to be done in the autumn, instead of in spring, as heretofore. I have found this to be by far the most eligible season; for, if done too late in spring, it is liable to make the trees shed their blossoms without setting fruit. With apricots, this is more particularly likely to occur. Potted trees, when top-dressed in autumn, commence at once to form fresh roots, which in spring are ready to fulfil their office in supporting the young fruit. Very recently, some cultivators have recommended trees to be shifted and re-potted annually: when they become large, this is a work of much trouble. I can say with confidence, there is no occasion to do this. My finest trees have now been seven years in the same pots; they bore last season large crops of very fine fruit, and are now full of promise, being covered with blossom-buds on short, well-ripened, healthy shoots.

THE ORCHARD HOUSE.

It was, I think, in the year 1849, that, being very fond of figs, I attempted to grow them in pots in one of my vineries; but finding they required more room than I could spare, I sought for some method by which I could overcome the difficulty. The pots I used, I ought to state, were not placed on benches, but on raised borders, for I had adopted the sunken paths and raised borders for many years, to avoid the expense of the usual benches of wood. The roots made their way through the aperture at the bottom of the pots, and the plants thus, even in comparatively small pots, obtained enough of vigor to support a crop of fruit. After the crop was gathered, the pots were gently turned up on one side, and the roots cut off with a knife, water was withheld, and the plants were soon at rest with well-ripened shoots. The following spring they were top-dressed with manure, and again placed on the border; but an idea occurred to me to give more room for the emission of roots by enlarging the aperture at the bottom of the pots: this I at once put in practice, with the most favorable results. I then reasoned, if figs in pots can be made to bear a crop of fruit by thus giving them extra nourishment during the summer, why should not peaches, nectarines, apricots, vines, plums, cherries, and pears, be managed in the same way? They can be; and I have now much pleasure in giving the simple method by which all these choice fruits can be grown on dwarf bushes in pots, with a certainty of a crop every season. I hope to see the day when hundreds and thousands of our small gardens will be furnished with cheap fruit-tree houses.

Glass, timber, and bricks, are now comparatively cheap; for sheet-glass that, when first brought into notice cost 2s. per foot, can now be bought at 2d. per foot; so we can build cheap houses, which, without the assistance of artificial heat, will give us, in average seasons, the climate of the south-west of France,—without the liability to injury from spring frosts, from which all temperate climates, both in Europe and America, at times suffer so severely. Let us now see how nearly glass structures without fire-heat will approximate to the climate of France in one of its most temperate districts,—viz., Angers.

The Chasselas de Fontainebleau grape, our Royal Muscadine, ripens there in the open air, in average seasons, on the 25th of August: this is as nearly as possible the time when it ripens here under glass without artificial heat. The black Hamburg grape ripens at Angers on the 25th of

September: in one of my vineries in a warm situation, I have had them fully ripe on the 15th without fire-heat. We can thus, at a little expense, in our own dear native land, reap the benefits of a warm climate, and enjoy its choice fruits, without suffering by a residence in its oppressive heat.

I may here mention that my idea of the approximation of the climate of the orchard house to that of the south-west of France is not imaginary, for some of my gardening friends from thence have said, on entering it, "Ah! Monsieur Rivers, voila notre climat!"

I believe that I have more than once described my "glass-roofed shed," for I have not ventured to give it too high-sounding a name; still, as it must come into extensive use, a better name may be found expressive of this peculiar structure, which is not a vinery, or pinery, or peach-house,—these all belong to great and grand gardens,—but a place for many fruits; it may, therefore, I think, without affectation, be called an Orchard House, a place requiring but little expense to erect, but little experience and attention to manage, and yet giving most agreeable results. To the suburban gardener, who has but a small garden, which must be a *multum in parvo*,—to the amateur with plenty of gardening taste and but a limited income,—in short, to a numerous class fully capable of enjoying horticultural pleasures, but with purses not bountifully supplied, the orchard house will, I feel assured, be a most agreeable boon. I will, therefore, proceed to give such directions as will, I trust, enable any carpenter to build one. There are two descriptions of houses calculated for this mode of fruit culture—the lean-to and the span-roofed. I shall commence with the former, which is perhaps the most simple and most common form of garden structures.

THE LEAN-TO ORCHARD HOUSE.

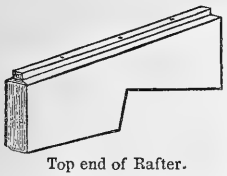
Its length may be from ten feet to one hundred or more, according to means and space; but its breadth and height should be according to the following dimensions, unless any improved plan may be suggested which will ensure greater advantages at the same cost.

I will suppose that an orchard house thirty feet long is required. A ground plan, thirty feet long and twelve feet six inches wide, should be marked out: then six posts of oak or good yellow deal, five inches by three, and nine feet six inches in length, or of larch poles sixteen inches in girth, cut in two and the flat sides placed outwards, must be firmly fixed two feet in the ground: the ground ends before fixing should be charred two feet six inches from the bottom, and then have a coat of boiling coal tar, which adds much to their durability. They will form the back line of posts, standing seven feet six inches in height from the surface of the ground. For the front wall six posts of the same thickness, four feet six inches long, must be firmly fixed eighteen inches in the ground, so that they stand three feet out.* Two posts will be required at each end; at one end (if only one door is wanted) these will form the door-posts. On these posts, both at front and back, must be nailed a plate four inches by three, on which the rafters are to rest; the posts are thus arranged in two lines. Now, then, for the rafters: these must be fourteen feet long. A nine-inch deal, *i. e.*, a deal nine inches wide and three inches thick, will make four, each four and a half inches by one and a half, or nearly so. These are light, strong, and

* These respective heights of front and back are a matter of choice: they may be exceeded; for I find that trees in pots make most vigorous growth.

the most economical of all. Instead of "ploughing" the rebate for the glass, which is great labor and waste of material, on the upper side of each rafter, exactly in the centre, must be nailed a slip of half-inch board, half an inch wide; this will leave half an inch of the rafter on each side for the glass to rest on—not too much for glass twenty inches in width. The rafters are so far prepared for glazing, but not yet fitted on the plates at top and bottom of the projected house: no mortices must be made, but the rafter fitted to the back plate by cutting out a piece as in fig. 1, and to the front plate as in fig. 2. They must then be strongly nailed to the front

FIG. 1.



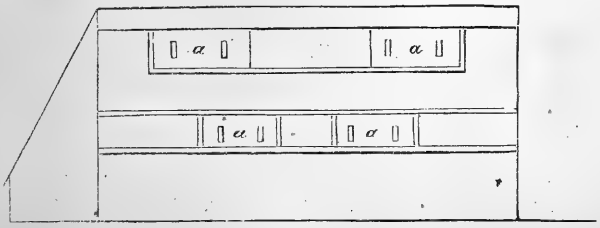
Top end of Rafter.

FIG. 2.

Bottom end of Rafter.

and back plates, leaving a space between each rebate of twenty inches. A piece of three-quarter-inch deal board, six inches wide, should be nailed along the top to the end of each rafter, so as to be even with their upper edges, and in this should be a groove to receive the upper ends of the pieces of glass. At the bottom a piece of board, one inch thick and six inches wide, must be let in, by sawing a piece out of each rafter for the glass to rest on and to carry off the water. We have thus formed a sloping roof seven feet nine inches (with the plate) high at back, and three feet three inches high in front. The glazing is now to be thought of. The most economical glass is sixteen-ounce British sheet glass, which can be bought at $2\frac{1}{2}d.$ and $3d.$ per foot, and the size to be preferred, twenty inches by twelve, placing it crosswise, as the rafters are twenty inches asunder. The laps should not exceed a quarter of an inch, and they need not be puttied, as the ventilation is more free when they are not. I find that scarcely any breakage takes place from frost, owing to the large pieces being elastic. On and outside the back posts, three-quarter-inch well-seasoned deal boards should be nailed. In the back wall thus formed, sliding shutters in grooves, three feet by one foot, must be fixed, to act as ventilators—two close to the roof and two about three feet from the surface of the ground, as in the annexed sketch; if two more be added to the right and left of the lower shutters, all the better: *in summer it is impossible to give too much air.*

FIG. 3.



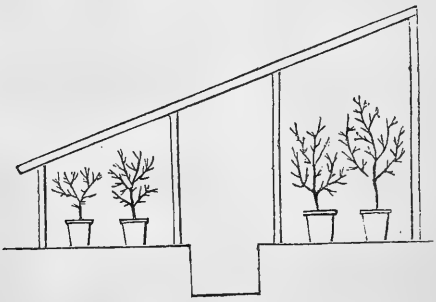
Back of Orchard House. *a*, *a*, *a*, *a*, Sliding Shutters in Grooves.

The front and ends (except the doorway) must have also three-quarter-inch boards, nailed on outside the posts; one of them, the upper one in the front, to be on hinges, so as to let down the whole length of the house: these, with the back shutters, when all open in hot weather, will ventilate thoroughly. To add to this, and it is all required in summer,

the boards will shrink and let in air: a fierce sunlight is thus admitted by the large glass, and abundance of air, in which all fruit trees thrive to admiration. The boards and rafters should be painted with stone-colored paint, which will give the house a very neat appearance. So much for the timber and glass; but when one sees that to walk along the centre of the building, which is about four feet nine inches in height, a person must be of very diminutive stature, the inquiry arises, how is head-room to be made? Simply by making a trench two feet six inches wide, and fifteen or eighteen inches deep in the centre of the ground plan: this will leave a border on each side four feet nine inches wide, and form a path at the same time. The front border need not be raised, as the trees in two or three years will require all the head-room they can have, but the back border should be raised about eighteen inches above the surface, supported by the brick or boarded edge to the path,—for the sides of the path must be supported with boards or four-inch brickwork. It will be found a great improvement (for which I am indebted to a friend) to divide the back border into two terraces, by raising the back half twelve or fourteen inches, building a four-inch brick wall, and filling in with earth, so that the back row of trees is elevated, and thus escapes any shade given by the front row; the effect also is very good. Now, as every thing depends on these borders—for there must be no benches and no shelves—care must be taken to make their surface loose and open: loose materials, such as lime rubbish from old walls, and road sand, mixed with manure, may be laid on them, about four inches deep; they may then be forked over to about nine inches in depth, well mixing the above materials with the soil: you thus have two borders not too far from the glass, and *on* which your orchard will thrive admirably. It will appear odd to read about trees thriving *on* instead of *in* a border; but when I explain that this is to be an orchard in pots, it will not seem so contrary to our usual garden culture.

It will be seen, I think, by the description I have given, that the lean-to orchard house is merely a low greenhouse, with its roof sloping to the south or south-west, such as may be seen in many of our small villa gardens;

Fig. 4.



Section of a Lean-to Orchard House.

only, instead of having a path in the centre and a bench on each side for the flower-pots to stand on, it has a sunken path and a border of earth on each side, on which fruit trees in pots are to be placed. The foregoing rough section will perhaps convey an idea of this structure and its use.

BUILDER'S ESTIMATE.

By Mr. Burton, Builder, Sawbridgeworth, given in 1857.

To ———. An Estimate for erecting an Orchard House, 30 feet 6 inches long, 12 feet 6 inches wide, 3 feet 3 inches high in front, and 7 feet 9 inches at back.

3 feet oak door sill, 4 by 3.
64 feet of fir for plates.
84 feet ditto for end rafters and door posts, &c., $3\frac{1}{2}$ by $2\frac{1}{2}$.
309 feet ditto for middle rafters and sill, $4\frac{1}{2}$ by $1\frac{1}{2}$.
110 feet ditto for posts, 5 by 3.
30 feet deal for top and bottom rails, 9 by $1\frac{1}{4}$.
560 feet (super.) ditto for boarding fillets, &c.
90 feet (super.) fir for sides of path, piles, latch, joints, and buttons.
Painting with anti-corrosion paint, 2 coats.
187 squares, 16 ounce sheet-glass, putty, and labor.

£28 5 0*

By using larch poles instead of squared timber for the posts, a saving may be effected; by being one's own carpenter, a larger saving. By using oak for posts, unless small oak trees can be bought cheaply, £1 15*s.* must be added to the above estimate.

The foregoing estimate and sketch are for a Lean-to Orchard House standing by itself: where there is a brick or other wall to serve as a back wall, it may be built against it, with a great saving in expense; but as sliding shutters cannot conveniently be let into such walls, ventilators may

* The following estimates of the cost of similar houses in America have been kindly furnished us by Richard Morris Smith, architect, of Philadelphia.—

AMERICAN ESTIMATES.

Fig. 4. Lean-to, or single-pitch Orchard House:

570 feet of hemlock scantling at 1¼c.	$7 12
680 " poplar for boarding, &c., at 2c.	13 60
450 feet, 15 by 20 glass, (per 50 feet), $1 95	17 55
Labor, putty, &c., &c.	32 00
Complete, without wash or paint,	$70 27

Boards to be milled but not hand-planed, and finished in two coats stone-wash if desired,—but the cost of stone-washing not included in the estimate. From $27 to $33 should be added, if the work is hand-finished for paint. About $15 should be deducted if it is built against a stable or other wall.

Fig. 5. Small span, or double-pitch Orchard House:

456 feet of scantling, (hemlock), at 1¼c.	$5 70
544 " poplar, at 2c.	10 88
550 " glass, (per 50 feet), $1 95	21 45
Labor, &c., &c.	31 00
	$69 03

$25 to $32 should be added, for hand-finish and painting.

Figs. 6, 7. Large span, or double-pitch Orchard House:

Finished in the first manner as above described, about	$120 00
Paint-finished	160 00

be made at the top of the slope of the roof, by having every alternate square fixed in a wooden frame, with a hinge at top and a flat piece of iron with holes in it suspended to the bottom corner: an iron peg should be placed in the rafter to fit into the holes; with this, the ventilators can be raised or sunk at pleasure.

The most complete house of this kind, built against an old garden wall, with a S. W. aspect, is in this neighborhood. The wall is 12 feet high, and covered with full grown peach and nectarine trees; the house is 200 feet long and 15 feet wide, 4 feet 6 inches high in front, with front sashes 5 feet by 3, on pivots, so as to ventilate thoroughly; the rafters are 4½ by 1½ inches, and fixed 20 inches apart; glass, 20 inches by 15, and every alternate square at the top next the wall is framed, and on hinges opening upwards (these should be arranged so as to open all at once with a line and pulley); the path in the centre is 3 feet wide, and on each side, 3 feet from the path, is a row of espalier peaches and nectarines; between the front row and the glass are bushes in pots, so that in one house are three modes of culture. It is also divided into three seasons by partitions of glass, forming three compartments; two of these are fitted with hot water pipes, and one left without, as in a common orchard house. In one house forcing is commenced early, so as to have ripe peaches or other fruit in May; the second succeeds it with peaches in June and July; and the third, without heat, gives its crop in August, September, and October: peaches and nectarines are thus in perfection from the middle or end of May till the end of October. The fruit on the wall is the first to ripen, and is very early, owing to the warm aspect. This is the most complete lean-to orchard house I have ever seen; and although 15 feet wide, it can be built at a less cost than the narrow upright houses in front of the walls at Trentham, which are only 5 feet in width.

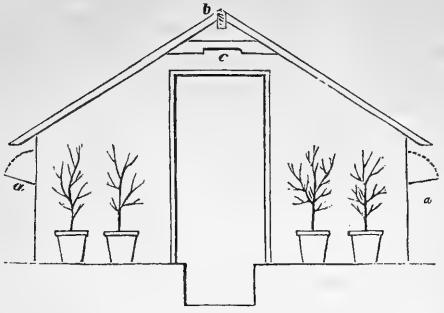
The lean-to house, whether against a wall or standing alone with its boards for walls, forms a most excellent vinery for grapes not requiring fire-heat, such as the Black Hamburg, and the Sweetwater, and Muscadine grapes. The vines should be planted inside the front wall, and 2 feet apart, trained under the rafters, 14 inches from the glass, and managed on the spur system, which is the same as that given for the training of grapes in pots. In the south of England, the sorts above named will never fail to ripen in this kind of vinery. So much do they love free air, that I have for some years opened my ventilators in the middle of July, and have never closed them till the end of September. My grapes have invariably been of the finest quality.

I now propose to give a sketch and description of a Span-roofed House, a little wider and cheaper. A house of this form is more agreeable as a promenade, and I think the trees are attended to with more facility. But unless placed in a warm sheltered garden, peaches and nectarines do not ripen quite so early in it as in a lean-to house. I think, however, it has a more agreeable look, and I must confess a preference to it. The following is a section of what I shall call the Small Span-roofed Orchard House. Height at sides, 4 feet; at centre to ridge, 8 feet; width, 14 feet; rafters, 8 feet in length, 3 inches by 1½, placed 20 inches apart; posts of oak, 5 inches by 3*, 5 feet apart; plates, 3 inches by 2; central path, 2 feet 6

* Oak posts of this size, I find on referring to the wooden tombs in the churchyard, last from 50 to 60 years.

SMALL SPAN-ROOFED ORCHARD HOUSE.

Fig. 5.



Section of the Small Span-roofed Orchard House.

a, a. Shutters on hinges, 12 inches wide, one on each side. The upper edges should be 1 foot from the eaves.
b. Ridge board.
c. Shutter over the door.

inches wide. The borders in this description of house need not be raised, but the path may be sunk 2 or 3 inches, and each side sloped so as not to crumble into it; the expense of a brick edging is thus saved. The borders should have a dressing of manure and sand, or manure and burnt earth,—in short, of any lose materials,—and be well forked over and mixed to 6 or 9 inches in depth.

Two rows of trees may be placed on each border, thus—

3 feet from stem to stem, so that the sun may shine on every leaf. This is most essential; for I have occasionally had some of my peaches deficient in flavor, and on examination have always found the trees too much crowded, so as to shade each other. In these small span-roofed houses, the trees placed as above form a charming avenue, and are looked down upon by the cultivator, so that every leaf and fruit is seen. It will add some trifle to the expense of building, if the sides, 1 foot or 18 inches from the eaves, are of glass, the wooden ventilating shutter being beneath the glazed part. The doors and ends may be partially glazed: the extra expense is fully repaid by the light and agreeable appearance given by this mode of building.

The cost of a plain-boarded house, as given me recently by Mr. Rivett, Builder, Stratford, Essex, is as follows:—

A span-roofed orchard house, 30 feet long, 14 feet wide; sides, 4 feet, middle to ridge, 8 feet high; oak posts, 5 inches by 3; close boarded, glazed with 16-ounce glass, painted twice with anti-corrosion paint: complete, £27 10*s.*

The small span-roofed house will be found an agreeable and economic structure; but, as large gardens require large houses, I am induced to recommend for them the following, which I shall term the

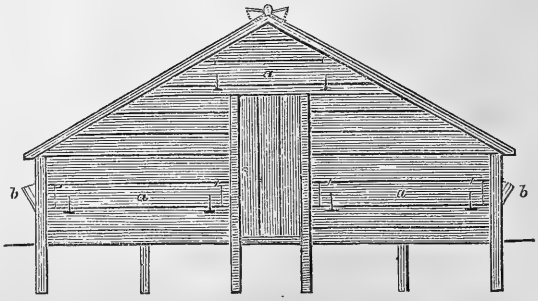
LARGE SPAN-ROOFED ORCHARD HOUSE.

My large houses are twenty feet wide, the sides four and a half feet high, and nine and a half feet in height to the ridge; the paths are two and a half feet wide; the brick beds at the sides are four feet wide and fifteen inches high, the central bed seven feet wide and eighteen inches high. These dimensions may of course be varied at the pleasure of the builder; I give mine exactly as they are. The posts to support the side plates are of oak, six inches by four; they are two and a half feet in the ground, and placed four feet apart; on these are nailed deal boards three-quarters of an inch thick, the upper one of which, on each side, one foot in width, is on hinges to form the shutters for ventilation; the rafters are four and a half inches by one and a half, and placed twenty inches asunder. (In large span-roofed orchard houses used for forcing fruit, and in which artificial heat is employed, one or two shutters on hinges at the apex of the roof are necessary to let off the heated air in sunny weather; but I find them quite unnecessary in houses without fire-heat). This is the most economical method of building large span-roofed orchard houses; but they may be varied, and iron, and brick, and glass, employed at pleasure. One recently built at Audley End is, I think, worthy of a short description: its sides are brick walls, two feet six inches high; on these, sashes two feet six inches by three feet, are fixed with pivots, so as to admit a large quantity of air; width twenty feet, length ninety feet, height ten feet; the roof is supported by a row of two-inch iron pillars along the centre, about seven feet apart; the central and side beds are twenty inches high, the paths three feet wide. This is really a noble as well as a nobleman's orchard house, and forms a healthy and most agreeable promenade. In all orchard houses where expense is not heeded, the water should be conducted from the roof into a tank or tanks underground, either outside or inside. Rain water is the best of all to syringe or to water the trees with.

The following is the estimate recently given me by Mr. Rivett for a large span-roofed orchard house, built in the plain manner, as given in figs. 6 and 7:—

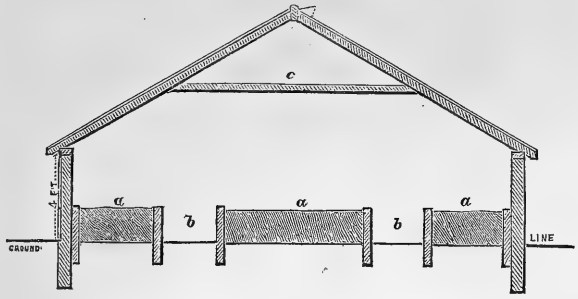
"An orchard house thirty feet long, twenty feet wide; sides, five feet high; middle, ten feet to ridge; with iron pillars to support roof; oak posts, close boarded, glazed with sixteen-ounce glass, painted twice with anti-corrosion paint, £45. The raised brick borders generally built in houses of this size, are

FIG. 6 (*End Elevation.*)



a. Shutters, 1 foot wide, on hinges at ends.
b. Do. do. on each side.

FIG. 7 (20-*feet Section*).



a. Beds (supported by 4-inch brick walls, built with cement) filled up with compost.
b. Paths, 2½ feet wide.
c. Collar beam. These collar beams should be 6 feet apart: iron pillars, which may be formed with 2-inch gas pipes, in a row along the centre, support the roof equally well, and have a lighter and better effect: they should also be 6 feet apart.*

not included in the estimate." I may add that raised borders may be dispensed with if half-standard trees are cultivated, with stems from 2½ to 3½ feet high. The tallest trees should occupy the centre of the house: this kind of house, furnished with nicely-pruned round-headed trees, with straight stems, would have a very orchard-like look, and they would be very productive.

It is essential that these large houses should stand endwise N. E. and S. W., or nearly so; for if placed N. W. and S. E., as mine are, owing to the peculiarity of the site, the trees in the north-east border are too much shaded, and do not ripen their fruit well. I also prefer the same position for small span-roofed houses. The height of the above exceeds that which I have described in p. 16, but I am inclined to think it more eligible, for it is surprising to see what fine and even large trees can be grown in pots.

A very good gardener has asserted that peaches and nectarines from bushes are inferior in flavor to those grown on trellises in peach houses; and that he could produce more fruit in the same space by the latter mode. I can easily imagine a partial failure in flavor; not owing, however, to the system, but to the management. The trees alluded to have not had room or air enough; and, consequently, the fruit has not been high flavored. I have had Noblesse and other peaches from bushes in a pot standing in the full sunshine in one of my houses of the most delicious flavor, while those from trees partially shaded were not good. The peach-house trellis system is not adapted for small gardens; one, or at most two trees, will cover the roof of a house 20 feet by 12; and nothing can be grown under them. Besides this, three or four years must elapse before they commence to bear to any extent; and, above all, it will require a good gardener to train and prune them, for no amateur could bear the fatigue of constantly keeping his eyes to the sun.

Since the foregoing pages were written, "crystal palaces" have been built. I have written for more humble gardens; but large orchard houses may be built on the ridge and furrow system: still it will require caution, for I am inclined to think that a ridge and furrow house of great width can never be ventilated sufficiently to give flavor to fruit. One of these "palaces" with raised borders, well furnished with peaches, nectarines, apricots, figs, and even pomegranates, in 20-inch pots, and treated as recommended for all other orchard-house trees, would realize an Eastern garden, and bring

* A lighter and equally eligible mode of supporting the roof is by iron rods (2 inches in circumference) in lieu of collar beams; these must be supported by perpendicular rods, hooked on to the centre and fastened to the ridge board by screws.

to mind one of the fruit gardens of Damascus, so vividly described by travellers. In short, I know of nothing in gardening more capable of fully gratifying the two senses—sight and taste. Thus in great and grand places, in lieu of a cheap and simple orchard house, a fruit conservatory, heated by hot-water pipes, may be built, and the trees grown in ornamental vases placed on elevated beds. A few tea-scented and other delicate roses, and spring-flowering bulbs, planted in the borders, would make them gay, and have a pretty effect. It must, however, be recollected, that but very few of what are called conservatory plants can be planted in a common orchard house; for it is necessary that it should be cold and dry in winter to give the fruit trees their rest. If fire-heat is used, it must only be applied early in spring—towards the end of February—to force the fruit, if early fruit be required, and not in winter, as in greenhouses, to keep out the frost. I have, however, reason to believe that orange trees and camellias may be planted in the borders with a good chance of success: they should have no water after the middle of October, and about the middle of December some sticks should be stuck in the ground round each tree, and the space between the sticks and the tree filled up with dry hay, and a mat or light woollen cloth (Frigi Domo would answer well) wrapped round the sticks. The mat or outer cover should be taken off by the end of January, leaving the hay, and replaced if severe frost comes on. It would insure success with oranges and camellias planted in the borders, if the house could be gently heated in severe weather, so as to prevent the temperature falling below 26°; this would not stimulate the fruit trees to any extent, and yet would, to a certainty, preserve camellia and orange trees. The most severe frost will not injure tea-scented roses or bulbs, if the house be kept perfectly dry after October.

It is very possible that some who read this may say, "Why not plant the trees in the raised beds, rather than in pots or vases?" To this I reply, They cannot be kept under control, unless they are annually lifted and replanted early in November. I had some peach trees which were planted in the raised borders of one of my orchard houses: they bore well; but, in spite of root-pruning, they would grow too rapidly. Now, in pots, the size and growth of the tree may be regulated with the greatest nicety; the annual root-pruning can be done with much facility, and there is no occasion to dig and disturb the borders, which must be done to a great extent to thoroughly root-prune trees planted in them. Indeed, as far as my experience has gone, I can honestly recommend pots, vases, or boxes, for fruit trees in orchard houses or fruit conservatories. In the "Gardeners' Magazine," vol. ii., page 278, peach trees are mentioned as having been in pots twenty years without being repotted: they had been kept in health and fruitfulness only by top-dressing.

I am, however, inclined to think that peach and nectarine trees, planted as pyramids and bushes in orchard houses, would give great satisfaction to the "poor gentleman" who is his own gardener, for it is only such that can and will fully enter into any new mode of gardening. Peaches, nectarines, and apricots thus cultivated should be lifted and replanted, with a little rich compost, annually, the last week in October: they should each have, when replanted, four or five gallons of water, and the same quantity about a week after: no more should be given during the winter.

Size of Pots.—In potting trees for this description of culture, pots of

different sizes may be used, according to the taste of the cultivator. If large trees for large houses are required, 15-inch pots (15 inches in diameter and 15 inches deep) will be necessary; for moderate-sized trees, 13-inch pots: this on the whole is the most eligible size. For smaller compact bushes, 11-inch pots are convenient, as they are not unwieldy, and the trees may be made ornaments of the side-board in the dining-room; and beautiful objects they are when full of fruit. Miniature, yet fruitful, peach and nectarine trees may be grown in very small pots, for I have some not more than 9 inches high, in 8-inch pots, full of blossom-buds. Trees of this size must not be allowed to bear more than four or five fruit. They are most interesting, and I have no doubt will, ere long, be extensively cultivated by the curious. These very small fruitful trees are grafted, which seems to make them precociously fruitful: peaches and nectarines are generally budded.

In remote places, where large pots are difficult to be procured, tubs like those used for orange trees, or more properly boxes, may be employed with success, and for trees of large size, *i. e.*, when they are from ten to fifteen years old, they will probably be absolutely necessary. They are easily made: boards, one inch thick, either of oak or deal, should be firmly nailed together so as to form a box fifteen inches deep and twenty to twenty-four inches square; the bottom should be formed with bars one inch thick, placed about half an inch asunder, to allow the roots to penetrate into the borders.

Apricots.—Apricots in pots are very rarely seen, even in large establishments; they are difficult to force, as they will not bear the confined air of a forcing house. I remember, some years since, being much struck with some apricots cultivated as dwarf trees in the South of France: the trees, full of their golden fruit, looked so beautiful,—at the time I wished that our climate would allow us to grow them in the same way. I did not then think of cheap glass, root-pruning, and pot culture.

It must always be borne in mind that, without abundance of air and the full light of an unshaded roof,—by this I mean that no vines must be trained under the glass,—fruit of high flavor cannot be grown; the trees will bear well, but their fruit will be vapid and flavorless.

The best trees for pot culture are those that have been in pots one or two years: if these can be purchased, so much the better. The next best are trees that have been removed and cut down one year in the nursery. If neither of the above can be found, "dwarf maiden trees"* will do. Trees taken from the open ground must not be potted till the end of October. Presuming that potted trees have been procured, they may, early in October,—if omitted then, in November or December,—be repotted into pots of the size selected for this system. I have named 11-inch pots, because they are portable, and the trees may then be shifted into large pots as they advance in growth; 11-inch pots will, at any rate, do well to commence with. October, November, and December, are the best months for potting trees; they may indeed be potted till March, but then no fruit must be expected the first season. If fruit-bearing trees that have been grown in pots can be procured, they cannot be potted too early in October.

I know of no compost better for stone-fruits than two-thirds turfy loam and one-third decomposed manure, to which some road or pit sand may be added. The loam should not be sifted; if it contains a large proportion of

* This is a term applied by nurserymen to trees one year old from the bud or graft.

lumps as big as an egg, so much the better. If you examine an 11-inch pot, you will find it eight inches across at the bottom, and the aperture from one inch to one and a half in diameter. Take a light hammer, and enlarge this aperture to five inches in diameter*; then place four or five large pieces of broken pots or tiles across, so that they rest on the inside ledge left by the hammer, leaving interstices for the free emission of roots: on these place some of the most lumpy part of your compost; then your tree, not too deeply, but so that the upper part of its roots is a little below the rim of the pot: if it has a ball of earth, loosen it; fill up with compost; ram the earth down firmly, as you fill, with a stout blunt-pointed stick; place it on the border where it is to grow during the summer; give it two or three gallons of water, and a top-dressing of some manure to lie loosely on the surface, and the operation is finished.

We will suppose that our tree, a nice dwarf bush, with five, six, or seven branches,† is potted. It may rest till February, and then be pruned,—a pleasant, simple operation, more easy to show than to tell how to perform. I may as well now state that the pruning recommended here for apricots will serve for all bush fruit trees under orchard house culture, except peaches, nectarines, and figs. Each branch must be shortened with a sharp knife to ten inches: these shortened branches will form the foundation of a nice regularly-shaped bush. In May each branch will put forth three or four shoots: all of these but the topmost one must be pinched off to within about two inches of their bases: they will form fruit-bearing spurs; these will continue all through the summer to make fresh shoots, which must always be pinched off to a length of two inches. By the end of the first season the leading shoots of the tree will be probably three feet in length, and, as well as the spurs, be furnished with blossom-buds. The summer is past; the month of October is with us. Its shoots are ripe, and the tree has ceased to grow: it must be put to rest for the winter, by lifting up the pot and cutting off closely every root that has made its way into the border: it is then ready for its top-dressing, the method of giving which I have described further on.

The second season:—in February, or early in March, the leading shoot made the preceding year, and which ought to be from two to three feet long, must be shortened to ten inches, and the young shoots as they push forth in summer (all but the leader) be pinched off as in the first season. The third season:—as the tree will have increased in size, its leading shoots may be shortened to six inches, and as it becomes aged and fruitful, annually to four inches, and at last pinched off in summer to two inches, as to make a compact round bush. In the course of time some of the shoots in the centre of the tree will require thinning out with the knife, if at all crowded.

The general management of the trees the second year should be as follows:—

February is with us, and, if the season be mild, buds are beginning to swell, and flowers to bloom: the trees in your orchard house are, however, dry, dusty, and stagnant; place them in their stations, three feet stem from

* I now have my pots made with five holes, each an inch and a half in diameter. In remote places, where these cannot be procured, the enlarged holes may be used.

† If a tree with only three or four branches is potted, they must be cut into four inches; and the tree must have a season's growth to form itself.

stem, give each of them a small quantity, say a pint, of water,—not, however, if the winter is still raging,—let them rest three days, then give them a quart each—in short, gradually saturate the earth in the pots, and afterwards water them regularly according to the state of the weather. The buds, if the weather is mild, will soon begin to swell, and in March, or early in April if the season be late, they will put forth their full bloom; and beautiful things they are, for no frost, no storms, will destroy the blossoms. If the weather be sunny, with sharp frosts at night, as is often the case in early spring, the shutters, both back and front, may be open all day and closed at night; if a wind-frost and cloudy weather, they may be closed day and night; the ventilation through the joints of the boards will then be amply sufficient. With this treatment nearly every blossom will set. As soon as the fruit becomes the size of a horse-bean, commence syringing the trees morning and evening with soft water, and continue to do this all through the summer till the fruit begins to change color before ripening. Weak liquid manure may be given once a week during the summer. This is, however, almost a matter of choice. My trees grow and bear well without it. Guano water, one pound to twenty gallons, is perhaps as good as any; and a good soaking of this once a week is better than using it more frequently. While in their young state, the fruit must be thinned, leaving, at first, upon a bush that has been two years in a pot, about three dozen; which, when they attain the size of a small nutmeg, must be reduced to two dozen: the third year, a tree, if it has prospered, will be able to bring three dozen to maturity; it is, however, better to have a few finely-grown fruit than many that are small. If some of the trees are required to decorate the dessert—and what can be more ornamental than an apricot tree full of fruit?—they must be prepared for removal by lifting the pots a week previously, so as to break off the roots that have struck into the border: no harm will be done,—it only checks their growth a little prematurely; they must, however, in such cases, be brought back to the orchard house after the fruit is gathered, and have water till the end of October.

To sustain trees in health in pots something more must be done than allowing their roots to go into the border; annually, in October, every tree should have a top-dressing of rich compost. I have employed, with much success, horse-droppings gathered from the roads, and unctuous loam, equal parts. The former I have had saturated with night-soil or liquid manure, and then exposed to the air for two or three months before mixing it with the loam. Some powdered charcoal strewed over this compost will prevent any disagreeable smell. Any kind of rotten manure, however, and loam, seems to answer well for top-dressing, which is done in the following manner: take out a portion of the soil, five or six inches in depth, and about four inches in width all around the side of the pot, leaving the central mass of roots undisturbed (a portion of the mould may, however, be picked out from among the mass of fibres with advantage, as fresh food can do them no harm); then fill in the compost, and ram it firmly down; keep on filling and ramming till it is on a level with the edge of the pot; place one or two inches of loose compost on the surface, as it will settle much during the winter; give one or two good soakings of water; and then place the trees close together, for you will then have more space for winter parsley, lettuces, young cauliflowers, and other matters requiring shelter. Water

must be withheld, and the trees suffered to remain dry and completely at rest during the winter.

This treatment may be continued every year without variation, except as regards pruning. In removing the trees to their allotted places on the borders in spring, I have lately found it beneficial to take out about two shovelfuls of earth on the place where the pot is to stand, and replace it with the same quantity of the compost used for top-dressing: the tree is thus fed from above and below. It will be necessary in very dry winters to watch the trees to see if their shoots shrivel; if so, they must have a small quantity of water, but not in severe frost; and if the winter be excessively severe, to "make assurance doubly sure," some dry hay or litter may be laid on and around the pots: the dry state of the soil will, however, as far as my experience has gone, perfectly resist the effects of frost.

The best implement for top-dressing is a piece of iron rod an inch and a half in circumference and nine inches long, flattened at the end, with a handle of wood five inches long, like the annexed figure.

Fig. 8.

Now, let us see what we may expect from this treatment. The apricot, the peach, and nectarine, as is well known, all come from the East. We will take Persia or Armenia. The winter there is dry and very severe; the spring dry, with hot sun and piercing wind, just when peaches and apricots are in full bloom, and yet how they succeed! Let any one go into an orchard house when we have our usual March weather: the wind will whistle through it, and the climate will be dry, sunny, and bracing; the blossoms, under these circumstances, will all set. Unfortunately, we cannot command sunshine enough to carry us along, to make our fruit ripen in May and June, as in warmer climates; we must, therefore, wait patiently, for our orchard house climate is slow but sure in its operations. If the above directions are followed, Eastern nature is imitated as closely as our cloudy skies permit. The trees bloom in a dry, airy place; they pass through a comparatively dry, warm summer; they are, like all trees natives of dry climates, early in a state of perfect rest, which is continued all through the winter, and thus they form healthy shoots and well-developed blossom-buds. Nothing in culture can be more perfect, and all is so simple, that, knowing as I do, with what facility it is done, I feel ashamed of the many words I have used in describing it.

It will be seen that I have, to carry out this system, recommended houses of wood and glass; those, however, who prefer brick to wooden walls, may have them, as any greenhouse may be made into an orchard house, by merely lowering the roof to the height given in page 10*, sinking the pathway, and having sliding shutters, back and front. The grand essentials are, low roof, borders instead of benches, and constant ventilation, more or less, according to the state of the weather, through the shutters; but in houses with brick walls there will not be that constant, gentle percolation of air which there is through boarded houses, and which seems so highly favorable to the well-being of stone-fruits.

* It must always be borne in mind, that a low roof, so that the trees are not too far from the glass, is most essential. My trees, seven years old, nearly touch it,—the nearer the glass the finer the fruit.

I have, I find, omitted to state the number of trees that may be grown in a given space. The trees should be placed in the borders, back and front, three feet apart, stem from stem. A house of the dimensions given in p. 12 will thus hold from twenty-five to thirty trees. Thirty trees will give sixty dozen and upwards of fruit, when in full bearing. A small bush of the Pitmaston orange-nectarine, four years old, produced, one season, four dozen of fruit, and brought them all to perfection; still this is too many, as some of the fruit were small. I mention this merely to show what can and may be done in this very interesting mode of cultivation, which, to sum up, is as follows: annual top-dressing, annual summer pruning by pinching, autumnal or spring pruning, and root-pruning.

There are, I well know, some amateur as well as professional gardeners who object to the pot culture of apricots; to such I can with confidence recommend planting of apricot trees in the borders, and lifting and replanting them biennially, about the end of October, with a few shovelfuls of the potting compost: they soon form compact and most fruitful bushes: I have some trees under this treatment remarkable for their healthy and sturdy growth.

The season of that very fine sort, the Peach-Apricot, may be prolonged to a great extent; it generally ripens in the orchard house about the first week in August, but by the following simple method it may be had in perfection till the middle of October. The end of June some trees full of fruit should be selected, and those that are to be very late should be placed under a north wall till the first week in September, and then removed to the orchard house to ripen their fruit. Those that are to ripen in September should be placed in a sunny, exposed place, till the end of August, and then be removed to the orchard house. The fruit from those trees that are much retarded will not always prove good, unless the weather be fine and warm; but that from trees set out of doors in a sunny place and then ripened in the house will be most excellent.

Half-standard apricots may be made charming ornamental trees for the summer decoration of the flower garden; for this purpose trees with nice straight stems about three feet in height should be selected, and planted in pots or tubs. They should be grown in the orchard house, and about the middle of July be removed to the lawn or any part of the garden where such trees would be desirable. They can be pruned into round heads and employed for summer ornaments, just as orange trees are in many gardens: they will be found equally ornamental and more useful, because their fruit is valuable.

The most desirable sorts of apricots for pot culture are: the Red Masculine, which ripens in June; the Large Early in July; St. Ambroise, which follows very closely; the Kaisha; the Blenheim; the Royal; and the Peach-Apricot, like the Moor Park, but larger and a better bearer. These are placed as nearly as possible in the order of their ripening, and give a good succession.

They will come in nearly at the same season as those on walls; for it must be understood that fruits in thoroughly ventilated orchard houses are not much forwarded unless the season happens to be very sunny. It is not an *early* but a *certain* crop that must be expected. I have not named any later kind than the Peach-Apricot because it is so easily retarded, and is always of the highest excellence; it is also the most abundant bearer of all.

FIG. 9.

An Elruge Nectarine Tree, three years old, from a Daguerreotype.

Peaches and Nectarines. Few fruit trees give more satisfaction in the orchard house than a choice selection of peaches and nectarines: when in blossom, in early spring, the trees are so fresh and beautiful; they are so exceedingly prolific; and in autumn, what fruit can vie in beauty with a ripe peach or nectarine? and what to the lover of fruit trees can be more gratifying than to see his sideboard or dining-table decorated with peach-bushes in pots, studded with their lovely and perfectly ripened fruit?

If bushes of only a moderate size are required, 11-inch pots, as recommended for apricots, may be used. It is surprising to see what vigorous growth, and what fine fruit, peach-trees in 11-inch pots give; for, owing to the compost being rammed down, a large quantity of nutriment is given in a small space. I may as well, however, state, once for all, and for all descriptions of fruits, that, if fewer and larger trees are required, larger pots may be employed; thus 13, 15, or 18-inch pots may be used with equal success, by having numerous apertures at the bottom, allowing the emission of roots during the summer, root-pruning, and putting the tree to rest during the winter. A peach or nectarine-tree may thus, in two or three years, be made capable of bearing many dozens of fruit; but I must confess that my taste inclines to small prolific trees only because one can have greater variety in a small space; and small trees are pretty, are easily looked over, so that each leaf and bud, each blossom and fruit is known.

If peach-trees, already in pots, and in a bearing state, can be purchased, so much the better, for then a year is saved; but as such are more expensive than either "maiden" or "cut-down" trees, the cost of which is generally about 1*s.* 6*d.* to 2*s.* 6*d.* each, these had better be purchased. I may here state that "cut-down" trees are two years old, and if nice healthy trees of this description, with fully ripened shoots, can be found, they are better than "maiden" trees. But as they are not often to be met with,

I will first give the treatment required by one-year-old, or "maiden" trees.

These have one shoot, more or less vigorous, which should be well furnished with buds towards its base. This shoot must be cut clean off with a sharp knife, at the seventh bud from its base, and the tree then potted in the same compost recommended for apricots, in the same sized pots, and at the same season, being towards the end of October, or early in November.* The following summer every bud will, or ought to, produce a shoot. If there are seven shoots, the tree is formed for the season: they need not have their tops pinched off, but will merely require the laterals (small side shoots) pinched off to within two buds of their bases as soon as they are four inches long. This will induce the ripening of the shoots, so that by the end of the summer they will be full of blossom buds. At the end of August the point of each shoot should be pinched off, and they will then only require the annual pruning, either in autumn or spring, for which directions are given below. If the tree puts forth a fewer number of shoots than seven, the tops of all should be pinched off early in June; each shoot will then put forth three or more young shoots; all that are not required to form the tree must be pinched off in the same way as laterals, leaving seven, or, if the tree be vigorous, nine shoots to each tree. These trifling manipulations are easy to do, but difficult to describe: so to make the matter as clear as possible, let us place a young tree before us early in June, with five branches, each twelve inches in length; then let us, with a sharp penknife, shorten each branch to nine inches; then, at the end of June, let us take the same tree in hand, and we shall find that each shortened branch has put forth two or three young shoots; we must pinch them so as to leave on four branches two, and on one only one, making nine shoots, which as they grow should have their laterals pinched off regularly; they will then make vigorous trees in one summer, and form abundance of blossom-buds: no other pruning is necessary the first season; and if abundant ventilation and syringing daily, as recommended for apricots, have been attended to, the fruit buds will, towards the end of August, begin to be fully developed. The experienced gardener can at once distinguish them: such a person may prune his trees early in October. Let me endeavor to tell how to distinguish a fruit-bud, which, by the way, is the only bud to prune down to.

Well, then, generally,—or "general always," as a foreign friend expresses it, when he wishes to say anything that invariably takes place,—towards the base of each of your seven or nine shoots, you will find four or five pointed single buds, covered with their brown coat; these are leaf-buds; next to these, and higher up the shoots, are triple buds, a plump silver-coated one on each side, and a thin one in the centre. These plump silvery buds are blossom-buds, and the central one a leaf-bud, which produces a shoot, so necessary to the well-being of the blossom-buds, that without it they would be abortive. Be sure to have on each shoot, if possible, nine to twelve of these triple buds, and cut off the shoot close to one of them; if this cannot be found at the proper place, so as to be able to form the foundation of a nice, regularly-shaped, bush-like tree, cut off the shoot at a leaf-bud. If the trees are pruned in autumn, the buds are difficult to distinguish; it

* This season is recommended, but it may be departed from; for my peaches and nectarines are sometimes not potted till March, yet they make fine growth.

will, therefore, be better for the beginner not to prune his peach and nectarine-trees till February or early in March, when every bud will plainly show its character,—the blossom-buds by that time will have opened their silvery coat, and the bright pink will be peeping out. If the shoot be cut off at a single blossom-bud, it will die down to the next leaf-bud ; this must therefore be carefully avoided.

Let us now proceed with the culture of our maiden tree. A season has passed : it is early spring, say the middle of February, and our tree, with its nine branches of the last summer's growth, is before us ; three of these should be cut down to within five buds of their bases, to give a supply of young shoots for the succeeding year, and six should be cut down so as to leave on each branch ten or twelve triple buds. These are the fruit-bearing branches for the present season : and so it must be every year ; a few branches, say one-third, must be cut in closely on opposite sides of the tree to give young shoots, and the remainder left as above to bear fruit. Those shoots that have borne fruit will often require to be cut out, to make the tree dwarf and prevent its becoming naked, as the spurs die after bearing, unlike those of the apricot and plum, which continue to bear fruit for many years. Much will depend upon the sort cultivated, and the vigor of the tree : one thing must be borne in mind,—do not let the tree become bare of young shoots towards its base, and tall and straggling. If pruned in spring, the nature of every bud may be seen, and the tree formed, by the proper use of the knife, into a fruitful, beautiful bush.* From twelve to fifteen leading shoots should be left in summer pruning on each tree when in a full-bearing state.

I have thus endeavored to follow the "maiden" tree to its fruiting state. The "cut-down" tree, which should have four or five branches, should be potted in autumn and pruned in early spring : each branch must be shortened to six inches ; these will put forth numerous young shoots, which in June should be thinned out with a sharp knife, leaving nine or more shoots to be pruned the following spring, as above directed. If trees in pots three or four years old in bearing state can be purchased, it is a saving of time, for if they are potted before Christmas, a crop of fruit may be expected the ensuing summer ; in such trees, the shoots intended to bear fruit, and covered with triple blossom-buds, may be shortened to ten buds, and those which are to make young shoots for the next year's bearing should be shortened to five buds.

I think I may now add with safety, having (this day, February 14, 1856) just pruned my trees for the sixth year, that but little anxiety need be felt by the beginner, for when a peach-tree has been in a pot in an orchard house for two years it *will* bear, prune it how you will. All that seems to be required is to make the tree symmetrical and prevent its bearing too bountifully, for it must be borne in mind that fruit from a tree overloaded, whether under glass or in the open air, is never of a fine flavor. Peaches, pears, plums, apples, and indeed all descriptions of fruit, suffer in flavor to an extent scarcely thought of, if the tree be suffered to bear too many. It is better to have one dozen of peaches large and of fine flavor, than two dozen small

* When the trees are in a bearing state, many short, spur-like shoots, from four to six inches long, will be made every season on the stem and towards the base of the principal branches. These will be generally covered with single blossom-buds and a terminal leaf-bud : they may be removed if too much crowded, *but never shortened.*

and inferior; besides this, a tree suffered to bear too large a crop will be sure to fail the following season.

I need not repeat here the directions for the general management I have given for apricots: exactly the same is required for peaches and nectarines, which may be grown with them; the same top-dressing, liquid manuring, syringing, root-pruning, and winter management.

Peaches and nectarines, either in the open air or under glass, are inclined to grow too vigorously: pot culture here gives a great advantage; the trees should be lifted, so as to break off all the roots that are entering the border from the apertures at the bottom of the pot; this operation should be performed once a week, commencing the second week in June, and continued till the end of July; they may then be suffered to make roots into the border till the fruit is gathered. By this treatment the trees become sturdy and short-jointed; *i. e.*, very short spaces will be found between the buds. Trees that have been from five to seven years in pots will require abundance of water daily, in summer, as the pots become full of roots, and absorb a large quantity.

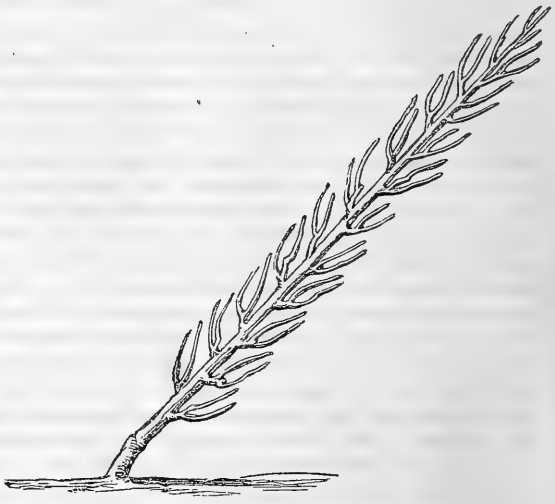
There is a matter of importance, in the culture of peaches and nectarines, to which I beg the reader's special attention, although it is a repetition, and that is free ventilation. In the warmer parts of England, and more particularly in Surrey, I have heard of two or three failures in growing peaches and nectarines in orchard houses, owing entirely to the attacks of the red spider, brought on by the unskilful management of servants, calling themselves gardeners, who would persist in shutting up their houses at four o'clock in the afternoon, in hot weather, and not opening them till nine in the morning; the poor trees were thus suffocated, and so enfeebled as not to be able to resist the attacks of this most persevering and insidious enemy. Now let me advise any one who has such a servant, to open all the shutters about the first week in July, and have them nailed so that they cannot be closed; they may remain so till the first of September. If the trees are regularly syringed, no red spider will make its appearance, and the fruit will be of much finer flavor for this constant and free ventilation. The usual and proper mode of ventilation is to have the shutters open by day all through the spring and early summer months, and open night and day as soon as the peaches begin to color, unless the house be in an exposed place, and the weather cold and windy, then they should be only partially open. But few gardeners have the courage to give air enough to orchard houses and vineries: in mine, without fire-heat, abundance of air is given night and day, from the middle of July till the grapes are ripe.

A very simple and agreeable method of retarding such mid-season peaches as the Noblesse, Royal George, and Grosse Mignonne, and all mid-season nectarines, may be practised as follows:—Remove the trees from the orchard house to the open air the end of July (if the season is early, and the house is in a warm situation, a week earlier); place them in some warm sheltered place, or in front of a south or south-west wall, about two feet from it. In a few days both peaches and nectarines change to a deep crimson, and if the weather is sunny, their flavor will be very vinous and piquant. Under this treatment, such sorts as I have named above will ripen by the end of September, or later, according to the state of the weather. By this method, the season of our fine melting peaches and nectarines may be much prolonged, and, in cases where the absence of a family

may require it, the whole crop of an orchard house can be retarded. Half standard peaches and nectarines with nice round heads, may be used as ornamental trees in the same way as recommended for apricots.

Within these few years a method of growing peach-trees against walls has been brought into notice in France. This is called training "en cordon oblique," and is carried out by planting against walls, maiden trees twenty inches or two feet apart at an "angle of forty-five degrees." The lateral shoots are shortened in closely, and rigid summer pinching is practised, so that a wall is soon completely covered with short fruit-bearing shoots. In warm climates and in dry soils this method has been found to answer very well, but has been objected to in climates and soils of a contrary description, as the vigor of the trees is not restrained enough by the most severe summer pinching. The French gardeners do not know, or will not practise, root-pruning or annual removal, which would doubtless make these very pretty trees abundantly fruitful. The annexed is a figure of one of these oblique trees, from the work on pruning by M. Hardy.

FIG. 10.



A Peach Tree trained "en cordon oblique."

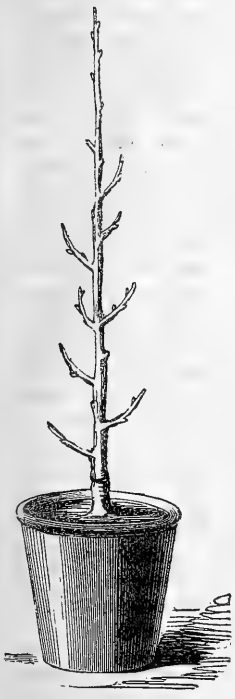
I now propose a modification of this mode of culture for the orchard house, by forming peach and nectarine-trees into close compact pyramids like an upright cypress, and annex a figure (fig. 11) of a maiden tree potted and pruned. For this purpose maiden trees with straight stems and well furnished with lateral shoots should be selected, and planted in 11-inch pots. They should not be more than from three and a half to four feet high; if more, their tops may be cut off to that height. Each lateral shoot should be cut into two buds; these and the buds in the stem will give numerous shoots: during the whole of the summer every shoot must have its point pinched off as soon as it has made six leaves; those that are weak and form their terminal bud at the fifth leaf need not be shortened. This incessant summer pinching of the shoots of a potted tree, in the climate of the orchard house, will, in one season, form a compact, cypress-like tree, crowded with short fruit-spurs. The second season these should be thinned out in February, so as to leave them as nearly as possible at regular distances, and in summer the fruit should be thinned and the shoots pinched as in the first season.

A close fruitful pyramid will thus be formed, on which the fruit will be fully exposed to the sun and air. A great number of trees may in this way be grown in a small space, and they will form beautiful objects of high culture. I have recently planted some trees of this description in one of the

borders of an orchard house, and intend to manage them after the method I have given as regards summer pinching; and lifting and replanting them every year early in November. A plantation of these pyramids, in a small span-roofed house, will, I am certain, prove most interesting and profitable.

The peach and nectarine season may be much prolonged by a judicious selection of varieties. The earliest peach is the Red Nutmeg, which will ripen in July (it is small, but very nice); next the Early Anne and the Early York, which ripen immediately after it; then the Acton Scot; the Early Grosse Mignonne; the Grosse Mignonne; the Noblesse; the Royal George; the Galande; the Reine des Vergers, a beautiful and hardy new peach; the Barrington; the Chancellor; the Walburton Admirable, a most *admirable* new variety; and the Late Admirable, of which the Teton de Venus and Bourdine are excellent varieties: these ripen nearly in succession, are all melting peaches, and give their fruit from July till the middle of October. I am also inclined to think, that with the large "Pavies" or clingstone peaches of France, such as the Pavie de Pompone, and the Catherine, the peach season may be prolonged till the middle or end of November. These very late peaches, on walls in moist climates, are quite worthless; but in the dry climate of the orchard house, although not high flavored, they serve to prolong the peach season. They should be cut in slices and served with wine and sugar, as in France.

FIG. 11.



A Maiden Peach-Tree pruned to form a close Pyramid.

A selection of nectarines may include the following:—Fairchild's Early, small, but the earliest; Hunt's Tawny; Elruge; Hardwicke Seedling; Pitmaston Orange, very beautiful and very good; Violette Hâtive; New White; Roman; Early Newington; and Late Melting.

There is a race of nectarines from Syria well worthy of especial culture; the best of these is the Stanwick and seedlings raised from it. Many gardeners have failed in its culture, finding it crack, and drop off in stoning. It is easily cultivated in pots, but requires an orchard house gently heated: the best of houses for the culture of this fine fruit is the small span-roofed with boards, and heated by one 4-inch hot-water pipe round the house. As soon as the trees are in blossom in April, the fire may be lighted every morning at six and kept up till five in the afternoon all through May, giving abundance of air in the day, and a portion by night, although the crevices of the boards will admit some. In June and July the fire may be lighted at six in the morning, and suffered to go out at mid-day; the trees must be syringed regularly. By this treatment the fruit will ripen in the South of England in August, be clear, free from cracks, and the most perfect and delicious of all nectarines; its flavor is most peculiarly gratifying, and I have no hesitation in saying that no fruit can be imagined more exquisite in flavor.

Plums.—I do not think that the good qualities of this fruit are as yet

half appreciated. It is in season from July to November; it is excellent for preserves and for compôtes. And then how delicious are many of its varieties as dessert fruit! For the orchard house it is also well adapted; the early varieties ripen very early; the late kinds may be kept in muslin bags all through November; they shrivel in the dry climate, and are perfectly delicious. I have had some of Coe's Golden Drop in muslin bags on the trees, partaking of the flavor of those called "French plums," but richer and more agreeable.

Plums for potting may be grafted on the sloe (Prunus spinosa), but they are equally prolific when grafted on the plum-stock: if they have been removed the year previously to potting, they will be full of bloom-buds, and will bear a good crop the first season; if they can be procured already established in pots, the crop will be better and the fruit larger. The same compost and the same treatment recommended for apricots will do for plums; the same potting, pinching, and pruning, so as to make the trees nicely shaped, compact, and dwarf, is all that is necessary.

In selecting varieties some care is required, so as to have plums all through the summer and autumn. The very early and very late plums here in the South of England seem to ripen in the orchard house without any loss of flavor; but the mid-season plums, such as the Mamelonnée, Green Gage, De Montfort, and, I may add, the Jefferson, are, I think, improved in flavor by being ripened in the open air. For this purpose the trees should be lifted, so as to break off their young roots, a week previously, and then removed to some warm and sheltered situation. Their flavor is, I think, improved by this treatment; and their removal will give more room to the peaches and nectarines. In wet and moist climates, where the Green Gage ripens with difficulty, they must remain under glass all the summer.

And now to our selection. For the first, take the Early Favorite and Early Prolific,—two most excellent sorts, which ripen about the middle of July, nearly as soon as the Jaune Hâtive, a very early, but very inferior, plum; next in succession comes the Saint Etienne; then the De Montfort; the Denniston's Superb, and the Mamelonnée—early green-gage-like plums; the Green Gage; the Jefferson,—rich and delicious it is; Purple Gage; Reine Claude de Bavay; Coe's Golden Drop; Ickworth Impératrice; St. Martin's Quetsche; Coe's Late Red, and the Late Black Orleans;—all these are excellent, and ripen nearly in succession as I have placed them. A very nice way of keeping the autumn plums, or, indeed, those that ripen in summer, from wasps and flies, is to form the trees into compact bushes, which may be enclosed, when bearing fruit, in a muslin bag,—any common cheap muslin will do,—tying it tightly round the stem of the tree, so as to exclude the ants, which are great pests in dry and pleasant places. I have only to remark that the plum in orchard houses will to a certainty always give abundant crops, and as certainly ripen its fruit: in short, its culture will be sure to give satisfaction to those who love gardening.

After some years of experience, I have found the plum so easily grown in pots, that I feel a new era in their cultivation has arrived. It is well known that plum-trees in our climate bloom so early in spring as to be much injured by our spring frosts: it may safely be asserted that a fair crop of Green Gages, away from walls, is realized but three years out of seven, even in the South of England, but two years out of seven in the Midland Counties, and seldom or never in Yorkshire. Now I propose that, for those

who wish to grow a regular and certain crop of plums without incurring a heavy expense, rough-built lean-to orchard houses should be erected in some out-of-the-way corner of the premises, consisting of larch poles, rough half-inch boards, with two or three sliding shutters for ventilation,—in fact, merely a glass-roofed shed on purpose for protecting plum-trees in pots while in blossom and setting their fruit. It is surprising with what vigor and beauty plum-trees blossom even in the rudest glass structure, and as the trees need not remain in the house longer than the end of the first week in June,—for then all danger of severe spring frosts is over,—they may be placed so close together, that a house twenty feet by twelve, with a path in its centre, will hold ninety-six trees, forty-eight on each border. The trees may be planted in 13 or 15-inch pots, and treated exactly as other orchard-house trees; with this difference,—all the trees having young fruit should be removed from the house in June, and placed in rows or otherwise in the garden, to ripen their fruit in the open air.* The pots may be plunged in the soil one-third of their depth, but not more; for if the roots are too cold, the fruit will suffer in flavor, and if the soil be wet and cold, it should be drained or made porous, so that the water passes from the pots rapidly, and the top-dressing of manure must be most abundant. As a matter of course, the very late plums must be ripened under glass; but all those varieties that ripen in the open air before the end of September may be there grown to great perfection, and regular annual crops insured, if care is taken to thin the fruit properly. If too large a crop is extorted, the tree *will* have a year's rest. It is quite astonishing how prolific these bushes become in a few years; and by merely pinching off the ends of exuberant shoots—which should be done about the end of June—to within three or four inches of their bases, they soon form themselves into compact round-headed trees, quite as ornamental as orange-trees in pots and tubs, and far more gratifying as regards utility; for one would not like to place a dish of English oranges—cultivated as they are at present—before one's friends, but English Green Gages are always acceptable.

The best varieties for this extended mode of plum cultivation in pots, are the Early Prolific; De Montfort; Denniston's Superb; Green Gage; Angelina Burdett; Woolston Black Gage; Kirke's; Guthrie's Late Green; Reine Claude de Bavay; Purple Gage; and, above all, the Jefferson, one of the most beautiful and delicious of plums. These are for the dessert; but as in some climates it may be necessary to grow plums in the same way for culinary purposes, I may as well give the names of a few good kitchen plums: such are the Victoria and Autumn Compôte, both large and excellent, ripening in succession; the Diamond; the Early Orleans; White Magnum Bonum; and Prince Englebert. The trees must all be removed to the orchard house the last week in October, top-dressed and watered, and then kept dry all winter. As the earth of these out-of-doors orchard-house trees becomes very firm by the heavy rains of summer, an iron pick, to take out the mould in spring, will be found very useful. I give a sketch in p. 19 of one which I have had made by the village smith. As plums are coarse feeders, I take the surface earth out to the depth of six inches at the side of the pot, sloping upwards to the stem, so as to be able to give them a large quantity of fresh compost.

* There might be danger in this practice in America, from the curculio, without the muslin bag.—PUB.

To those who wish to grow plums under glass in large quantities, I beg to point out a very simple mode of culture,—viz., planting a house with bushes or pyramids, and removing them biennially to check their growth: one of our most skilful gardeners, Mr. Monroe, grows them in this manner, and finds that, after two or three years, owing to the trees being every season loaded with fruit, they do not require removal, as they grow very slowly.

Cherries.—The Cerasus Mahaleb, Bois de Sainte Lucie, or Perfumed Cherry, has been long employed on the Continent as a stock for dwarf cherries; it will grow well in calcareous and shallow soils, unfavorable to the common cherry-stocks. It is a very good stock for trees for potting; when grafted or budded on it, they form beautiful dwarf bushes: the May Duke and Morello cherries, of which there are several varieties, do much better on it than the Bigarreaus and Hearts, which are apt to gum, and grow too rapidly in proportion to the stock. Cherries are well known to be difficult to force, or to grow under glass: the blossoms generally fall without setting their fruit; but in our well-ventilated orchard houses, this is not the case.

Their potting, compost, and treatment may be exactly the same as that recommended for apricots: the tree should be formed into a nicely-shaped bush, with regular divergent branches; on each branch the shoots, all but one leader, must be pinched back in June to a spur of about two inches, and the leading shoot shortened in August to about six inches, till the tree has attained the size desired; the leader may then be shortened to one inch annually, and the size of the tree, if it becomes too bulky, reduced by the knife. The best early cherries for the orchard house are, the May Duke, the Archduke, the Belle de Choisy, and the Royal Duke,—which ripen in succession. Then of the Heart Cherries and Bigarreaus, the very earliest of all is the Belle d'Orléans; then the Early Purple Guigne; Knight's Early Black; the Black Eagle; Elton; Bigarreau Napoléon; the Bigarreau; and the Florence: I have placed them as nearly as possible in the order of their ripening. Of late cherries of the Morello tribe, which succeed admirably as dwarf bushes, there are Reine Hortense, a large and delicious sweet cherry; the Late Duke, also sweet, and of the highest excellence; Griotte de Chaux; Coe's Late Carnation, a most delicious late cherry; Belle Magnifique, a very large Morello-like cherry, but not very acid; and the Morello, which, when fully ripe, and black, in September, is not to be despised as a dessert fruit. All these may be made to supply the dessert through August, September, and, indeed, great part of October, by enclosing each bush in a muslin bag, tied tightly round the stem near the ground: the dry air preserves them from mould, and the warm climate gives them a flavor very superior to that of late cherries cultivated in any other mode. Cherries under glass are very liable to the attacks of the black aphis. There are two remedies for this pest: brushing the shoots, as directed in p. 44; dipping them in strong tobacco water; or covering the bush with a sheet of tiffany or calico, and placing ignited tobacco paper in a small flower-pot under it, so that the draught through the aperture at bottom is open. This a good method of fumigation.

In wooded districts it is almost impossible to taste cherries fully ripe, so numerous and destructive are birds: in such places cheap orchard houses might be built for their sole culture, in which the ventilators should be kept constantly open as soon as the fruit begins to color, but the openings must

be covered with netting to keep out their winged enemies. They grow remarkably well in pots, and in a few years become most fruitful, every spur giving a bunch of blossoms; nothing can be imagined more cheerful than a cherry orchard house when the trees are in full bloom in April and May.

Figs.—The fig is not a general favorite; but to those who like them, as I confess I do, their cultivation in the orchard house is interesting and most simple.

Figs may be planted in the compost already recommended, and in pots of the same size, top-dressed in spring, syringed in summer, and put to rest in autumn, and treated exactly as other fruits. Although fig-trees against walls require protection from the frost,—which would otherwise destroy the young fruit that is the first to ripen in early summer,—yet under glass, with the mould perfectly dry, and the shoots thoroughly ripened, they will be uninjured by the most severe cold. If a well-formed bush cannot be procured, the tree must be cut down the first season to within nine inches of its base; the shoots, when they make their appearance, thinned out to five: when these are about a foot in length, pinch off the end from four, leaving the central shoot for a fortnight or so to grow longer; then pinch off its end in the same manner. Your bush will be formed, but you must not expect any fruit the first season. In succeeding seasons it must be pruned in the same manner that you would a bearing tree purchased and placed at once in the house: *i. e.*, in May or the beginning of June, as soon as the young shoots have made five leaves, pinch out the terminal bud of each: they will then give fruit for a second crop, the first crop having been produced by the shoots of the preceding year. And to keep your trees as compact bushes, never allow any shoot to make more than five leaves without pinching out the terminal bud with the nails of the finger and thumb. The tree will, in a year or two, become too much crowded with young shoots; thin them with a sharp knife, leaving no spurs, but cut close to the main branch or stem. Figs like more heat than any other fruit yet mentioned; they may have the warmest corner of the house, not requiring much ventilation. A house with fire-heat is indeed necessary for them, if two crops in the season are wished for. In 1857 figs in common orchard houses ripened two crops of fruit in several instances. They must have abundance of water, or the fruit will all drop, when nearly full-grown, without ripening. The varieties best adapted for pot culture are, the Early Violet, the White Marseilles, and the Brown Turkey, or Lee's Perpetual: if more varieties are required, the Angelique and Black Ischia may be added.

To those who have not much orchard-house room, the following method of growing figs may be useful. In the summer of 1857 I happened to visit Altenburg, a small town, the capital of the Duchy, about twenty miles from Leipsic. In the kitchen garden of the castle I observed some fine half-standard fig-trees with very stout clear stems and round heads full of fruit, then (August) nearly full grown. Aware of the coldness of the climate, the thermometer often descending many degrees below zero in winter, so as to kill fig-trees in the open air, I inquired of the gardener how they were managed. He stated that every season, in October, they were taken up with their balls of earth and placed in a cellar, where they remained till the first week in May: they were then brought into the kitchen garden and planted in a row as I then saw them. He said they always ripened one

abundant crop of fruit in September. I have reason to believe that standard figs treated in this way would also ripen one crop in the neighborhood of London, and in the Southern Counties.

Pears.—In the South of England, pears can be grown on pyramids with so much success, "barring" spring frosts, that there is no occasion to let them occupy room in the orchard house; still, in seasons like that of 1850, when, in even the most favored districts, all the blossoms were destroyed by spring frosts,I felt much gratification in having about a dozen trees in pots on quince-stocks covered with fine fruit,—and more highly flavored Brown Beurrés I have never tasted. Their culture is very simple, for trees on quince-stocks that have been root-pruned may be potted any time in the autumn, or even as late as February, and yet give a crop the first season after potting; as they set their fruit very thickly, they must be severely thinned the first season, and eight or ten pears ought to be the maximum of a crop. In two or three years a well-managed tree will be able to give from eighteen to two dozen finely-grown fruit. In the North this method of culture will be found both eligible and interesting; for glass without fire-heat will give just the climate suitable to the finer sorts of pears.

The pear-tree, when grafted on the quince, seems to be quite at home in a pot. I have some trees that have now been five years in 13-inch pots; they are in the most perfect health, and the stock seems to swell with the graft, showing that existing circumstances are favorable to its growth. I am inclined to attribute this healthy state of the stock, and consequently of the tree, to the roots of the quince enjoying, if I may so express it, the warm atmosphere which surrounds the pots during the whole summer; for my trees have been placed, unplunged, out of doors in the sun: in warm dry soils however, to economise water, it would be advisable to plunge the pots one-third of their depth in the soil. Pear-trees are gross feeders, and should have three or four surface-dressings of manure during the summer.

Pears deserve to be grown extensively in pots; and in climates liable to spring frosts, or in gardens having but little space for the finer kinds of pears on walls, a pear-house may be built, as recommended for plums. The trees may be treated exactly in the same way, and abundant crops of fair-sized fruit obtained. Pears ripened under glass require attention as to the proper time of gathering them; they must not be suffered to hang too long on the trees; for in 1854, and again in 1855, in two or three instances, I had pears on my trees which were grown under glass all the season; these, although of fine size, and most beautiful in appearance, having clear skins of a fine golden color, without speck or blemish, never became soft; I was for some little time, I must confess, entirely at a loss to account for this curious fact, as all circumstances seemed so favorable to the ripening process; but I believe I have now discoved the cause. In the autumn of 1855 I allowed some Louise Bonne pears, some Passe Colmar, and a few other kinds, growing in the open air on trees well sheltered, so that no wind could displace them, to remain on the trees till the first week in November; they were remarkably beautiful, both in form and color, and the fine dry weather we had for so long a period seemed so favorable that I felt unwilling to gather them: these pears never ripened. I am, therefore, led to conclude that pears under glass should be gathered early, *i. e.*, as soon as they will part from their foot-stalks when lifted. From not being disturbed by

the wind when under glass they will hang a long time, and one is loath to rob the trees of their ornaments: they thus become hard and worthless from a species of over-indulgence.

From recent experience, I am induced to recommend that in the South of England pear-trees should always be removed from the orchard house in July, and suffered to ripen their fruit in the open air, in a sheltered yet sunny situation; their flavor will then be piquant and racy, more so than that of fruit gathered from wall trees.

The trees should be formed into bushes, as recommended for apricots, plums, &c.; the young shoots pinched in June, and the leading shoot of each divergent branch shortened in August to six inches; so that the tree gradually, but slowly, increases in size, every part being furnished with blossom-buds. An abundant top-dressing of the strong compost recommended for apricots must be given in spring, even laid up above the rim of the pot; and such gross feeders are they, that manure-water may be given to them every day in summer with advantage. The most prolific and eligible sorts for pot culture are, the Brown Beurré; Easter Beurré; Glou Morceau; Bergamotte d'Espéren; Gansel's Bergamot; Doyenné Gris; Beurré d'Aremberg; Beurré de Rance; Louise Bonne; Marie Louise; Passe Colmar; Josephine de Malines; Crassane: Winter Nelis; Beurré Clairgeau; Prince Albert; and Van Mons (Léon le Clerc). The above are all autumn and winter pears. If summer pears are desired, Doyonné d'Eté, Jargonelle, Citron des Carmes, and Colmar d'Ete, may be potted. In the North, where these early varieties do not ripen kindly in the open air, their culture under glass will give much satisfaction, for they may be brought to the dessert with their fruit in full maturity. I need not, I trust, say more about this really new and interesting mode of cultivating pears. My readers will, I hope, see its advantages, and many of them venture to put it in practice. I may, I trust, be allowed to add, that if I lived in an unfavorable pear climate, and wished for a certain supply of fine winter pears, I should fill a house with those two most delicious kinds, Josephine de Malines and Winter Nelis, which, unlike some sorts, ripen under glass with their full flavor.

Grapes.—For some few years it has been the fashion for gardeners in lordly places to grow grape-vines in pots, which, after bearing one crop of fruit, have been destroyed. Now these pots are generally of such large dimensions as to be quite out of character for our orchard houses, and totally unfit for the amateur who wishes to be master of "all he surveys." By observing in the land of the vine that grapes, and good grapes, could be grown on very small bushes, and in crevices containing but a scanty portion of earth, I was induced to try their culture in comparatively small pots, without destroying them after giving their first produce, continuing their culture without shifting, but top-dressing them annually, suffering their roots to feed in the border during the summer, and then root-pruning and managing them in the same way as other orchard-house trees. This has succeeded admirably, and my vine bushes have been beautiful objects, bearing from four to six bunches of nicely-ripened grapes.

To form these bushes but little care is requisite; a vine one or two years from the eye, with a single stem, must be selected, and potted into an 11-inch pot, in the same compost as recommended for other fruit trees, adding to each pot a quart of 1-inch bones, well mixed with the mould; then cut the

vine down to within eight buds of its base : the three lower buds must go for nought ; the five upper buds, if the wood be well ripened, will give each a bunch. The lower shoots should be stopped, their tops pinched off as soon as they are four inches long : the upper five shoots may be suffered to grow till the bunch is perceptible ; these may then be stopped one bud above the bunch, and all lateral shoots that afterwards come forth may be stopped at two buds from the base of the shoot they spring from. No other pruning will be required during the first season than this finger-and-thumb pruning. It is quite possible that some of the five buds may fail to give a bunch ; no matter, stop them of the same length as the fruit-bearing shoots, so as to make a uniform pretty bush ; for the vine in all sites and situations, and in all stages of its growth, is a beautiful object. You will now have an upright stem with five divergent branches or spurs. Now, on the pruning of these spurs depends success ; they will, of course, from being grown under glass, be well ripened, and the buds well developed. Begin at the stem, and count four or five buds upwards ; the fourth or fifth will, in all probability, be nice and plump. This must be your fruit-bud. Cut down to it closely ; then with a sharp pen-knife *cut out* two or three buds, leaving the terminal bud and another at the base of the spur close to the stem. This will give you a shoot, which is to be your fruit-bearing shoot for the following year. You will thus have on each spur two buds, one for fruit, and the other for wood.

In autumn, that part of the spur which has borne fruit must be cut down close to the shoot which is to bear fruit the following season, and this shoot must be pruned in the same manner to one fruit-bud and one shoot-bud. This pruning should be done early in October, as the buds are then fully developed, and much is gained by autumnal pruning. A vine treated thus will last for many years, and may be always kept as a dwarf bush : the main stem, in time, will swell, and not require the support of a stick.

The first season the cultivator must be content with four or five bunches from the vine ; but if it has its annual autumnal top-dressing of the compost described in p. 18, and in summer a weekly supply of manure-water, it will soon be able to bear eight or ten bunches, and become like one of those hardy prolific bushes one often sees growing in the crevices of rocks in the wine countries of Europe.

After their fruit is set, vines require syringing like other orchard-house trees. As soon as the fruit is gathered, prune off the roots which have fed them so bountifully all the summer, top-dress them, withhold water, and put them to rest for the winter. I may add, that vines do not need the extreme ventilation recommended for stone-fruits : a warm part of the orchard house will suit them best ; or if a small house with a brick Arnott stove can be entirely appropriated to them, so as to force them, and have two, or even three, crops in the season, their culture will be most interesting. To do this, if forcing be commenced in January, put in one-third of your plants, early in March another third, and then in May the remainder. I do not hesitate to say that a house appropriated to vines in pots will give more fruit than the same space of glass with vines trained to rafters in the usual manner.

The varieties best adapted for this bush culture are those that are very prolific, none are more so than the following :—the Early Malingre ; the Purple and Black Frontignans, most abundant bearers ; the Prolific Sweet

Water ; the Purple Fontainebleau, also abundantly prolific ; the Esperione; the Grove End Sweet Water ; the Cambridge Botanic Garden, a variety of the Black Prince, and a great bearer ; the Chasselas Musquée ; the Muscat St. Laurent ; the Royal Muscadine ; the White Romain ; the Black Hamburg ; and the Chaptal, which gives large and most beautiful bunches. It must not be forgotten that the berries must all be thinned when they have attained the size of small peas, or they will become crowded and inferior.

Apples.—There are a few delicious American apples which require more sun and a drier climate than that of our "tight little island," and these I feel convinced can be cultivated in the orchard house with success. They should be grafted on the Paradise stock, be planted in the same sized pots as other orchard-house trees, in the same compost, and have the same treatment with regard to summer pinching as apricots. The only sorts I know at present to be worthy of this in the South of England are some foreign varieties, among which are the American apples, the Newtown Pippin ; the Northern Spy, a delicious, large, handsome, and good-keeping apple, with half-melting flesh ; the Melon Apple, of equal goodness : these seem to require a warmer climate than the open air even of our Southern Counties. The Male Carle, a favorite Italian apple, may also be tried. In the far North, however, some of our fine English apples may be equally worthy of a place under glass : such as the Ribstone Pippin ; the Nonpareil ; the Golden Pippin ; the Golden Reinette ; the Van Mons Reinette ; Coe's Golden Drop ; the Sturmer Pippin, and some others. I hope one day to see orchard houses on many a sunny slope in the Highlands ; and why not ? If art and wealth can overcome Nature in making fruits grow instead of heather, the conquest will cause smiles rather than tears, and give a much greater amount of happiness than the "glorious victories" of our history.

Mulberries.—In the North this delicious fruit does not ripen kindly ; in such localities dwarf plants in pots may be tried in the orchard house, and I doubt not but they will succeed well.

I may also add that White Currants, which are seldom well ripened, and even then are very acid, may be grown to great perfection in pots under glass.

Strawberries.—On the back border of the lean-to orchard house—for, unless the front is partially of glass, the front border is too much shaded—spaces will be found for strawberries in pots, and they give much pleasure and satisfaction ; their fruit will ripen about ten days before those from plants in the open air, and to a certainty will not be spoiled by rain or vermin. Whoever has tasted fruit of the "British Queen" grown under glass without being forced, will, I am sure, have a lively recollection of their being much higher flavored than those generally gathered from strawberry beds.

Nothing in our orchard-house culture is so simple as the management of potted strawberries, and nothing will be so certain of agreeable results. About the middle of July take 6-inch pots, place two or three large pieces of broken pots at the bottom, so as to lie hollow ; then mix your compost, which should be two-thirds loam—if rather stiff the better—and one-third rotten manure. You are so far prepared for operating ; but you still lack an implement, and what a strange one in the hands of a gardener ! for it is neither more nor less than a pestle,—a wooden pestle, fashioned out of any stout stake, and perfectly rounded at bottom : now then, take a handful of

mould—nothing like the hand in potting—put it into your pot, and give it a good pounding, and so keep on with a handful, and a pounding, till your pot is full, quite level with the brim, for the earth will afterwards sink enough to retain water. You will thus, if you have done well, make your earth level with the brim, and as hard as a barn floor. Take the pots to your strawberry beds,—and mind, there are but few strawberries known at present to be worth forcing or growing in pots in the orchard house,—Keen's Seedling and the Seedling Eliza for early sorts, and the British Queen and Carolina Superba for a main crop, will suffice,—and place on the centre of each pot a runner which has commenced to make roots, or if no roots are apparent it will do as well, and on the runner place a small stone, to keep it from being blown off by the wind: make no hollow place: do nothing but place it on the hard surface, as I have directed. If the weather be dry, water daily; and if the runner, as is often the case, pushes forth another runner, pinch it off. In two or three weeks the roots will have penetrated to the bottom of the pot; the plant may remain attached to its parent till the middle of September, and then all the pots may be removed to their winter quarters,—some sunny place: they should be placed on rough cinders, and then plunged in sawdust or rotten tan. In February, they may be removed to the orchard house or forcing-house, as required; no shifting is requisite, and a plentiful crop will be the result.

Strawberry plants, treated in this manner, attain much strength and luxuriance in the autumn; their fruit-buds will be finely developed, and they will be all that the gardener can wish them to be. This very simple mode of treating strawberries for culture under glass is not new; it was pointed out to me by a market-gardener some years ago. I have practised it ever since, and am more than ever pleased with it. In growing strawberries in pots, it is the usual practice to place them on shelves close to the glass. In the orchard house at Hyde Hall, I have seen, annually, remarkably fine crops; the pots are placed among the peach-trees, on the back border, six feet from the glass.

The following extract from the "Gardener's Chronicle" of June 7, 1856, seems to give a very nice mode of cultivating strawberries in pots:—

"In the garden of the Horticultural Society, in the year 1855, Mr. Gordon caused runners to be taken up from the ordinary plants in the open borders in the first week in August, and potted in 2½-inch pots (small 60s); the soil used was a mixture of rotten cow-dung and loam (quarter dung, three-quarters loam). When potted, they were placed in a close frame until established, and when the roots had filled the little pots, which was in about four or five weeks, the plants were shifted in the same kind of soil as before, into 4-inch fruiting pots (48s). They were afterwards transferred to a fully exposed situation in the open air, where they remained until the first week in December, at which time they were removed to a border in an unheated orchard house, where they were kept rather dry during winter. On the 14th of March the pots were removed to the front shelf in a curvilinear vinery, kept at a temperature of 40° until the middle of April, when the temperature was raised to 55°. The plants were watered twice, when the fruit was fairly set, at an interval of three days, with a weak liquid manure, made with half-rotted cow-dung and water, allowed to stand a few days before using. The result was an abundant crop of excellent fruit."

Almonds.—To those who wish to be reminded of the "sweet South," by

having almonds fresh and ripe from the tree, the orchard house will give one more tribute. Almond-trees in pots require exactly the same treatment as peaches and nectarines; but the choice of the proper sorts is of consequence. The Sweet Almond in common cultivation, and which is so conspicuous in our shrubberies in March, with its bright pink blossoms, is not the variety to be selected. The only sorts worthy of cultivation are the Tender-Shelled Almond—"Amande à Coque Tendre," and the Large-Fruited Almond—"Amande à Très Gros Fruits;" the former has shells very tender and easily broken with the fingers; the latter gives large fruits with shells not quite so tender. They require, however, even more air than peaches, while in bloom, and if the weather be dry and sunny they should be placed in the open air by day, removing them to the house at night: if this is inconvenient, they should be placed near one of the ventilators, which should be open night and day.

THE FORCING ORCHARD HOUSE.

This kind of fruit house may be built in the same way as the common orchard house; but it is necessary to nail felt over the boards to prevent its being too airy in early spring, when forcing is commenced. It requires skill and attention; still, with only common care, a house heated by a brick Arnott stove placed in the centre, or by hot-water pipes, will not disappoint the careful amateur gardener, and will give strawberries in March, grapes in May, and peaches and nectarines in June.

I have a house thirty feet long, with a brick Arnott stove in the centre of the back border, which is excavated for it. Everything thrives admirably. My forced strawberries, placed on the front border near the glass, root into it, and give me abundance of excellent fruit. In like manner, peaches, grapes, figs, and apricots may be forced with but little trouble—in fact, with much pleasure and gratification. The three modes of heating are by a well-built flue, the brick Arnott stove, and hot-water pipes; the first and second are about equal as regards economy,—the latter the most expensive, but certainly more agreeable than any other. A flue may be employed for houses under fifty feet in length and twelve or fourteen feet wide, efficiently, but not, I think, for houses above that length. Any country bricklayer can build one: its dimensions inside should be nine inches deep, and six inches wide, formed by bricks on edge, covered with two layers of tiles: the furnace should be fixed low, so that there is an immediate ascent from the end of the furnace into the flue, and a gentle rise—three inches in twenty feet—should continue to the chimney, which may be less than the flue with advantage, according to some gardeners; it is not, however, of much import. In building these *forcing* orchard houses the *constant* ventilation through the cracks in the boards must be avoided; the boards must be rebated or be cased with asphalt felt; or, as bricks are cheap, the walls may be of brick, with the ventilating shutters in back and front. The forcing orchard house I have alluded to above is built with posts of larch cut once down and covered with half-inch boards; these being nailed on, were well tarred with Stockholm tar, and the felt (M'Neil's) then nailed on, and done over twice or thrice with boiling coal-tar, in which lime that had been slaked a fortnight was mixed to the consistency of thick paint: this has formed a shining imperishable mineral coat. I know of nothing equal to it for felt, clay, or lime walls or fences. My clay walls on some old buildings

have, by repeatedly using it, become coated with a substance as hard as stone.

I have mentioned that bricks may be used; but although I have many plant houses built with bricks, I have not employed them for building orchard houses, or even houses for forcing roses, &c. My preference for boards covered with felt for forcing houses may be owing to imagination; but I may as well state *why* I have and do prefer them;—it is because I have found them fiercely hot during the day, even in moderate sunshine, the evil effects of which are easily modified by abundant ventilation, and agreeably cool during the night, without that stifling atmosphere peculiar to houses with brick walls, only because bricks give out heat for many hours after sunset. Now, in thus rapidly cooling down, they certainly approximate to the descriptions given of the climate of the East, the birthplace of all our choice fruits; and so my peaches, nectarines, grapes, and figs grow and do well in houses with their walls of half-inch boards and felt.

Forcing of peaches and nectarines in pots, unless the fruit is required to be ripe very early, *i. e.*, in April, or early in May, is not a difficult operation. The trees should be removed from the orchard house to the forcing house in December, and towards the end of the month have a good supply of water, so as to thoroughly moisten the earth; if severe frost comes on, a fire should be lighted at night to keep the earth in the pots from being frozen. About the middle of January forcing may be commenced, the temperature by day kept up to 50° by fire-heat (if the sun shines it will mount up to 60° and 70° for a short time without injury to the trees), the night temperature may go down to 40°. The trees should be syringed twice a day with tepid water; this will soon make the blossom-buds swell; and when they are fully open, which will be in about twelve days, discontinue syringing; and, if the weather is mild and sunny, give air very freely in the day and a little by night, so that no stagnant moist air, so fatal to the blossoms of the peach, exists in the house; if the weather is keen and frosty, air must still be admitted, and a brisker fire kept up, so that the temperature is not lower than 50° by day and 36° by night. Close worsted netting, or Haythorn's hexagon netting, placed over the ventilators, will allow of air being given night and day, even in frosty weather, without injury to the blossom. As soon as the fruit is set and commences to swell, syringing twice a day (with tepid water), as directed for peach culture in the orchard house, may commence; a day temperature of 60° and a night of 40° to 45° should be kept up, and, when sunny, abundance of air may be given, for the thermometer will then rise to 80° and 90°; instead of lowering the fire, which may lead to inconvenience, admit more air, to lower the temperature, for gleams of sunshine in our early spring months are not of long duration, and the temperature is completely at command by the ventilators. To sum up, give brisk fire-heat and abundance of air by day; very little fire-heat, or none if the weather is warm, and a slight portion of air by night; syringe twice a day—in the morning at 9, in the afternoon at 4—till the fruit commences to color, and peaches and nectarines will ripen kindly, early in June, and be of fine flavor.

Apricots, May Duke cherries, and plums, may also be forced; and although in large establishments the two former often have houses especially allotted to them, as they require much care to fully succeed, yet a few trees placed near the ventilators, for they require even more air than peaches and nec-

tarines, may do very well with them. It is a good practice to thin out the clusters of blossoms on the May Duke cherries with sharp-pointed scissors before they open, taking out quite half from each cluster.

THE HEDGE ORCHARD HOUSE.

Some thirty years since, I planted numerous beech hedges for shelter; these stand with their ends S. E. and N. W. A few years ago their S. W. sides looked such compact green walls, 8 feet high, that I was tempted to rear against them four lean-to houses, each 40 feet long and 12 feet wide, 8 feet high at back, and 3 feet high at front, with a sunken path in the centre. The climate in these houses in the summer months is most delightful. Tea-scented roses, magnolias, and other shrubs liable to injury from our severe winters, thrive admirably, owing to the dryness of the soil and air. Apricots and peaches ripen about three weeks or a month later than those on walls; but, owing to the quantity of cold air admitted through the back hedge in spring, their blossoms often suffer in April, if frosts are severe. I found this to be the case in 1854 and 1855; this induced me to build some small span-roofed houses, 12 and 14 feet wide, 4 feet high at the sides, and, instead of using boards, to plant them with hedges to form the walls,—one with yew, the other with Siberian Arbor Vitæ. These are clipped twice in the growing season; they now form compact hedges, and seem to flourish all the better for the drip from the glass which pours into them when it rains heavily. I mention these span-roofed hedge houses, not only because their climate in spring, summer, and autumn, is most charming, and perfect as a promenade for persons in delicate health, but for their convenience in retarding fruits. The trees bloom ten or twelve days later than those in the regular orchard house, and generally escape injury from spring frosts; there is such a constant percolation of air through the hedges when the sun shines, that the healthy growth is surprising. If Royal George and Noblesse peaches are to be retarded, they may be removed from the boarded orchard house to the span-roofed hedge house from the first week in June till August; they will ripen about three weeks later than those left in it. Apricots, plums, and pears ripen well in these houses, and are always perfect in flavor; cherries are liable to be eaten by birds which creep through the hedges. The great charm of them is, their perfect ventilation without any trouble. For many kinds of greenhouse plants they will be found the best of summer quarters; the increased temperature in sunny weather, from 15° to 20° above the open air, and the absence of heavy storms, which so often injure exotics when placed out of doors in summer, are most advantageous to their well doing.

THE TROPICAL ORCHARD HOUSE.

An orchard house for tropical fruits has long been with me a favorite idea, and recently, from my having had a daughter return from a nearly two years' residence in the West Indies, it has received a fresh stimulus. The variety of tropical fruits seems almost endless; some of them, if I may judge from description, are too rich, others too insipid for English palates, and of the greater part the trees that bear them would require a house far beyond the means of the amateur not blessed with a large fortune. I will, therefore, for the present, confine myself to a tropical orchard house for fruit trees of moderate growth, not extravagant in its dimensions, and yet capable of giv-

ing many luxuries. The small span-roofed house, with some little modification, (described in pp. 11 and 12,) seems best adapted for this purpose: its sides should be five feet in height, three feet of which should be 9-inch brickwork, and two feet (the upper part) of glass, with sashes two feet long, on pivots or hinges, at intervals of five feet for ventilation in hot weather; it should be glazed with double crown glass, which is very clear, and rarely gives occasion to scorching. Its height should be ten feet, the path two and a half feet wide, and the borders on each side four and a half feet wide, raised with brickwork to sixteen inches in height. In the centre of each border two 4-inch hot-water pipes should be laid, and then a flooring of slates laid across from wall to wall of each bed, so as to leave a space for a hot-air chamber; six inches of the brickwork must be carried up above the slates so as to form a hollow bed with 6-inch edgings to support the mould, which must rest on the slates to form the perpetual hotbed, on which the pots are to stand. The compost for this border should be two parts turfy sandy loam, lumpy as possible, one part rotten dung, and one part bricks broken into small pieces from the size of a nut to that of a walnut, with their dust; these should be mixed with the above, to keep it open and favorable for drainage, and a border of mould made with it on the slates, four or five inches in depth. A perpetual hotbed is thus formed.

So far this is a safe and necessary step; but the hotbed will not heat the air of the house sufficiently in the damp and chilly days of winter. This must be done by two 4-inch hot-water pipes carried round both sides of the house, next to the walls, just above the surface of the borders. The atmosphere of a house thus heated should range, in spring, summer, and autumn, from seventy to ninety degrees (the latter only in sunny weather), and from sixty to seventy in winter, *i. e.*, from the end of November till the middle of February.

It is well known that orange trees, cultivated in the usual way in France or England, never give fruit at all eatable, solely from the lack of heat at their ripening period late in autumn and winter. In Grenada (West Indies) they commence to ripen towards the end of October in a temperature varying from 70° to 80° or thereabouts; their flavor there, freshly gathered from the trees, is so delicious that they are far superior to those we receive from St. Michael's and other places, all of which are gathered before they are ripe. In our tropical orchard house oranges would ripen about Christmas. How agreeable to be able to gather a portion of the Christmas dessert from one's own trees!

The orange will, I have no doubt, form a distinguished feature in this mode of fruit culture. I will, therefore, commence with directions for its cultivation. As an ornamental tree in the greenhouse and conservatory, it is an old friend; and perhaps no tree in the known world has suffered, and does suffer, such vicissitudes, yet living and seeming to thrive under them. It *glories* in a tropical climate, and yet *lives* and *grows* after being poked into those cellar-like vaults used for its winter quarters on the Continent; it gives flowers in abundance under such treatment, and would even give its fruit—albeit uneatable—if permitted. Nearly the same kind of cultivation has been followed for many, many years in England: it has rarely had heat sufficient to keep the tree in full vigor, and its roots in pots or tubs must have suffered severely from having been placed out of doors in summer on our cool damp soil, and in winter on a stone floor still more cold. If

roots could make their complaints audible, what moanings should we hear in our orangeries all the winter!

In cultivating the orange for its fruit, the first consideration is to procure some of the most desirable varieties; such as the delicious thin and smooth-rinded oranges which we receive from St. Michael's; the Maltese blood-orange, and the Mandarin: with the present facilities of transport, young trees of these could be procured. The latter, called also the Tangerin orange, deserves especial notice, as it proves to be the hardiest, as well as the most excellent in flavor, of any yet introduced. It will do well in a common greenhouse; and, when placed out of doors in June, it ripens its fruit of fine flavor in September; which remain good on the tree for six months. This delicious little orange is only eaten in perfection when fresh from the tree. In Lisbon it is sent to dessert in clusters with leaves attached to them: unless these are quite fresh and green when the fruit is served, it is not reckoned in full flavor. If grown in the tropical orchard house, the trees should be placed in the coolest part of it, and have abundance of air in mild weather in winter; they will then bloom later, and set their fruit with greater certainty. They should be placed out of doors in June (so that the fruit ripens slowly), and replaced in the house in September.

There are also some sweet oranges cultivated in France, of which trees could be readily introduced; but the first-named varieties seem to me most worthy of the careful cultivation to be given them in the tropical orchard house. The first matter of import is the soil best adapted for the orange; there are many receipts given in our gardening books, but the most simple compost of all, and one that cannot fail, is the following: two parts sandy loam, from the surface of some pasture or heathy common, chopped up with its turf, and used with its lumps of turf about the size of large walnuts, and its fine mould, the result of chopping, all mixed together; one part rotten manure at least a year old, and one part leaf mould; to a bushel of this compost add a quarter of a peck of silver, or any course siliceous sand—calcareous sand and road sand are injurious—and the mixture will do for all the fruit trees of the tropical orchard house, as well as for oranges. In potting the orange it is better to commence with a pot too small rather than too large; for, unlike the peach or the plum, it does not feed rapidly and at once fill the pot with roots. Thus a tree two or three years old, may be potted into a 9-inch pot, suffered to remain for one year, and then removed to a 13-inch pot, perforated as for other orchard-house trees, in which it may remain (unless the house is very large, and a large tree is wished for) six, seven, or ten years: a portion of the surface soil should be annually removed early in February, as directed for other orchard-house trees, but not deeper than from three to four inches, and the pots filled up with the above compost; and about the beginning of March a surface-dressing of manure should be given. I have observed that the French cultivators strew fresh sheep's manure on the surface; they also place their trees in a pure peat earth. I have not seen this mode of culture in England, but it may be tried where peat is abundant. Two other surface-dressings of manure should be given, one in June, the other the beginning of September. The trees will of course be placed on the hotbed, or plunged slightly two or three inches into the mould. I am not, however, an advocate for plunging to any extent, unless very rapid growth is required, for I find that trees in pots standing *on* a bed of heated mould and rooting into it, make a healthier, although a slower

growth. As soon as the fruit is gathered, which ought to be by the beginning of February, when foreign oranges commence to be good, the trees should be lifted and root-pruned, as directed for peaches, and top-dressed.

Orange trees should have a portion of the house to themselves, divided by a light glass partition, as they require and will bear more ventilation than other tropical fruit-bearing trees. Thus a portion of the small span-roofed house should be appropriated to them, so that they are placed on both borders, the other part of the house being occupied with mixed trees and shrubs. Air can then be given to them by opening the sashes on one or both sides, without interfering with trees and shrubs requiring less ventilation.

Orange trees when grown constantly under glass are liable to a black fungus on the upper surface of the leaves; this can only be removed with a sponge and warm water; they should be syringed with soft tepid water twice a day (at 9 A.M. and 5 P.M.) during the summer, and once a day in the morning in sunny weather, in early spring and autumn; while the fruit is ripening in the winter, syringing should be discontinued. It is the custom to cultivate orange trees in square boxes made of oak. I am inclined, however, to recommend pots perforated at bottom, as usual with other pots used for orchard-house trees; the slate pots made by Mr. Beck, of Isleworth, are very neat and even ornamental; with the usual five or seven perforations, they would doubtless answer very well. If wooden boxes are used they should have bars at the bottom to allow the roots to make their way into the hotbed.

The Mangosteen (Garcinia Mangostana). There are, it is said, many kinds of this "most delicious of all fruits," varying in their size, flavor, and fertility. Penang and Singapore are, according to report, the only places to which it is brought in perfection; the communication with these places is now much quickened by the Overland Route and steamers. Young trees of some of the most prolific varieties should be imported, and also abundance of young trees of some of the more common kinds, to be used as stocks for grafting, which, as is well known, often induces a tree to bear fruit. By these means fruit-bearing Mangosteen trees will soon cease to be rarities, and we may even live to see Covent Garden supplied with this rare fruit home-grown. The trees should be planted in the pots usually employed for orchard-house trees, and suffered to root into the hotbed of mould on which they are placed: if they are inclined to grow too vigorously, they should be kept in check by lifting the pots; and when the fruit is gathered, root-pruning and top-dressing, in the usual way, should be attended to;—in short, to prevent repetition, the treatment recommended for orange trees will, as far as I can see, answer for all other tropical orchard-house trees.

The "Chirimoya" (Anona Cherimolia). In our estimation this is the Mangosteen of South America. A recent traveller in Peru (Markham) describes it as resembling "spiritualized strawberries and cream." It is said to attain its greatest perfection at Caraccas, owing probably to peculiarity of climate; as is the case with the Mangosteen at Singapore and Penang. If there are any superior varieties in existence, they should be sought for at Caraccas; and when tropical orchard houses are established, a consignment of Wardian cases, filled with young trees from La Guayra,—which is only about twenty miles from Caraccas, thus giving but trifling land-carriage,—will, I have no doubt, be a safe venture.

The Pomegranate (Punica Granatum). Although this tree does not in

general bloom and bear fruit under glass, treated as it is in France and England, I am inclined to think that, like orange-trees, it will succeed in the tropical orchard house: there is a large-fruited sort from Malta, and a seedless variety, both of them worthy of a trial.

The Lee Chee (Euphoria Litchi). This, even when brought over from China in a half-dried state, is, as I can testify, a delicious fruit; when fresh from the tree it is said by those who have visited China to be most refreshing and excellent.

The Loquat (Eriobotrya japonica). This is also a Chinese fruit which will ripen in the tropical orchard house in winter, and is therefore desirable; trees grafted on the common white-thorn will come into bearing more quickly than those reared from cuttings, layers, or seeds. The late Lord Bagot, according to Loudon, used to grow this fruit in great perfection at Blithfield; its flavor is mild and agreeable, something like a medlar.

The Guava (Psidium Cattleyanum). This is the most prolific of the guavas, and bears most abundantly; its flavor is peculiar and does not at first please all palates, but it is quite worthy of cultivation. There are also the Spice Guava, the size and shape of a lemon, with a white interior and clove-like flavor, and the Large Yellow Guava, its inside red, both of them esteemed in Grenada, an island remarkable for the great variety of its tropical fruits.

The Granadilla (Passiflora). There are many varieties of this fruit, varying in flavor, size, and color, so that it is difficult to point out the best for our purpose. To some persons their flavor is most agreeable, to others the contrary. I suspect this must be partly owing to the variation of flavor in different sorts. Markham speaks of the Peruvian Granadilla as being delicious. My daughter, from Grenada, mentions the "Water Lemon," a variety of the Granadilla the size of a hen's egg, and full of a most refreshing juice, as a delicious fruit. They are all climbers, and should have a frame of iron wire placed in the pot to train them to.

The Mango (Manifera indica). There are numerous varieties of this fruit in India, more particularly in Java: some of the most free-bearing varieties should be imported, as it is likely to prove a valuable fruit tree for this species of culture. The late T. A. Knight was "inclined to think that the mango might be raised in great abundance and considerable perfection in the stove in this country." Mr. Ivison, the skilful cultivator of tropical fruits at Sion House, is of the same opinion, as it does not require so high a temperature as many other tropical trees.

The Dwarf Plantain (Musa Cavendishii). This fine and most prolific fruit-bearing plant will not group well with our other tropical trees and bushes; but a place should be found for it at the warm end of the house near the boiler. As it is a gross feeder, it must have a larger pot than ordinary; one from sixteen to eighteen inches in depth, and the same in diameter, will not be too large: such a pot will require at least seven apertures at bottom for the emission of roots. This plantain, however, roots so strongly that care must be taken to lift the pot at least once a fortnight, and rather to give it fortnightly surface-dressings of manure than suffer its roots to spread too far,—in short, to feed it from above rather than from below.

The Rose Apple (Jambosa vulgaris). According to Loudon in his "Encyclopædia of Gardening," this is an agreeable tropical fruit, "about the size of

a hen's egg, rose-scented, with the flavour of a ripe apricot," ripening in December. Mr. Cattley used to have this at his famous hothouses in Hertfordshire, of which now scarcely a vestige remains, and had a great success in its culture, as his trees yielded regularly abundance of fruit. Mr. Ivison also thinks this tree will prove useful.

The Sweet Lime is a variety of the genus Citrus, the size and shape of a full-sized nectarine, with a thin and fragrant rind of a pale yellow; its flavour is like that of a very superior orange, with a delicious aroma, and so wholesome and refreshing is it, that "from twelve to eighteen may be eaten at once with pleasure and without injury to health." The tree is very prolific, and bears its beautiful fruit in clusters of ten and fifteen each; this is a fruit highly esteemed in Grenada.

The Sapodilla (a variety of Achres sapota) is also a Grenadian fruit; it is the size and shape of a large lemon, with a brown rough coat, and a luscious juicy pulp, in which a few black seeds are imbedded; it is commonly eaten with a spoon, and is in great estimation.

The Fig. This may be made a most desirable tropical orchard-house tree, and so managed as to give its quota to the Christmas dessert. Trees of one or two years old, that have been protected from the winter, in a cold-pit, should be potted early in May into 13-inch pots, and protected from frost by being placed in the orchard house, or any cold frame or pit, till the first week in June. They may then be placed out of doors for the summer in a sunny exposure, sheltered from boisterous winds. Liquid manure may be given to them once a week, and they should be lifted once a fortnight, to prevent the roots which would make their way through the bottom of the pot from becoming too large. They may remain in their summer quarters till the end of September; but if one or two frosts occur in that month, they should be protected by having a piece of calico or a little hay thrown over them. At the end of the month they will be covered with young green figs, and if removed to the tropical orchard house they will ripen their fruit towards the end of November and through December. If it is wished to retard the ripening of the fruit on some of the trees, they may be placed in the common orchard house or a cold-pit till the first week in November. They will then, on being removed to the tropical orchard house, mature their fruit even as late as January. The most prolific and best varieties for winter figs are the White Ischia, (this is sometimes called incorrectly the Nerii: it is a most abundant bearer,) the Brown Turkey, or, as it is often called, Lee's Perpetual, and the White Marseilles.

I have in these few pages given the outline of what may be done towards increasing our garden luxuries. The culture of tropical fruits is not a new idea; but I have endeavored to give a new version of an old idea. There is now no occasion for the bark-bed, in which it was once thought necessary to plunge the pots containing the plants of all tropical fruits. A perpetual hotbed, on which to place the trees—which may or may not be a new invention—is now easily formed by hot-water pipes: and I well know, and again say, that a tree standing *on* a hotbed will make a healthier although slower growth than one that is plunged *into* a bark-bed. Moreover, the latter is always disagreeable from its requiring to be turned and renewed, as well as from its unpleasant smell.

It will be seen that I have confined myself to the description of a comparatively small tropical orchard house; this I have done that I might be consistent. Large gardens have, for the most part, great gardeners, who

know how to build houses, if the means are provided, much better than I can tell them ; but when the system of culture is understood, I can see no reason why the large span-roofed houses described should not be built in gardens of moderate size. The great object is to have abundance of heat at command ; the central border, therefore, in a large span-roofed house would require four 4-inch hot-water pipes, each side border two ; and to heat the air would require four 4-inch hot-water pipes round the sides. In such a house the trees might be suffered to grow to a goodly size and give a great abundance of tropical fruits from the delicious little Lee-chee to the exquisite freshly gathered Maltese orange.

I have been content with the enumeration and description of only a few tropical fruits ; when their culture is better understood the list may be extended ; for in all tropical climates there are numerous fruit-bearing trees and bushes utterly unknown to English gardens. It may perhaps be said that some of the kinds of fruit I have recommended, will form trees too large for a house of the dimensions given : this ought not to influence the cultivator ; for, as is well known, the fig grows into a very large tree when the soil and climate are favourable, and yet bears well in a pot of moderate size. Collectors have for many years past paid much more attention to Orchids and Pines than to tropical fruits, only because their culture has not been carried on in England with spirit. Let us hope that, owing to the introduction of hot water as a means of heating, the low price of glass and bricks, and the low price of timber, we shall see tropical orchard houses rising up and rivalling the now numerous orchard houses in their agreeable results.

INSECTS AND HOW TO DESTROY THEM.

The numerous species of aphides under the name of "blight" are, as is well known, most troublesome enemies to all fruit trees in the open air: one regrets that orchard-house trees are not exempt from their visitations. Each species of fruit tree seems to have its peculiar aphis. There are, however, two which attack the peach and nectarine; the brown aphis, which often makes its appearance on the young shoots and buds in November and December, and the green, which generally attacks the trees as soon as the fruit is set on the young leaves unfolded. These are easily destroyed by tobacco-water, made by infusing two ounces of tobacco in a quart of boiling water, and applying it when cool with a middle-sized painter's brush in the following manner:—With the left hand place a piece of slate or glass against the shoot, so that it rests against it, and then dip the brush in the water and brush upwards : if the first application does not kill them, it must be repeated.

This will destroy all the tribe, even the hard-to-be-killed blue aphis, peculiar to the plum, and the black which so often infests the cherry.

Another mode of destroying them is by fumigation, which is the most eligible when a large number of trees are infested. This is best done in the evening, and most economically with tobacco paper : the house should be shut up, and two or three (or more, according to the size of the house) 8-inch flower pots, with large burning wood embers at the bottom, placed on a tripod, or on two or three stones, so that there is a draught through the bottom, and then filled with the paper. The next morning the trees should be syringed with all the force possible, by applying the syringe close to each. Another mode of fumigation (and this is convenient when only a

tree or two are infested) is, to envelope the tree in tiffany or thin calico, and then place under it a small pot of ignited tobacco paper. In all cases the dead and dying insects should be washed off with the syringe. "Sigma's Aphis Powder," sold by Mr. Powell, Ticehurst, Sussex, is also a convenient and efficient aphis destroyer: this is best applied, by a dredging box with a muslin cover, to the under surface of the leaves; it should be suffered to rest upon the leaves for eight or ten hours, and then be washed off with the syringe.

In the orchard-house culture of peaches and nectarines, syringing must play an important part; for the red spider is so fond of their leaves, that, like Sindbad's Old Man of the Sea, he will stick closely, and cannot be dislodged without applying the syringe close to the under surface of the leaves. If this pest be suffered to make the least progress, the flavour of the fruit will be entirely destroyed. A small pocket lens, in the hand of the amateur, will be the best instrument to discern it; looking closely at the under surface of the leaves, if it be there, a small bright-red speck, like a red grain of sand, will be seen. The experienced gardener does not look for them. One glance at the upper surface of those leaves, which show some minute yellowish specks, is quite enough for him. If, therefore, the least sign be apparent, continue the regular syringing, even till the fruit is ripe; otherwise, syringing may be discontinued, when the peaches and nectarines commence to soften, preparatory to ripening.

A very excellent mode of using sulphur has just been given in the "Gardener's Chronicle," No. 1, p. 5, by Mr. Gardener, of Rossall Hall, Fleetwood. "The house being shut up quite close in the evening, some large flower pots (say 13-inch pots) were half filled with fresh unslaked lime: this was sprinkled with water, and a handful of sulphur strewed over it, and suffered to remain all night. The next morning the house was syringed till quite saturated." This will not only destroy the red spider, but also the mildew on vines, and is, in my opinion, one of the best remedies ever discovered. As prevention is better than cure, I advise all lovers of orchard houses and vineries to apply it once a week through June and July. I am inclined to think that this simple remedy will do away with the necessity of the constant syringing I have recommended; and if so, the fruit will be improved in flavour. It is at any rate quite worthy of a trial.

MONTHLY CALENDAR FOR THE MANAGEMENT OF THE ORCHARD HOUSE THROUGHOUT THE YEAR.

January.—Observe the same rules for protection against frost, and give water, if necessary, as directed for December. In bright sunny weather the ventilators may be opened, to lower the temperature and prevent the blossom-buds from swelling prematurely.

February.—Continue the same rules for ventilation and protection as directed for January: towards the end remove the trees to their summer stations, making one for each tree as directed in page 19.

March.—Early in the month all the trees should be pruned according to the directions given under each kind of fruit. Watering may now be extended, unless the frost is very severe, giving a quart to each tree, and gradually saturating the earth.

If the weather be sunny, with sharp frosty nights, the shutters, both back and front, may be open from 9 A. M. to 4 P. M., and closed at night. If the

weather be cloudy with frost, the shutters should be closed night and day. Apricots will sometimes bloom in the middle of this month, before the other trees. If the frosts are severe at night, it will be well to throw a piece of tiffany over such as are in bloom, removing it in the morning; this is so light that the blossoms will not be injured.

April.—Observe the same regulations as in March, as to ventilation. In the beginning of the month the trees will in most seasons be in full bloom. If severe frosts come on, which is sometimes the case, and the thermometer in the open air descends to 24° in the evening, a fire, consisting of 6 or 8 quarts of charcoal, should be placed in an iron pan in the centre of the house: for a house 30 feet long one pan will do; for one 100 feet long, three pans will be required. Whenever charcoal is burnt, the ventilators over the door or doors in span-roofed houses should be left open, and a portion of the top ventilators in lean-to houses.

Towards the end of the month, when the fruit is set and commences to swell, syringe the trees morning and evening with soft water, or spring water that has been exposed to the air for a few hours. Place the syringe close to the under surface of the leaves. If the weather be dry and warm, the trees, if the earth is dry, may be watered in the evening, giving to each from 1 to 2 quarts of water. The aphides will now begin to make their appearance. Their destruction must be seen to, as directed in p. 44.

May.—Observe the same regulations as to watering and syringing the leaves, as in April. Ventilation must now be strictly attended to: in all descriptions of weather the ventilators must be open by day from 8 A. M. to 6 P. M.; but, if the situation of the house is exposed, so that the N. E. wind can blow through it, it will be as well not to open the ventilators that will admit that or the east wind when it blows fiercely. Worsted netting, with meshes just large enough to admit the point of the finger, is a most excellent material to place over the ventilating openings inside, to remain all the summer. It softens the violence of a brisk gale, and yet admits plenty of air. It will be found most useful near large smoky towns, for the fibres of the worsted meet in the meshes and keep out sooty particles; insects also never attempt to enter. A clever orchard-house cultivator, living at Bow, near London, has found this worsted netting of great value, for his orchard-house trees are as green and as fresh in summer as if they were in the country, instead of being in the midst of smoke. Aphides will now be very active, and must be destroyed. Apricots will also be infested with a caterpillar in their young shoots; the ends of them must be pinched, so as to crush it.

June.—Syringing at 7 A. M. and 6 P. M. must now be strictly attended to; and, if the weather be hot and dry, the trees will require watering abundantly every evening. My trees in 13-inch pots and seven years old take one gallon each. All the ventilators should be open from 8 A. M. till 6 P. M. Some fresh top-dressing of the usual compost may now be added, if the surface of the earth in the pots has become hard and close.

Commence to thin the fruit and pinch in the laterals, as directed in page 22, particularly of the figs.

The red spider now requires particular attention, and the pocket lens must be brought into use. If syringing fails to completely extirpate it, lime and sulphur, as in p. 45, must be resorted to. Remove plum-trees to the open air, to ripen their fruit, if there is a scarcity of room in the house; also apricot trees (see pp. 20, 27.)

July.—Thorough ventilation must be attended to—it is a good practice to fasten back and front shutters, so that they cannot be closed. Syringing and watering as in June. If any of the trees are growing grossly and too rapidly (particularly figs), gently tilt up the pot on one side, and cut off all the roots on that side that are making their way into the soil, and a week after do the same with the other side. Renew the top-dressing, if the surface has become firm from repeated watering. Frequent top-dressings in summer are better than manure water. Pinch in lateral shoots to within two buds of their bases, to prevent the tree being crowded with shoots and leaves (see p. 22). The compressed earth in the pots gives vigor almost beyond belief.

Remove pear-trees to the open air to ripen their fruit; also peach and nectarine-trees (see pp. 24, 32).

August.— Ventilation and watering the same as in July; syringing till the fruit begins to color, or, if the house can be kept perfectly free from the red spider by lime and sulphur, discontinue it from the last week of July. Still pinch in laterals, and, at the end, pinch off the points of all the leading shoots, except figs; these will not require any further pinching.

Remove peaches, nectarines and apricots to the hedge orchard house, or to the open air, to retard their ripening, if required.

September.—Ventilation as in August, unless the weather be peculiarly windy and stormy. In such weather the house may be closed: watering must be continued, but no syringing. Pinch in laterals, if they still persist in growing.

October.—Ventilation and watering as in September. About the middle of the month every tree—except late peaches with their fruit still on them—should be lifted, and all its roots cut off close to the bottom of the pot; and about the 24th, top-dressing must be done (this is described in p. 18), and a gallon of water given to each tree. They may now be placed close together, so as to give room for other plants, particularly Chrysanthemums, which bloom well in the orchard house all the autumn. Prune vines in pots (see p. 33).

November.—Ventilation the same as in October. On the 5th give each tree a gallon of water, the last for the year. The autumnal top-dressing and watering encourage the emission of young roots, so that the tree is prepared for its fruit-bearing work early in spring. If the brown aphis makes its appearance on the young shoots and buds, use the brush and tobacco-water, as directed in p. 44.

December.—The house may now be shut up day and night. A registering thermometer should be kept inside; if at any time this denotes a night temperature of 20°, some dry hay or litter should be placed among and on the pots, to six inches above the surface; this will keep their roots from injury by frost.

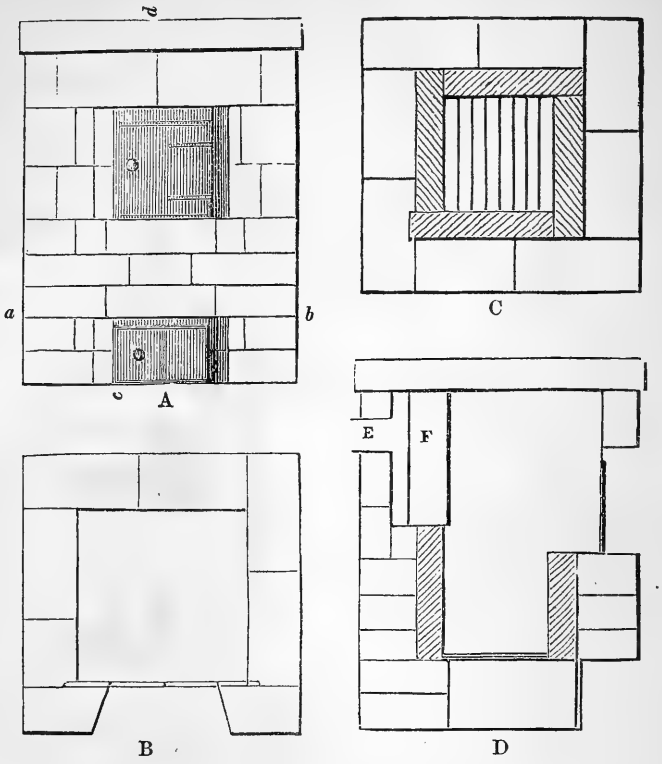
If the weather be windy, dry and mild, observe if the trees are inclined to shrivel from being too dry; if so, give each a quart of water at 10 A. M.; otherwise, no water all this month. If they shrivel from severe frost, it will not matter, for as soon as a thaw comes they will recover. Pay attention to the brown peach aphis.

Conclusion.—I appear in the foregoing pages to have employed a great number of words in the endeavor to make plain this simple, agreeable and novel mode of cultivating fruit trees. Judging from my own feelings, its

advantages and pleasures are manifold. Each bud, leaf and blossom is brought close under the eye of the cultivator. All the minute and beautiful

THE BRICK ARNOTT'S STOVE.

FIG. 12.



A, front elevation ; B, ground plan ; C, horizontal section through *a b* in A, showing the fire-bars or grating ; D, vertical section through *c d* in A, showing the front and back fire-lumps, the former reduced to nine inches in depth ; E, iron pipe leading to the chimney ; F, fire-lump, placed an inch and a half from the mouth of the pipe leading to the chimney, and about the same distance from each end : this causes the smoke to pass round, thus preventing a too rapid consumption of the fuel. The courses of bricks in height are laid flat.

operations of nature can be closely watched in a genial climate. The silvery covering of the peach blossom-bud,—the beauty of its fully developed flowers (how fresh and happy they always look !)—the anthers shedding their pollen,—the germs gently swelling,—the downy, ruddy, luscious-looking coat of its charming fruit, are all calculated to give pleasure to the healthful, cheerful mind ; for the varied works of Nature's laboratory are brought near to the eye, near to the mind, near to the heart, which is instinctively lifted in thankfulness to the Giver of all such good and beautiful things.

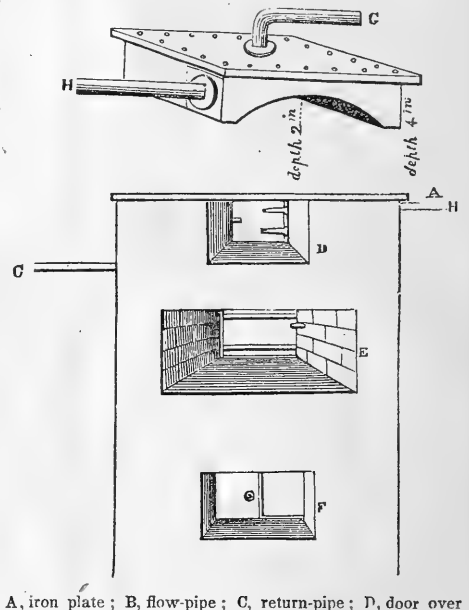
The above figures, the blocks of which have been kindly lent me by the editor, appeared in the " Gardener's Chronicle " for January 24th, 1846, and a description of them was given in the same paper for January 17th in the same year (p. 35).

I had then four in operation; I have now twelve; and have never yet seen any mode of heating small or moderate-sized houses so efficient.

For a house twenty to thirty feet long by twelve, a stove two feet four inches square, outside measure, and three feet ten inches high, and the fire-box eight inches over and eight inches deep, will be amply sufficient. For a house forty feet long by twelve, one of two feet ten inches in diameter and three feet ten inches high, the fire-box ten inches over and ten inches deep, will also answer well. The stove should be placed in the centre of the house, within a foot or eighteen inches of the back wall, and the horizontal pipe* go at once into a chimney outside, or, what is better, the chimney may be built inside, and carried out of the back wall, just under the glass. By this method no heat is lost. If it be thought necessary to have the feeding-door and draught-door outside, the draught-pipe must be reversed. I, however, prefer the doors inside, for the cold damp air of the house, floating near the ground floor, is sucked in and heated. No inconvenience is experienced from dust, as every morning, before the stove is cleaned out, a pint or so of water is poured in at the feeding-door, so as to saturate the ashes before they are drawn out. Coke from the gas-works is the only proper fuel to use. These stoves should be built with 4-inch brickwork and mortar, the fire-boxes with fire-bricks and fire-clay; and they should not be used till two or three weeks after building, or the brick-work is apt to crack. I find nothing like iron for the roof or top of the stove, as Welsh tiles are apt to crack. A plate of cast-iron, nearly three-quarters of an inch thick, is necessary. On this a shallow pan, two inches deep, two feet square, of galvanized iron, filled with water, will always keep up a genial moisture in the house.

THE ARNOTT'S STOVE BOILER.

FIG. 13.



A, iron plate; B, flow-pipe; C, return-pipe; D, door over the boiler: E, feeding-door; F, ash-pit or draught-door; G, flow-pipe; H, return pipe.†

The above, figured in the "Gardener's Chronicle" for May 12th, 1849, the blocks of which have been kindly lent to me by the editor, is perhaps the most economical and efficient hot-water apparatus ever introduced; it is merely a boiler placed over the fire-box of an Arnott's stove, which does its duty most admirably, at a less cost for fitting up and fuel than any boiler I have yet seen in operation.

* These stoves will not burn well with a long horizontal draught or flue: three feet must be the extreme length.

† The flow and return-pipes were originally 2-inch; they are now made 3 and 4-inch, and are found to do better.

I have now six in full work. They have been hitherto cast of three sizes —14-inch, 16-inch, and 18-inch. One of fourteen inches (fourteen inches square), which holds just eight quarts of water, is now heating an orchard house forty feet by twelve,—it does this well, at a very small cost for fuel—coke ; another 16-inch boiler heats two propagating pits with gutters, each sixty feet long by six feet, also most efficiently ; another heats also a propagating pit sixty feet long by six feet. These two last-mentioned boilers have superseded two of those ribbed monstrosities which cost four times the amount to "set," and devoured four times the quantity of fuel required by the above very simple form of boiler. When used for heating houses, the feeding and draught doors may be outside, although I do not adopt this plan : but the stove should be, if possible, inside, as the dry gentle heat of the stove, with the moist heat from tanks or gutters, forms a perfect combination. These boilers are made by Mr. Hughes, the Iron Foundry, Bishop's Stortford, at a charge of from 30*s.* to 35*s.* each. A good self-taught engineer is William Vale, of Sawbridgeworth : he has had some experience in building Arnott stoves and fitting boilers to them in small forcing orchard houses.

A SELECT LIST OF FRUITS ADAPTED FOR ORCHARD-HOUSE CULTURE ;

Placed in the order of their ripening. The sorts marked thus,* may be selected by those requiring only a few trees.

Apricots.

Red Masculine.
Musch Musch.
Large Early.
*St. Ambroise.
*Kaisha.
Blenheim.
*Royal.
*Peach.

Peaches.

*Red Nutmeg.
Early Anne.
*Early York.
Acton Scott.
*Early Grosse Mignonne.
*Précoce de Savoie.
Pêche Abec.
Grosse Mignonne.
*Noblesse.
*Royal George.
Reine des Vergers.
Barrington.
Chancellor.
*Walburton Admirable.
Late Admirable.
*Bourdine.
Desse Tardive.

Dessert Plums.

*Early Favorite.
Early Prolific.
St. Etienne.
*De Montfort.
Denniston's Superb.
*Mamelonnée.
*Green Gage.
*Jefferson.
*Purple Gage.
Woolston Black Gage.
*Reine Claude de Bavay.
Guthrie's Late Green.
*Coe's Golden Drop.
Ickworth Impératrice.
St. Martin's Quetsche.
Coe's Late Red.
*Late Black Orleans.

Kitchen Plums.

*Early Orleans.
*Kirke's.
*Victoria.
*Prince Englebert.
Pond's Seedling.
White Magnum Bonum.
Diamond.
*Autumn Compôte.
*Belle de Septembre.

Cherries.

*Belle d'Orléans.
Early Purple Guigne.
*Knight's Early Black.
*May Duke.
*Archduke.
Royal Duke.
Belle de Choisy.
Black Eagle.
*Elton.
Bigarreau Napoléon.
Bigarreau.
*Reine Hortense.
*Florence.
*Coe's Late Carnation.
*Late Duke.
Belle Magnifique.
Morello.

Figs.

Early Violet.
White Marseilles.
Brown Turkey.
White Ischia (for forcing).

Pears.

*Doyenné d'Eté.
Citron des Carmes.
*Jargonelle.

Pears—continued.

Pius the Ninth.
Seckle.
*Colmar d'Eté.
*Louise Bonne.
Gansel's Bergamot.
*Beurré Superfin.
Beurré Rouge.
Crassane.
Doyenné Gris.
*Marie Louise.
*Thompson's.
Beurré Clairgeau.
Van Mons (Léon le Clerc.)
*Glou Morceau.
Beurré d'Aremberg.
Passe Colmar.
*Winter Nelis.
Easter Beurré.
Beurré de Rance.
*Josephine de Malines.
*Bergamotte d'Esperen.
*Prince Albert.

Grapes (*for the Common Orchard House*).

*Early Malingre.
*Prolific Sweetwater.
Grove End Sweetwater.
*Muscat St. Laurent.
Royal Muscadine.
*White Romain.
Purple Fontainbleau.
*Esperione.
*Black Hamburgh.
Chaptal.
Cambridge Botanic Garden.
*Muscat de Sarbelle.

Grapes (*for the Forcing Orchard House*).

Chasselas Musquée.
*Purple Constantia.
*White Frontignan.
*Muscat of Alexandria.

Apples.

Calville Blanche.

Apples—continued.

Newtown Pippin.
Northern Spy.
Reinette de Canada.
Melon Apple.

Apples for the North.

*White Juneating.
*Irish Peach Apple.
*Cox's Orange Pippin.
*Ribstone Pippin.
*Golden Pippin.
Golden Reinette.
*Van Mons Reinette.
Coe's Golden Drop.
*Sturmer Pippin.

Strawberries.

*Keen's Seedling.
*Seedling Eliza.
Sir Harry.
*Carolina Superba.
Ingram's Prince of Wales.
*British Queen.

INDEX.

APPENDIX.

FRUIT TREES IN ORCHARD HOUSES.

BY WILLIAM SAUNDERS, GERMANTOWN, PA.

Fruit trees of all kinds flourish so luxuriantly in the open air in America, that it would, at first sight, seem perfectly unnecessary to provide them with glazed roofs, and nurse them up in pots ; but when we recollect that the curculio destroys most of our plums and nectarines, that both them and the peach are prone to a luxuriance incompatible with the highest degree of fruitfulness, that mildew in various forms continually insinuates itself and makes sad havoc with our calculations ; not to more than mention grubs and borers, late spring and early autumn frosts, the cutting, blighting winds of spring and wilting droughts of summer, quite a formidable array of calamities can be enumerated, without infringing upon truth, as every grower of these fruits has but too good reason to know.

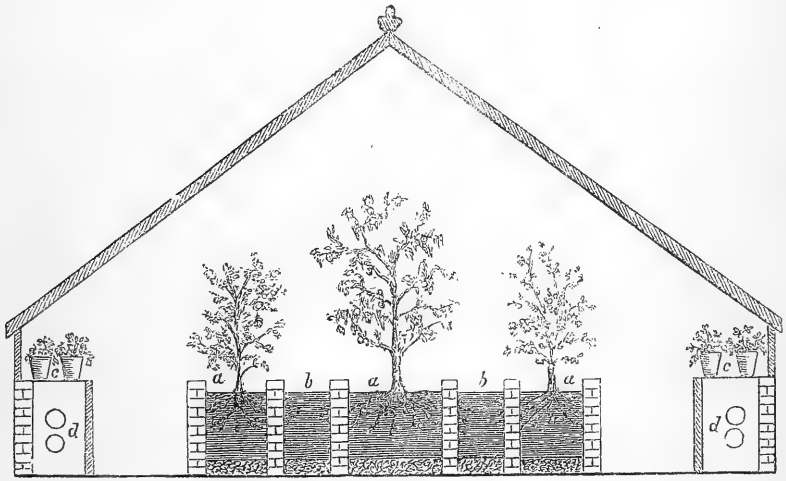
In the orchard house, all these conflicting opponents to success may be avoided ; the curculio is too cunning to be caught under roof, and the borers will seldom be found under glass if the trees are free of them when introduced ; the atmosphere is so completely under control that mildew and all other maladies consequent upon sudden and extreme changes may be prevented.

Many of these advantages, however, are only incidental. Earliness of bearing and continued productiveness are the essential characteristics ; the certainty of the crop, as well as the ready means of accelerating the ripening, are also subjects worthy of note.

In all fruit-bearing trees a certain maturity has to be attained before fruit is produced ; and the period when this takes place depends much on local circumstances. "Whatever produces excessive vigor in plants is favorable to the production of leaf buds, and unfavorable to the formation of flower buds ; while, on the other hand, such circumstances as tend to diminish luxuriance, and to check rapid vegetation, without affecting the health of the individual, are more favorable to the production of flower buds than of leaf buds." When a tree is planted in a deep, rich soil, in a climate congenial to its growth, the fruiting period will be the longest deferred ; from the encouragement to the extension of roots, branches will be produced with a barren luxuriance for many years. Whereas, a tree set in poor ground will make feeble growths, but will blossom and fruit at an early period, although such fruiting may be the means of seriously weakening it ; some trees will thus fruit themselves to death. This is a well-known law,

and has been acted upon by various expedients, such as root pruning, bending down branches, ringing, etc. The most popular, because most available, method of inducing fruitfulness at present, is that of modifying excessive vigor by grafting, or otherwise introducing those of robust growth on stocks of weaker habit, familiarly known as the "dwarfing system." This practice is followed with more or less success, according as experience discovers the peculiarities of growth and constitutional vigor of individual trees.

It is very obvious that the limited amount of soil in a pot will speedily be interwoven with roots; growth will then be checked and fruit buds formed; it is equally apparent that these conditions must limit the quantity of fruit that can be matured. Here the orchard house system becomes valuable; the pots being set on a border of soil early in their growth, young roots find



SECTION OF AN ORCHARD HOUSE.

access into it through openings left for that purpose, and thus the plant is provided with an extra supply of nourishment during the period of formation and ripening of the crop; the roots thus produced being removed when the crop is perfected, all tendency to redundant wood-growth is checked, and the branches are again thickly studded with fruit buds.

The greatest objection to this course of culture is its expense, involving, as it does, much care and time, in watering and other necessary attentions, neglect of which will inevitably be followed by failures. These objections might be partly obviated by setting out the plants in permanent borders; and to guard against over luxuriance in the first stages of growth, and deficiency of nourishment in the future, let spaces be left between the plants for root pruning and additions of fresh soil, as either of these operations is demanded. The following figure shows the section of an orchard house arranged according to the above suggestion.

The trees are planted in the spaces *a a a*. The spaces *b b* to be filled with soil during summer, removed altogether after the crop is gathered, or

turned over so as to disturb the roots sufficient to check growth. The walls each side of these spaces to be built pigeon-hole fashion, so that a communication may be provided for the roots. The shelves *c c* will be useful for strawberries in pots, or other similar purposes. The heating apparatus, if any is required, is placed at *d*.

This arrangement secures all the advantages of a system of pot culture, and would be equally productive and easier of management. The larger body of soil would retain moisture for a longer period, and daily visitations of the watering pot would not be required.

POT CULTURE OF GRAPES.

BY WILLIAM SAUNDERS, GERMANTOWN, PA.

We doubt whether the culture of grapes in pots will ever become popular or general, as it is a costly mode of producing fruit. It is true that, under a given surface of glass, as much fruit may be raised from vines in pots as from the best established and permanent plants ; but then, allowance must be made for the previous preparatory growth of the pot vines, as they require to be grown under glass for two seasons before fruiting, and during the second year they will occupy as much space as when in fruit. Two houses, therefore, are required to get one crop ; and when we take into consideration the amount of time and labor required in potting, watering, and general management, it will be found that the cost of production is more than double that of border vines ; and even to insure these results it is necessary to prepare a new set of fruiting plants yearly ; for although it is perfectly practicable to take a crop yearly from the same plants even in pots, yet the crop is so small that it will not repay labor, and, so far as comparative economy is considered, more will be realized by fruiting young, well-prepared plants, even at the expense of a second house, the increase in the crop more than remunerating the increased expense. A thorough trial of these methods has led to this conviction. The labor and constant watchfulness inseparable from pot culture in a climate so varied and intense in its extremes as ours, may ultimately lead us to adopt a modification of the system, combining all its advantages on much more economical principles.

The principal object attained by growing fruit trees in pots is the entire control which the cultivator has over the root growth; and with reference to forcing into fruit before the natural season, there is a very great advantage in having the soil into which the plants are growing, surrounded by the same temperature in which the branches are exposed; for when the branches of a plant are stimulated by a greater degree of heat than that influencing the roots, a species of exhaustion ensues highly detrimental to growth.

With reference to complete isolation from external influences, it is evident that the same conditions may be secured by preparing a small border inside the house, and planting out the vines with a view to permanence. In other words, plant a number of vines in a large pot, instead of placing them separately in more contracted spaces ; for a border placed in this position is as much dependent upon the care of the cultivator as the pot, with the additional advantage of being better guarded against extremes either

of heat, drought, or moisture. The border once prepared will require little further care, and the plants will produce good crops yearly without the constant renewal demanded by exclusive pot culture.

The accompanying sketch is introduced, the better to illustrate the above system. It will be observed that the soil in the pit *a*, Fig. 1, is wholly inside the house and completely isolated from the walls, so that it is surrounded by the same temperature as the branches. The soil is placed upon a stratum of drainage; oyster shells, brick, rubbish, and such like will answer well for this purpose, and insure porosity and dryness when required. The arrangements of the plants *b* will be understood from the section and ground plan, Fig. 2. The position of the heating apparatus is

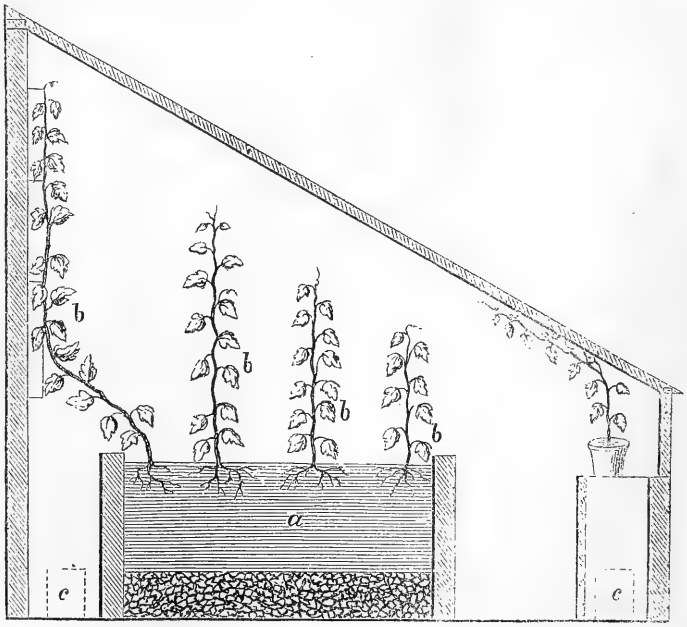


Fig. 1.

indicated at *c*. Large-sized draining tiles or flues built with brick, pigeon-hole fashion, for the admission of air and heat into the soil, should be placed across the bottom of the border through the drainage, as shown at the dotted lines *d*. These may be placed six or eight feet apart, and left open at the ends, that the air may more effectually permeate the soil; by this means the soil will be kept at a suitable temperature, if ordinary care is exercised in the application of water. The drainage will always prevent anything like stagnation of water, but in the early stages of growth the soil should be kept rather dry, which will increase its temperature. During active growth, water will be required more freely, and increased vigor may be imparted by manurial solutions; these applications should, however, be administered with caution, and only when the plants most require it; the majority of vine borders are made too rich and extensive at the outset, a

fruitful source of maladies, the cause being seldom suspected or recognized. Again, when the fruit approaches maturity the ripening process will be accelerated by gradually withholding water from the roots of the plants. It is well to remember that, just as we remove plants, as it were, from the hands of nature, the necessity increases for a thorough knowledge of the principles of vegetable growth, and the application of its agencies; hence we may expect to hear of failures in orchard houses; the successful production of crops from this highly artificial state of culture will at once draw a broad line of distinction between the scientific cultivator, and the mere routine practitioner.

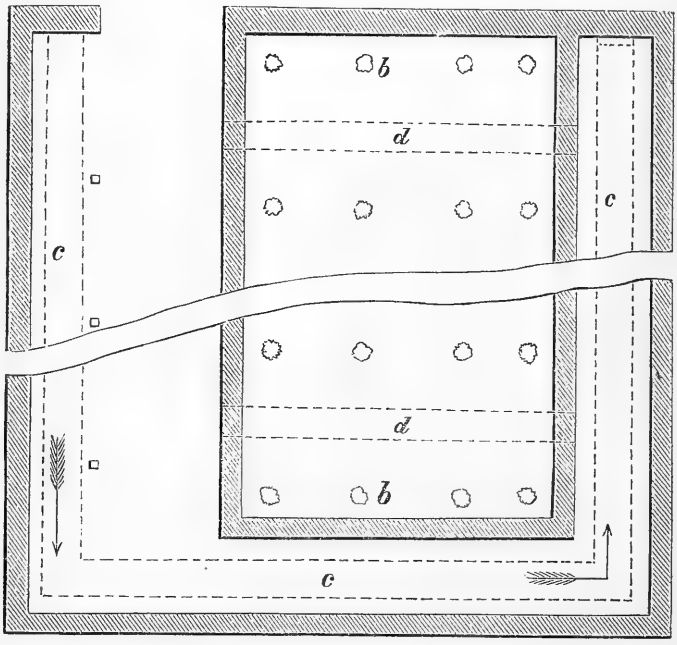


Fig. 2.

It will be observed that the plants are placed two feet from each other, in rows three feet apart; the object in planting thus closely at first is to secure a good crop at once, and, as occasion demands, the plants may be thinned by drawing out the least valuable. It also affords an opportunity of occasionally cutting a plant close by the surface in order to procure young, strong shoots, which are the most productive; heavier crops can be taken from the same surface, from young, vigorous canes, than from old and rigidly spur-pruned stems, according to the present prevalent system of management, and I feel convinced that this mode of renewal in graperies will ultimately become popular, as its advantages become known.

When a plant of two or three years' growth is cut down, a robust growth will follow; this shoot, if allowed to proceed unchecked, would grow to an unnecessary length, and if pruned back in winter the most mature and best

fruit buds would be removed. To insure fertility near the base the shoot should be stopped by pinching out the extreme point when about two feet in length. Lateral shoots will now push, and the uppermost should be removed entirely, so as to cause the top bud to break. This treatment will cause the lower buds to fill up; the laterals should be stopped at the second or third leaf from the stem. The same course should be followed when the shoot has grown four or five feet more, keeping the laterals checked, but not entirely removed until the wood commences to ripen, when they may gradually be removed, cutting out the lowermost first. The same treatment is applicable to the preparation of fruiting plants in pots.

The quantity of fruit that can be grown by this arrangement will be much greater than could be secured by any other system, and for early forcing it combines all that is necessary for complete success. Indeed, fruit may be produced at all seasons, allowing the plants a few weeks' rest after ripening a crop, and started again to grow, thus producing more than one yearly crop. Four crops have been thus taken from the same plants in thirty-two months. How long plants would survive such treatment we have no means of ascertaining, but on the renewal mode it might be followed for an indefinite period.

THE END.

Hollinger Corp.
pH 8.5