ROOT

Landscape Garden Series

LANDSCAPE GARDEN SERIES

VI. ARCHITECTURAL FEATURES

The GARDEN PRESS
Davenport, — Iowa

GLEN G. MOSHER

Fig. 1—An interesting portion of a garden wall; an example of the possibilities for artistic expression in architectural detail, figure composition and planting

Root, Ralph Rodney

LANDSCAPE GARDEN SERIES

CONSTRUCTION ARCHITECTURAL FEATURES

BY
LEONIDAS WILLING RAMSEY, B. S.

THE GARDEN PRESS
DAVENPORT, IOWA

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CHAPTER I.

GRADING, DRAINAGE AND LAWNS

Grading

GRADING in any of its forms, involves handling of earth and the shaping of the earth's surface for purposes of construction, drainage and lawn making. The level or slope given to the earth is known as a "grade". The permanent grade given the surface of the earth, road and sidewalk, is known as the finished or final grade. When a layer of topsoil or some material of construction is to be laid it is necessary to bring the earth's surface to a proper grade to receive this layer. A lower grade known as the "subgrade" is thus established.

As lawn making follows most grading, there should be due consideration for the future lawn in all steps of the work. In excavating for buildings the surface soil should be scraped off and piled where it will be kept free from debris. It is also well to save the topsoil around buildings by scraping it off a few feet from each side, for, otherwise, the refuse and trampling will ruin it for lawn making. Wherever lawns are to be made, the less the soil is disturbed, other than in actual lawn-making preparations, the better.

All graded surfaces that are to be planted to lawns should have at least four inches of good topsoil on the surface; and a layer of greater depth is desirable. If refuse is used in the backfill it should not come nearer than four feet to the surface.

Where areas are to be regraded, and cutting is necessary, the topsoil should be slipped off to a depth of eight inches and piled in spoil banks for future use. After the subgrade has been made the same topsoil can be again spread over the area bringing it to the proper grade. Likewise, in making fills, provision should always be made to supply a layer of topsoil to the fill, which can be stripped from the existing ground before the filling is done. If the existing topsoil is not suitable for finishing, the soil should, of course, be secured elsewhere.

The nature of the finished grade is determined by the requirements of construction, drainage, appearance and upkeep, and the use which will be made of the grounds.

In grading about buildings it is necessary to have the ground immediately surrounding the building to slope away from it to carry off the surface water. A fall of one-half inch to the foot will in most cases be satisfactory. In grading large areas for lawn purposes the shape of the ground should be made to resemble the ground that surrounds it and of which it seems to be a part. Grading for lawns requires the smoothing up of irregularities, but it does not require the earth to be brought to an even plane except perhaps on small lots, and, of course, for formal gardens and areas for games. A vast area appearing almost flat is generally uninteresting. The natural undulations, the gentle rises into banks or mounds or gradual falls into regular depressions, all add attractiveness to the lawn and resemble the natural landscape in character.

When the house is located near the street the method of grading is largely determined by the difference of elevation of the grade level of the outside walk and the grade line of the house. When both the level of the outside walk and the grade line of the house are practically the same it is best to grade the lawn so that it slopes away from the outside walk and then rises to the house. (Fig. 2A). When the

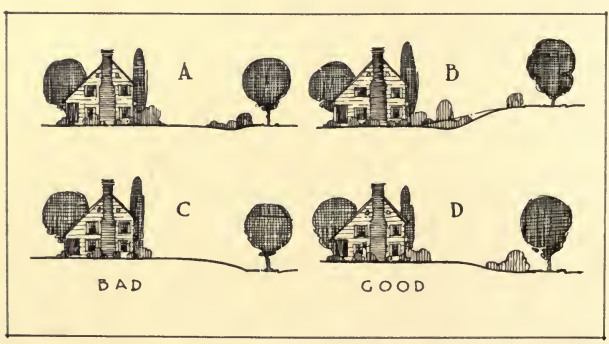

Fig. 2—Showing methods of grading. (A) good arrangement when house is on same level as street; (B) when house is below street; (D) when house is above street; and (C) poor method not as satisfactory as (D).

Fig 3—Garden in construction, showing grading to conform with steps and walks

house is considerably below the street level the lowest point in the lawn should be some distance away from the house to make drainage possible. (Fig. 2B). If the house is above the level of the street the grounds graded in an ogee curve from the street to the house will be found most pleasing to the eye while a lawn graded to a convex surface will not prove nearly so satisfactory. (Figs. 2C and 2D). A considerable difference of levels between the house and street will often require the use of retaining walls and terraces to make the necessary transition. The maximum slope that can be given in an area is largely dependent upon the maximum slope that can be given the approach walk.

Terraces near the house are really a part of the house and should be so considered and designed. The width of the terrace should be such that it is in scale with the building. The house terrace should be architecturally treated, being regular in line, with the upper line parallel to the sides of the building. The slope of the embankment should be of a nature to conform with approach steps; a minimum slope of

this nature is considered 1 to 2 (one foot of rise to each two feet of horizontal distance) while a slope of 1 to 3 is better and easier to maintain.

Terrace embankments that do not have to conform with steps may be as steep as a 1 to 1 slope which is the minimum slope in which most soils will maintain themselves. It should be remembered that terraces are always hard to maintain and where they are not a necessary means to an end they should be avoided. Where the difference of elevation is not too great for the distance an attractive way of handling the slope is found in the use of the ogee curve.

Grading should be done when the soil is in good workable shape and not wet and heavy. Fills made with frozen soil will settle more than soil not frozen and ample allowance should be made for this. All fills will settle in proportion to their depth and the nature of the material used. Hauling and working over the fills will help to settle them as the work progresses.

When it becomes necessary to establish an exact grade of known levels it is necessary to use some implement of a fair degree of precision. The surveyor's spirit level is used when absolute accuracy is required. Stakes can be set with their tops coinciding with the level of the desired grade or may be marked and a notation made as to the amount of cut or fill. A more accessible way of determing levels is to drive all the stakes and then sight from one to another of them by means of a carpenter's level. Two stakes of the same elevation will establish a plane or line of sight from which the elevation of the others can be regulated. A carpenter's level and a level board, 12 to 14 feet long, will provide a means of carrying a grade from one stake to another. This method is commonly used in laying sidewalks.

In all grading operations where teams are employed all existing trees should be protected by heavy guard stakes or by fastening a covering direct to the tree.

Drainage

The removal of surface and ground water is accomplished artificially by drainage. Drainage warms soils, thus increasing fertility and enabling the plant growth to start earlier (a benefit particularly favoring lawns and gardens); it makes soils moist instead of wet and in-

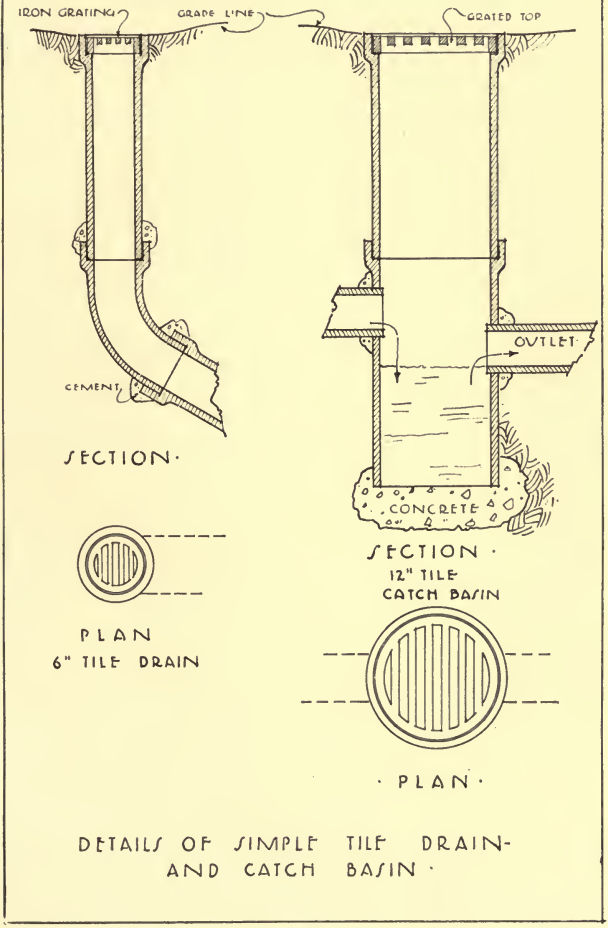
IRON GRATING
GRADE LINE
GRATED TOP
CEMENT
SECTION
OUTLET
CONCRETE
SECTION
12" TILE
CATCH BASIN
PLAN
6" TILE DRAIN
PLAN
DETAILS OF SIMPLE TILE DRAIN AND CATCH BASIN

Fig. 4

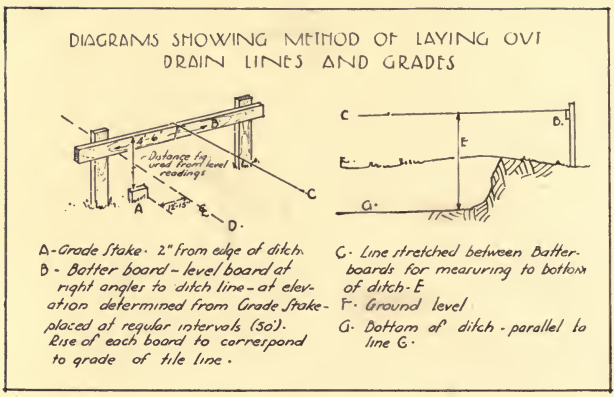

Fig. 5

creases the available moisture; it ventilates and firms soils; it assists pulverization, prevents surface washing and assists growth of desirable organisms; it helps to resist drought and prevents freezing out of plants and heaving of soils; it improves human health conditions.

There are special cases where drainage is absolutely necessary, but the list of benefits proves that drainage is desirable and an improvement in most any situation on any part of the estate. Wet, soggy soils indicate an absolute need for drainage. In roads and walk construction, especially where roads are built on sides of slopes, drainage of the ground water is necessary to keep the soil foundation firm and free from frost action. Tennis courts and other game areas where a firm, quick drying soil is desirable, must be drained. Water gathering behind retaining walls and around foundations should be drained off.

There are two common types of drain tiles in general use; the vitrified tile (glazed) and the porous clay tile (unglazed). Round tiles of these types are considered best for general use. The vitrified tile should be the best quality, salt glazed, vitrified clay pipe with hub and spigot ends free from defects. Porous clay tile should be whole and free from cracks and other defects.

When water cannot be taken into the ground as fast as it falls or cannot penetrate the surface on which it rests it will seek the

lowest level and there remain until it evaporates or soaks up. The existence of such conditions requires the installation of a storm drainage system. A suitable number of drain inlets, catchbasins and tile lines should be installed to carry off the maximum amount of excess water that would accumulate at any one time. This is a case where the tile lines may run full and with pressure at times, so vitrified tile, usually laid with closed joints, are used. The outlets of tile lines laid for subsurface drainage may be provided in the storm drainage system if the proper joining is made.

Drain inlets where the water enters the tile must be placed at the low points of the grade level. The drain inlet should be large or small according to the work it will have to do. There are many specially constructed types, but in all cases there is a perforated opening so designed as to let in the water and exclude as much as possible of the refuse which the water would otherwise wash in. A simple drain inlet may be constructed as shown in the drawing. (Fig. 4).

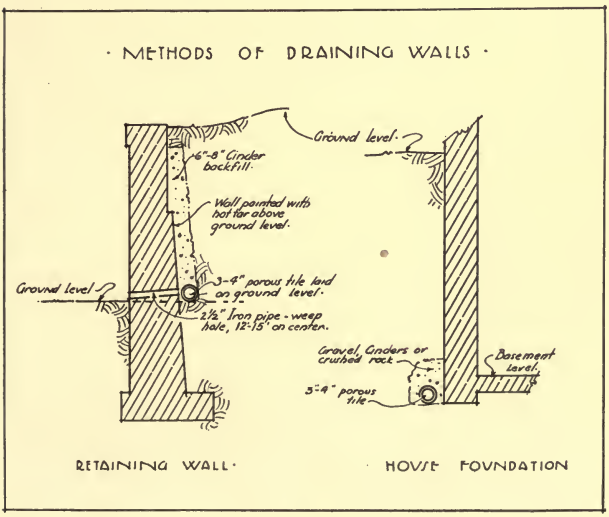

Fig. 6

Some sediment and refuse is bound to get into the tile lines, and in order to collect this and keep the tiles open or to reach them for cleaning purposes catch basins are introduced. From the drawing of a simple catchbasin (Fig. 4) it will be seen that the catchbasin provides a break in the tile line and a space in which the heavy sediment will settle, allowing the liquid to pass into the outlet pipe comparatively free from refuse that will not be carried on by the water pressure. When great quantities of water and refuse gather at a drain inlet there the drain inlet and catchbasin should be combined. (Fig. 4).

Catchbasins, other than tile, are built round or rectangular, large or small, according to the particular needs, and of concrete or brick. In all cases the tops are removable for cleaning purposes. Catchbasins are placed wherever needed to perform the service previously described; at anugular intersections of tile lines in some cases thus preventing clogging at the turn and enabling the tiles to be cleaned out; and at points in open-jointed drains where steep grades merge into flatter grades. Catchbasins or manholes are located where several lines of tile come together.

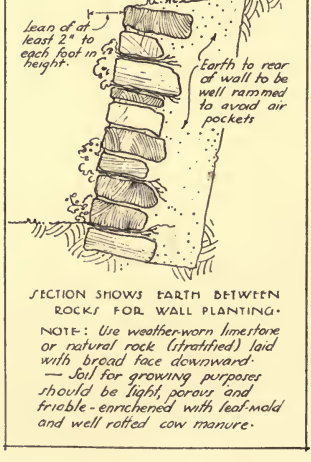

Fig 7

The tile lines should be placed at a depth of at least 3 feet and below frost if possible. The tile should be laid with bell end up grade, proceeding from outlet back. As the laying progresses, the joints, when to be closed, should be carefully cemented and the tiles wiped out to prevent clogging. If the outlet is into ravines or streams, the end of the pipe should be protected by a small wall of concrete built around and flush with the end of the pipe

to prevent backwashing or undermining. This type of outlet should be covered with a hinged screen or grating that will exclude animals, but allow the escape of water.

Subsurface drainage (the removal of ground water) is accomplished by laying open-jointed drains of porous or vitrified pipe. The vitrified pipe is seldom used except where a much stronger pipe is required. In many cases the subsurface drainage is all that is required, as water on the surface of the soil will quickly disappear if the ground beneath is drained.

In small areas there is need, usually, only of a few lines of tile connected with a suitable outlet, but in large areas a regular system of mains and laterals has to be devised and laid out according to the lay of the ground. The laterals are usually parallel approaching the mains obliquely or at right angles.

The average depth of tile line is 2½ to 3 feet, although the possible range is from 1½ to 4½ feet. Shallow-laid tile is of less benefit for growing purposes and more liable to harm from frost action. The distance apart of tile lines is determined by the existing conditions and the purpose served. In draining lawn areas the tile lines may be as close as 10 to 15 feet apart—this, as in all subdrainage, is to be understood to exclude all light porous soils where the ground water level is not near the surface. In fields used for agricultural purposes the average distance apart for tile lines in heavy clay soils is 30 feet; in muck soils, 60 to 80 feet, in ordinary loams, 70 to 100 feet. Frequently, as in gardens, the placing of the tile lines is determined by the location of the planting beds or walks which have to be drained. (See chapter on "Walks and Driveways").

The amount of water to be carried, the size of the area drained and the gradient, all have to be considered in determining the size of the tile. In large systems it is a matter of economy to use tiles of the proper sizes. In small areas when the difference in cost of the different sizes does not make much difference in the expense, the average sizes can be used. The average size tile is 3 to 5 inches in diameter; —it is advisable not to use anything smaller than the 3 inch size in most cases.

The digging of each ditch should begin at its outlet. As the ditch is dug the topsoil should be thrown on one side and the subsoil on the other if it is desirable to have the topsoil replaced on top, as is generally the case. A ditch 11 to 12 inches wide at top and 10 inches wide at the bottom generally suffices. The bottom of the ditch should be of even gradient and hollowed or troughed to receive the tile.

The minimum fall for a line of tile is 2 inches in 100 feet, unless the laying is very accurate. The elevations or grades have to be figured out before excavation starts. Levels are taken by means of a leveling instrument. A simple home-made device for this purpose comprises a one-legged stand with the leg sharpened so that it can be thrust into the ground to hold the stand comparatively level and firm. On the stand a carpenter's level can be placed, thus providing a line of sight. The use of an improvised leveling rod will enable the taking of readings and the determinations of the different elevations. Elevations are generally given as meaning the elevations at which the bottom of the tile will be placed (invert elevation). These elevations are marked on stakes and followed in digging the ditches and laying the pipe.

The tile laying should proceed from the outlet. In laying porous tile it is important to avoid large open joints. After laying, the joints should be covered with tar paper or burlap. The ditch can then be filled with the soil or other material. The efficiency of the tile is greatly increased by using material through which water can easily pass, but which will exclude silt and sediment from the pipe. In this case the tile can be covered with a layer 1 foot thick (measured from bottom of ditch) of coarse screened gravel free from broken stones, the largest of which does not exceed 2 inches in the largest diameter, or cinders.

The last few tiles at the outlet should be vitrified tile and the outlet, if above ground, should be protected as described for storm drainage systems.

Lawns

There is no element that can contribute more to the beauty and attractiveness of a place than the lawn. It is the lawn which carpets the open spaces and forms a setting for the house and planting. The element of beauty which lies in an expanse of velvety green, patterned

with the gold of the sunlight and the intricate tracery of shadow, makes good lawns an essential to the grounds beautiful. It is only a good lawn that can perform this service. The importance of observing the requirements that must be satisfied to have a good lawn should be realized at the very start.

A primary requisite of good lawns is thorough preparation of the soil. All refuse, sticks, and stones, should be carefully removed. The physical requirements of the soil must be satisfied. If the soil is sandy, plans should be made to add humus in the form of well rotted manure. Stiff heavy clays will have to be loosened up with an application of equal parts of sand and manure.

It is an all too common idea that the soil must be black to be good. Many are loathe to attempt making a lawn on clay soil without covering the clay with a layer of some dark colored soil considered better. This is a mistaken idea for when clay is loose and rich in humus it generally proves to be a good soil for grass. Most grasses that produce a good sod like a loamy soil and a clay or clay-loam subsoil is ideal.

In getting the soil ready to receive the seed, a thorough loosening and working is necessary. First cover the ground with well rotted manure at the rate of 10-20 tons per acre, (approximately ¼ to ½ ton for 100 square feet).

In large spaces where it is practical, the soil can then be ploughed and harrowed. When the subsoil is hard, it should be loosened with a subsoil plough. The soil should be disked and crossed disked until the lumps are well broken up and the ground is comparatively smooth. Fine tooth harrowing will also accomplish the same purpose.

In small areas where the work is done by hand a thorough spading is necessary properly to break up the soil. The lumps can be broken up as the ground is turned over or by using the hoe. Rolling and tamping will also help to get the soil into shape for seeding.

When liming is done or commercial fertilizer applied the application should be made after the ground is ploughed or spaded and before the work of pulverizing takes place. This will enable such materials to be mixed with the soil.

Any soil deficient in lime will not grow Kentucky blue grass, the standard grass and basis of most mixtures. A deficiency of lime is determined by making a test for acid. Dampen a small sample of the soil formed into a mudball and place a strip of blue litmus paper (easily secured at a drug store) in the center. If the paper turns red it is an indication of the presence of acid vegetable matter. Even if the soil is not acid it is desirable to make an application of lime for the lime improves the physical condition of the soil and makes good results much more certain when blue grass is planted.

For ordinary application use 1-1½ tons of hydrated lime per acre or 3 tons of ground limestone which has passed through a screen of 20 meshes to the inch. Limestone is slower to act than the slaked lime and almost twice the quantity is required for the same purpose. The limestone is as cheap and quite convenient to handle. Lime in any form should be applied by broadcasting; and then working into the soil.

The best fertilizer for lawns is well rotted manure applied at the rate, and in the manner, previously described. As the best and only opportunity for thoroughly enrichening the soil is offered when the soil is prepared it is a good policy to apply at this stage those fertilizers which will insure for all time an ample supply of the elements most needed for the growth of grass. The following formulas offer various combinations to be used for this purpose.*

	Per Cent	Pounds for one Acre	Pounds of different materials for one acre
Nitrogen.....	5	20 to 40	[1] 120 to 240 lb. nitrate of soda; or [2] 100 to 200 lb. sulphate of ammonia; or [3] 200 to 400 lb. dried blood; or [4] 4000 to 8000 lb. stable manure.
Available phosphoric acid.....	6	25 to 50	[1] 250 to 500 lb. bone meal; or [2] 175 to 350 lb. dissolved bone, etc; or [3] 200 to 400 lb. dissolved rock.
Potash.....	8	30 to 60	[1] 60 to 120 lb. muriate; or [2] 60 to 120 lb. sulphate; or [3] 250 to 500 lb. kainit; or [4] 600 to 1200 lb. wood ashes.

"As a more specific mixture, we suggest the following: 100 lbs. nitrate of soda, 100 lbs. bone meal, 100 lbs. acid phosphate (dissolved rock) and 100 lbs. muriate of potash, an acre."

* From 4th report Agricultural Experimental Station, Geneva, N.Y., as reprinted in The Farm and Garden Rule Book.—L. H. Bailey.

Fig. 8—A good example of latticework augmented with planting

The work of pulverizing the soil can be combined with the operation of making it level. In large areas leveling is accomplished by rolling with a horse drawn roller and dragging with a light road drag or lapped-plank drag. Hand workers must resort to the common garden rake and hand drawn roller. Rolling will indicate the soft places and depressions which can then be filled up and levelled. At this stage attention should be given to the fills to see that there is ample allowance for the settling that is bound to occur. Before the seed is applied the ground should be gone over with a rake or light weight fine-tooth harrow.

The close even turf desired on lawns is best obtained by using Kentucky blue grass *(Poa pratensis)* on account of its creeping root stocks and abundance of long narrow leaves. It also bears repeated clipping with a lawn mower better than any other grass. It is not advisable, however, to sow blue grass alone. Blue grass is slow in germinating and does not obtain full development until the third year. By using blue grass as a basis of the mixture and adding such grasses as red top *(Agrostis alba)* and Rhode Island bent *(Agrostis alba* var. *vulgaris)* a good mixture is obtained. The red top is good on any soil deficient in lime and will germinate quickly, thus enabling the lawn to make a showing while the blue grass is getting established. Rhode Island bent is low and creeping in habit. It is good on sandy soils.

General Mixtures

Kentucky blue grass	3 parts
Red top	1 part
Rhode Island bent	1 part

or

Kentucky blue grass	4 parts
Red top	4 parts
White clover	1 part

For shady locations a greater variety of grasses should be used to assure at least a partial success The following mixture is recommended:

Kentucky blue grass	5 parts
Wood meadow grass *(Poa memoralis)*	3 parts
Various leaved Fescue *(Festuca heterophylla)*	1 part
Crested Dog's Tail *(Cynosurus cristatus)*	1 part

For a fairly heavy seeding use from 75 to 100 lbs. to the acre (5 to 6 bushels) or one quart to the square rod. White clover is generally sown separate from the other seeds as it is much heavier. In most cases clover is used purely as a matter of preference and can be sown only where there is not much traffic on the lawn as it will not stand the wear. Clover can be added separately to any seeding at the rate of 5 to 6 pounds per acre.

All seed should be of the best quality and recleaned. It does not pay to use cheap seed in any case. Reliable seed houses usually keep in stock several prepared mixtures adapted to certain soils and situations; and which can be purchased in small quantities.

In order for grass seed to germinate and make a good start it is necessary to have the ground kept moist at least three weeks after sowing. Where this moisture can be insured it is practical to sow grass most any time. The time that nature provides continued moist conditions is in the spring and fall and for that reason these are the two seasons when seeding is most practicable. Generally the best stands are obtained by early spring sowing, the seed being applied as soon as the ground can be prepared. If the climate is right, good results can be obtained by sowing in the fall before the fall rains start. Fall seeding has the advantage of spring seeding in that weeds are less liable to get started before the grass has a chance.

Seeding should be done on a quiet day to insure an even distribution. If the seed is spread by broadcasting, instead of with a lawn seeder, the lawn should be broadcasted both ways to provide a uniform seeding. After raking or harrowing the seed in, roll the ground in order to firm the soil about the seed. A top dressing of one-half inch of sheep manure or well rotted manure that has been screened will help to keep the soil from becoming dry and hard and will afford a winter protection to seed sown in the fall. This top dressing will also facilitate watering when watering is necessary in dry weather. After the seed is well started it should be rolled again with a light, hand roller. This firms the soil about the roots and is supposed to cause the grass too stool (spread out) more.

When watering has to be done it should be done evenly and thoroughly. The ground should be gently soaked to a depth of several inches and then left. Light sprinklings do more harm than good.

As soon as the grass is high enough to cut, it should be mowed. Mowing should be done frequently with the mower set in such a way that the clipping will be two inches from the ground. The clippings can be left on the lawn if the mowings are frequent.

A winter protection is desirable the first winter. Well rotted manure or sheep manure should be used and applied in a thin layer. All material used for top dressings on lawns should be free from weed seeds.

After the first year all that remains to be done to ensure the life of the lawn is to go over it with a heavy roller each spring to firm the soil. An occasional spring application of bone meal or liquid manure will add fertility to the soil.

Sodding

Sodding is desirable for edging planting beds, walks and drives, and for covering slopes. In order to obtain the best results, sodding should be done in the early spring. The sod is taken up either with a sharp spade or special cutting machine in strips one foot wide and three feet or more long. An even cutting is desirable as it enables a close union when the sod is laid.

When the sod is laid the crevices between the separate pieces should be filled with loose loamy soil. Sod laid on a slope should be so

Fig. 9—A well can be made an interesting feature when fittingly used in an attractive setting

placed that the strips will lay along rather than up and down the slope. Less washing at the joints will result if this method is followed. Sod on slopes should be anchored with short pegs driven into the grounds.

After the sod is laid it should be thoroughly soaked, tamped and rolled in order that it will be level and adhere firmly to the soil beneath. Newly laid sod should be watered copiously until the danger of drying out is passed.

The cost of sodding depends upon local conditions. Generally sod is sold by the square (100 square feet) with laying cost included or separate. The cost will often determine the extent that sodding can be done. Where the season is favorable and the proper preparation is made it is just as practical to seed level areas as to sod them. Where slopes would have a tendency to wash badly before grass could grow, it is almost a necessity to sod. Sod is particularly valuable for securing quick effects, especially in summer when it would be impossible to start grass seed, and for giving a neat finish to a place newly graded.

CHAPTER II

WALKS AND DRIVEWAYS

THE importance of good construction and attractive grading in driveways is frequently given little recognition. Loosely built drives, that are too thin for permanence, following the grade of the ground without any attempt at a pleasing profile, are common. At the other extreme are drives of heavy concrete or stone construction, able to bear far more traffic than that to which they will ever be subjected,—a waste of expenditure.

The type of construction is determined by the following factors: (1) length and width of drive, (2) cost of various materials, (3) amount of traffic the drive will have to sustain, (4) soil and climatic conditions, (5) individual preference as to color, (6) amount of maintenance required.

The first step in planning a drive is to prepare a profile according to existing grades, and work out the desired grade for the drive. The ideal profile is one that rises steadily in a constant percentage. A slightly concave profile is also more pleasing than one that is convex. Changes in percentage of grade between the bottom and top of a continuous rise should be avoided.

The drainage should also be carefully planned. Where the soil is heavy or stiff, subdrainage is of paramount importance if the road is to stand up. Drainage may be secured by a line of tile under the center of the drive or at the edges. In very stiff clay soil it is best to have a line at both edges. It is also advisable to use cinders or crushed rock for "backfill" in the ditches dug for drain tile. This insures quick drainage so that the water does not stand under the road metal and freeze in winter with disastrous results.

Surface drainage must be provided, even where the soil is porous enough to permit economy in subdrainage, otherwise, water will col-

Fig. 10—The fountain is unsurpassed as a feature in such locations

lect at the lowest points, and unless the grade is very slight, surface water will also wash out the drive. To facilitate surface drainage the drive should be "crowned" at least two inches in the center. The steeper the grade the higher the crown required.

Catchbasins are installed at regular intervals, at turns, and wherever the tile line changes grade. If the slope of the drive is very gentle, catchbasins may be as much as 150 feet apart. On steep grades the catchbasins should not be over 50 feet apart on a stone drive. During rainfalls, thaws, etc., water rapidly accumulates and drains off along the sides of the drive; and the catchbasins should be so placed that water accumulating in the intervals between them cannot acquire enough volume or velocity to wash out the drive, nor fill low places faster than the catchbasins at those points can carry off the water.

The size of tile and catchbasins is governed by local conditions as to rainfall, grade, etc. Four-inch tile is used on most drives of moderate length and width, but six-inch tile is often required. Ordinary porous farm tile is sufficient where there is plenty of "fall", and no trees nearby whose roots will choke up the tile, and if the tile-line is thirty inches or more deep. Otherwise, vitrified tile with cemented joints is necessary.

Brick, stone, cement and gravel are the materials commonly used for drives. Brick is used less than other materials named. Stone and gravel construction of various types seem to be most popular, especially on large suburban or country places. Cement drives are numerous on small city places, and are to be found on many country places where the owner has decided in favor of permanence and minimum upkeep. The first cost of cement construction is greater than that of stone, macadam or gravel, although bituminous macadam is not much cheaper.

The thickness of the drive depends on the weight of traffic it has to bear. Six inches is the minimum for permanence, even on the small city place.

Having prepared profile and drainage, the next step is to prepare the subgrade by excavating or filling to attain the desired grade. The subgrade should be shaped to the same cross-section as the finished surface of the drive, and all soft spots or irregularities should be remedied so that when a heavy roller is run over the subgrade it remains smooth, firm, and of proper grade and crown throughout. This preparation of subgrade applies to all forms of construction in drives.

The foundation course is laid when the subgrade is completed. For stone or gravel roads this course should be spread evenly to proper grade and shape and thoroughly rolled. This done, the wearing course is added and the whole drive is given a final thorough rolling.

The surface of a stone road may be of white, yellowish, or gray screenings rolled on while wet, or it may have a dark surfacing of asphalt, Tarvia or similar bitumen. On either "water-bound" or bituminous macadam a thin coat of pea gravel or colored granite screenings adds to the surface appearance. Gravel drives with clay

binder, well watered and rolled, where traffic is not too heavy, are quite satisfactory. Applications of oil or various commercial preparations for surface treatment aid in preserving the surface and preventing dust.

Bridle paths may be built by simply grading up earth by means of "slip" scrapers or road grading machines to obtain a crown, with reasonable open drainage at the sides. Tanbark makes an excellent surfacing, especially for bridle paths that traverse wooded areas.

Walks

The construction of walks also depends on the use to which they are subjected. For public entrance walks or service walks, brick or cement is best. For recreative walks, brick, crushed stone, gravel, flagstone or turf are most pleasing.

Brick, crushed stone or gravel walks require good drainage and foundations. Flagstone walks may be laid on the ground if it is intended to have grass growing between the stones. If laid with mortar joints a well-drained, frost-proof foundation is required. Rough flagstones are best for minor traffic or naturalistic effects. Their uneven surfaces are hard on shoe leather. Dressed stone or smooth cast cement is better. Sections of broken cement walk, set in the ground, make acceptable flagstone walks. Stepping stones are more ornamental than useful unless made sufficiently large and set close enough together to enable one to walk naturally over them. In laying flagstone walks more than three feet wide, the best method is to lay the center line of stones first, just as you would lay a single line of stepping stones, using the largest stones at hand. The remaining walk area between these large stones and along the sides may then be filled in with the smaller stones. An effort should be made to have all longitudinal joints parallel the direction of the walk, especially at curves.

Brick walks may be laid on a cement foundation, with cemented joints, or on cinders or crushed stone with sand cushion and sand joints. The former construction requires very hard brick to insure against shattering under frost action. The latter type may require occasional relaying after a severe winter, and some weeding in sum-

mer, but is probably most satisfactory after all. There are endless possibilities in patterns for laying brick.

Crushed stone or gravel walks look best when edged with a curb of brick or cement. In gardens, especially, a curb is needed to keep the lines between walks and flower beds clearly defined. Such a curb also keeps the plant roots confined to the proper area. If cement is used, no matter how thick it is below ground, it is best to not have anything visible above ground but a neat, smooth line of cement about two inches wide, projecting about an inch above the surface of the walk. A light surfacing of pea gravel or granite screenings removes the glare of a crushed limestone walk and prevents "tracking" the stone dust with the feet after leaving the walk. Sometimes a bituminous surface is applied, similar to that used in drives.

Surface drainage must be provided where needed. Small catch-basins should be installed at low places, and connected to tile drains under the walks or flower beds.

CHAPTER III

WALLS, FENCES AND GATEWAYS

WHEN one sees a wall or fence which seems particularly pleasing, it will generally be observed upon close scrutiny that it has been designed with consideration to the ground plans and the continguous architectural features. It is this fitness which elicits our admiration. Often a seat along the wall, a wall fountain at the end of a vista, or possibly a garden house in connection with the wall, are features which tie the wall in with the remainder of the property and which gives it its particular charm.

Walls and fences are constructed to afford privacy, to screen objectionable views, to mark the division between different areas and to afford a support for vines, roses or grapes.

A wall constructed about the private portion of the grounds for the purpose of securing privacy should be at least six feet high. When the fence is constructed close to a line of vehicular traffic it should be higher. In screening an objectionable view a lattice fence will often serve the purpose as well as one which cannot be seen through, for

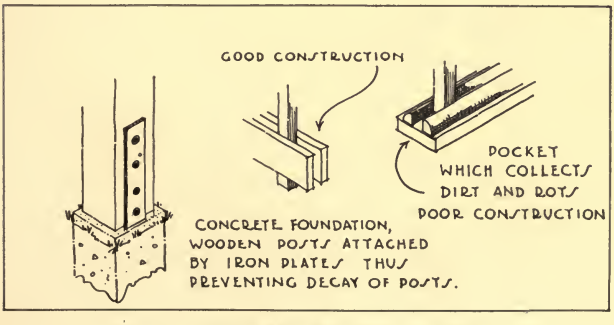

Fig. 11 – Hints on lattice and fence construction

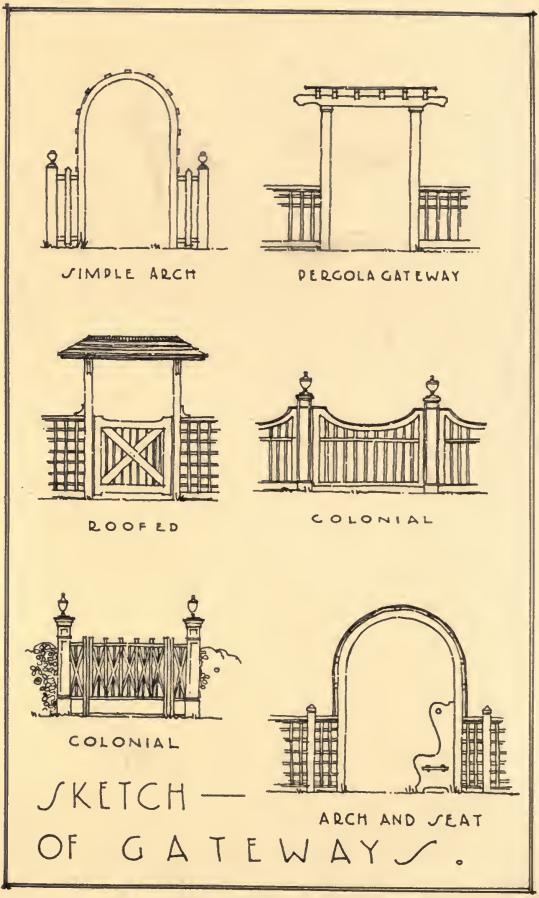
SIMPLE ARCH
PERGOLA GATEWAY
ROOFED
COLONIAL
COLONIAL
ARCH AND SEAT
SKETCH —
OF GATEWAYS.

Fig. 12

the eye is arrested by the lattice work and the objectionable view goes unnoticed, even though it might be seen by close scrutiny.

As a division between different areas the wall or fence may be much below the level of the eye. For instance a lattice fence of 2½ feet might be designed to set off the vegetable garden from the remainder of the grounds; such a fence would shut off the view of the growing vegetables and would afford a strong line of demarcation in an area of foliage and flowers.

As a support for grapes or vines a lattice fence should be constructed with the lattice strips at least six inches apart. A pergola effect along the top of the fence will often prove attractive, and affords additional support for the flowers or grapes.

A masonry wall should be built upon a foundation which should go down below the frost line. When brick is used for a wall the coping may be of either stone, concrete, tile or brick. Brick, probably, being the least desirable of these materials, for, although attractive, it does not withstand the seasons of freezing and thawing as well as the other materials named.

White pine, redwood, or cypress, are excellent woods for lattice construction. The posts, which extend into the ground, may be of white cedar, redwood, chestnut, cypress, or black locust. The posts should, of course, be placed far enough in the ground to make them firm. Such posts are often set in concrete; they will, however, last much longer when properly creosoted and set in the plain earth. Possibly the best method of construction to secure long life for the posts is to set a three-foot pier of concrete in the ground and attach the wooden posts to iron plates which are set in the concrete, thus keeping the posts above the concrete and yet close enough to ground to prevent the method of construction from being perceptible.

In lattice construction the joints are often mortised together, but in any case the construction should be done carefully. A few lattice strips tacked together do not make a fence. Lattice fences are generally painted white; although dark stain is often effective.

The gateway should be in character with the fence or wall. A few general types of gateways are shown in the accompanying drawing. (Fig. 12).

CHAPTER IV

GARDEN STRUCTURES

FOR the purpose of convenience garden structures may be classified according to their use in the ground plan. In this, more or less arbitrary classification, we have five general divisions, as follows: (1) as a terminal motive of a garden, (2) as a central motive of a garden, (3) as a portion of a wall, (4) to terminate a vista, (5) as a feature in an advantageous natural location or in a sequestered nook.

Garden houses have a double significance in our landscape development, for they serve as a dominant note in our design and afford shelter for garden teas and other sedentary garden activities.

With the proper furnishings the garden house may become as livable as the rooms within the house itself. Grass carpets, attractive furniture and even cut flowers assist in making the garden house inviting. Lighting facilities should be supplied so that the house can be used at night and there should be an electric wall socket to be used in preparing tea when desired.

The garden house when in close proximity to the residence, or when it is a part of the garden formed by an extension of the house lines, should be of the same arhitecture as the house and built of a similar material. The architectural detail should be well executed. One often sees garden houses constructed poorly and presenting a shabby appearance. In most cases poor architecture and construction are more glaring than in the house itself for the garden house is of small dimensions and the whole building can be seen at a glance; the faults are thus more readily apparent.

When there is a wall around the garden, a garden house is easily constructed, for one side of the house is already formed; and when the house is located at a corner two sides of the house are formed necessitating merely the addition of a roof and columns. Such houses

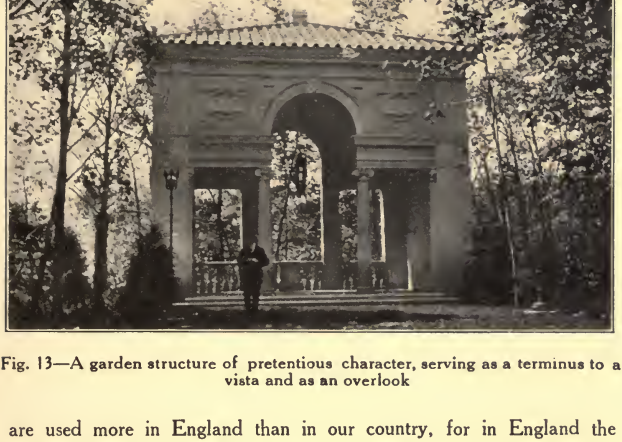

Fig. 13—A garden structure of pretentious character, serving as a terminus to a vista and as an overlook

are used more in England than in our country, for in England the use of walls about the garden is general, while in America it is seldom the case; and when there is a wall about the place our method of handling the problem differs somewhat from the method of building in England, for we seldom locate a garden house at the angle of walls two or more stories in height as is commonly done in England.

When far removed from the residence there can be considerable latitude in both the design and the materials used in building the shelter house. Often a temple or belvedere will be more desirable than any other type of structure. When built upon a lake, such a structure affords charming reflections in the water and presents a silhouette of white against a green background, thus affording a contrast which is welcome in a long expanse of foliage and water. Garden houses of color in such locations, though attractive, lack the classical influence which well designed structures of white stone or white painted wood afford.

The foundation for the garden house should be built upon rock or solid ground and should go below frost line, in most cases 3 or 3½ feet is considered a sufficient depth. The floor should be constructed of weather-resisting material; tile, brick, stone and concrete

being the materials most commonly used. When tile, brick or marble, are used, they should be set in cement and laid upon a well reinforced concrete foundation. Even with these precautions the joints often loosen during the season of alternate freezing and thawing.

A floor of concrete colored a turkey-red and marked off like tile makes an attractive and inexpensive floor. Often the outer edge of the floor can be left in the natural concrete with the colored concrete in the center. A flagstone floor placed upon sand will prove attractive and durable.

When the garden paths connect with the garden house they can often be widened, forming the garden floor. These might be, in addition to the materials already mentioned, of gravel, macadam or even grass, although grass will be found the least desirable of all of these.

Often in ravines where bridges and railings along paths are made of rustic work, a house of the same material would be in keeping, although it may be frankly stated that rustic work brought into well-kept areas where other types of construction are visible, would hardly be considered advisable.

Pergolas

The earliest examples of the pergola were used along pathways, and they are best to-day when used as a connecting feature between two buildings or two garden motifs. A pergola may, however, furnish a terminal motif at the end of an axis, a central motif of a formal or informal area, or the major part of some comprehensive architectural scheme. Whatever the situation, however, a pergola should be constructed of the best weather-resisting materials available; and, further, there are a few structural precautions which must be observed.

The columns should be made of staves joined together in some good interlocking method, for one thing, and built up that they may withstand the ravages of the elements. The capitals should be covered with either zinc or copper in order to protect the top. The base should be made of metal also, as a wood base resting upon a concrete foundation soaks up the moisture and is short-lived. The foundation for the column, made of concrete preferably, should go down below the frost line, which is about three feet below the surface of the ground

in the northern part of the United States. And, finally, the columns should be firmly anchored to the foundations in order that they may resist heavy winds.

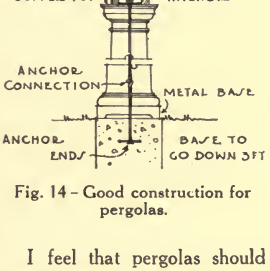

Fig. 14 – Good construction for pergolas.

The rafters may be of the same wood as the posts. A number of end designs are suggested. Rafters are usually placed about two feet apart. Lattice work, when used in connection with the pergola, should be snappy and should, therefore, be executed by a careful workman. Proper construction calls for the strips to be spliced together.

I feel that pergolas should be painted white, or stained brown, except under very exceptional conditions. White, by contrast, brings out the color in foliage and flowers, and a brown stained pergola is not as bleak as a white pergola when the leaves are off the trees. It is a good policy to let no one tempt you into painting your pergola any other color unless it is so closely related to the house that it demands consideration as a part of it.

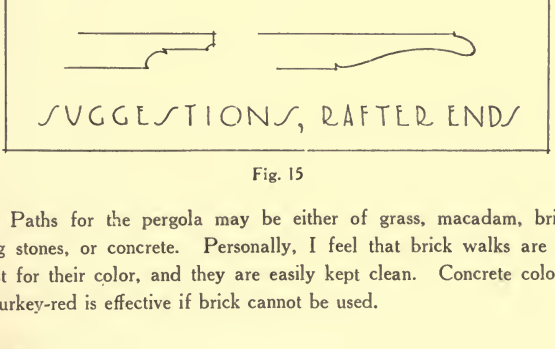

Fig. 15

Paths for the pergola may be either of grass, macadam, brick, flag stones, or concrete. Personally, I feel that brick walks are the best for their color, and they are easily kept clean. Concrete colored a turkey-red is effective if brick cannot be used.

It is, of course, as impossible to give a fixed rule for the height and the spacing of the posts for pergolas generally, as it is to establish a fixed rule for any architectural design; but I may say that the best columns to use ordinarily are the ones 10 inches in diameter, which will come 7 feet, 6 inches in height. These may be set 8 feet apart in a pergola that is 7 feet, 6 inches wide. All measurements, be it understood, are made on column centres. Where columns are used in pairs instead of singly, the open distance between the pairs should be 8 feet, measured on centres.

A sketch to scale, of the elevation of a proposed pergola, should always be made, however, roughly, in order to judge its proportions and its general effect when erected.

CHAPTER V

POOLS

FROM the earliest gardens of which we have record, until the present time, we find water employed as a prominent feature of our gardens. Certainly there is a charm about the garden with pool or fountain which one without never has. The reflections, the sound of rippling water and the cooling effect of a spray are a constant delight to the garden lover. Then, too, a pool affords a place to grow water lilies and other aquatic plants, the bright tropical colors of which add much to the beauty of our garden.

The formal, or regular shaped, pool should serve a definite purpose in our garden plan; it is often the dominant note in our garden

Fig. 16—Showing that the informal pool has an undisputed claim of beauty

employed as the center panel in our formal design. (Fig. 17). A pool may be used to break the monotony in a long series of steps and at other times it may be set in an open lawn. When the pool is constructed in an open lawn the relation of the pool to the house should be just as apparent as if it were the portion of a formal garden planned upon the same spot. In no case should a pool be located in an open lawn unless it bears strong axial relation to the house or some other out-of-doors structure. Let us assume that we wish a pool in an open lawn and we have selected a site. (Fig. 17A). The location selected in the sketch would be a good one, for the pool bears axial relation to the house, and were the lines of the house extended the pool would bear the proper relation to the garden scheme.

When the coping of a pool is only slightly above the level of the ground the eye carries across the pool and should in most cases be arrested by an architectural feature, seat, or some strong planting. The level at which water should remain in a pool should not be higher than the surrounding ground. When this level is established, the water should be kept at the level desired, for nothing presents a more slovenly appearance than a pool only half filled with water.

The coping about a pool should not be over six inches above the garden grade, and in a small garden four inches or less would be more desirable. The edging for the pool should be selected with consideration for the materials used in the house walls and other architec-

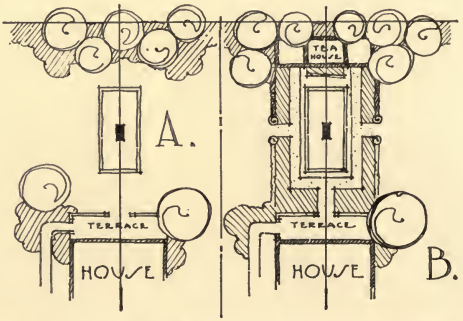

Fig. 17—A formal pool should bear axial relation to the house

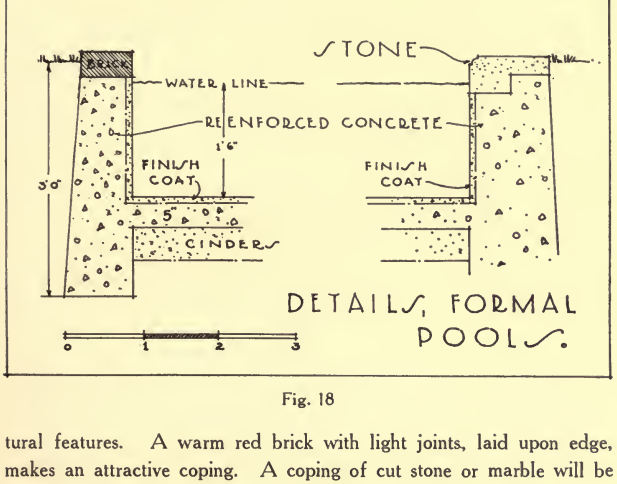

Fig. 18

tural features. A warm red brick with light joints, laid upon edge, makes an attractive coping. A coping of cut stone or marble will be found suitable in many cases. Although it is humanly possible to make an attractive concrete coping, the author has never seen one which even approximates in beauty and finish a coping of cut stone.

A strip of at least one foot should be left about the pool for planting for sod. When this planting is omitted about a pool the effect will be harsh and not nearly so pleasing as when there is a planting of violets, iris, or other low plants, or sod, to break the harsh lines made by the coping meeting the walks. This strip, however, can often be omitted when the pool is a small one constructed upon a paved terrace and when the coping is really a part of the paved area about it.

A pool can be as shallow as eighteen inches and still have six inches in which to plant water plants, with one foot of water over them. There is no object in having a pool too deep, for children enjoy playing about a pool, which, if too deep, becomes dangerous.

The floor of a pool should be at least four inches thick, of reinforced concrete, with a one-inch coat of waterproof Portland cement applied as a finish. The floor should be laid upon five inches of cinders or gravel to prevent heaving.

The reinforcing bars used in the floor should be long enough to turn up for the sides. The base of the pool and walls should be poured at the same time, when it is possible to do so. The walls should be at least six inches thick; five inches of reinforced concrete and a 1-inch finish coat of waterproof cement. The walls of the pool should go down three or three and one-half feet in order to be below frost line.

Pools should be piped so that they can be easily drained, and they should receive their water from the general water supply. A simple method for draining a pool is shown by the accompanying sketch. (Fig. 21). A one and one-half inch pipe will suffice in most cases. By using a pipe as is shown in the accompanying illustration the water can be drained off without the outlet becoming clogged up with leaves

Fig. 19—Where the possibilities of a formal pool and its elaborative are appreciatively revealed

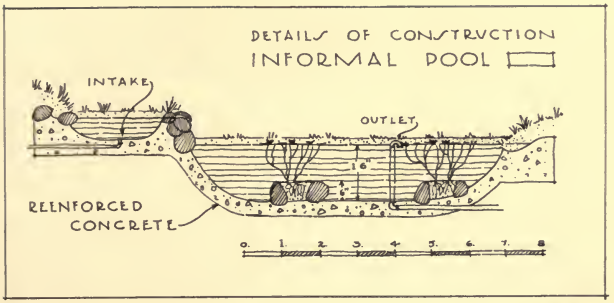

Fig. 20—A pool of this nature is possible for everyone who has a small space available

and other material. When it is wished to drain all of the water out of the pool the pipe can be unscrewed at the bottom of the pool. There are many other methods of draining pools, but this is one of the simplest and one of the most satisfactory for smaller pools. The outlet pipe can then enter an ordinary drain tile and the water be carried away.

An inch of sand placed on the bottom of a pool will add much to the pool's appearance.

Informal Pools

There is probably no other feature which will add as much charm to the garden as a small informal pool, and if set away snugly in some corner of the planting with a seat nearby will afford a meditation spot which is unexcelled and which will be a haven during the summer months. There one may enjoy the reflection of the planting, and with the addition of small fish and the possible murmur of the in-flow to give life, one will feel far off in the country even though the place be in the heart of the city.

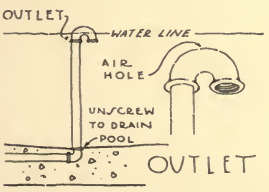

Fig. 21—A simple and efficient means of draining pools

Such a pool may be made of any size to suit the demands and desires of the builder, but as in the case of real formal pools, it should

be at least eighteen inches deep, in order to allow six inches for water plants with twelve inches above them. Shallow tubs may be used for the water plants, or rocks may be placed in the concrete when it is fresh to form a tub, the tub to be filled with soil when the time to plant the water plants arrives. If aquatic soil cannot be secured, good rich loam, with one-third well-decayed cow manure, will serve as a good substitute. The hardy water plants need not be removed in the winter, but the pool should be drained and then filled with straw.

One often objects to a pool for fear they will breed mosquitos. There should be no turning upon this score, for with the addition of gold fish, mosquito larvae cannot live to maturity.

The upper edges of the pool should be constructed as shown in the accompanying diagram, (Fig. 20), for this will be the secret of the success of your pool. If aquatic or bog plants are not used all around the pool, the intervening spaces should be sodded; thus the concrete will not be seen and the pool will present a very natural appearance. The construction of such a pool would vary little from the directions given for constructing a formal pool. When the hole is dug, the ground will serve as a form for the pool if it is carefully leveled. The outlet of the pool, which is usually a pipe, should have a connection at the bottom in order that when it is unscrewed the pool will drain.

The cost of such a pool as the above is governed by the ease with which the piping connections can be made as well as the area of the pool. Very charming little pools on this order have been constructed and the water plants secured, for the sum of twenty-five dollars; and from this they may of course run up to almost any amount. But if you want the water simply for the sake of growing a few water plants, —if you do not care for it as a garden feature itself,—even the expense of a tiny pool may be avoided by the simple expedient of sinking a half-keg or the half of a hogshead into the ground. Such a "pool" is perfectly practical, horticulturally speaking, and many splendid specimens of water plants are cultivated in precisely this way.

Where the open water surface is desired, on the other hand, a pool of the sort herein described, is, of course, necessary. Then be careful that you do not overplant it and thus lose the effect of water, which is lost if completely grown over, even though you have a quantity of it.

Swimming Pools

Swimming pools permit of little variation in general type of construction. To be permanent, they must be built of reinforced concrete. The only exception to this occurs where a natural pool may be dug in rock substratum, and often such a pool contains fissures, necessitating a "lining" of waterproof concrete in order to retain the water.

The shape and size of a swimming pool are determined by its relation to the general design of the place, the extent of its use, and the supply of water available to fill it. These factors also determine its location.

It is to be regretted that many people regard a swimming pool merely as a large outdoor bathtub, losing sight of its ornamental possibilities. High copings of cement or stone, and grass or iron handrails sticking up in the air serve to make the pool less attractive than it might be, and in most cases these features are unnecessary.

The most pleasing pools are those that allow the water to be seen as a flat, mirror-like surface, reflecting some attractive elevation of buildings or trees. The coping should not project over six inches above the ground, and is most attractive in cut stone. Entrance to the pool may be provided by steps; by iron ladder rungs set into the ends of the pool; or by "toehold steps" fashioned in the cement walls or in stone set into the walls, so that there is nothing projecting beyond the surface of the walls of the pool. The coping, whether of stone or cement, may be molded to form a combination handrail and gutter, thus avoiding the unsightly handrail of pipe, rope or cable.

An especially attractive type of pool is one that has only a narrow line of cement about two inches wide visible to separate the expanse of water from the surrounding green turf, which is level with the coping. The coping also serves as a handrail. Overflow is provided for by small catch-basin inlets sunk in the turf at intervals along the coping.

Most swimming pools have a shallow end for children and novices, and a deep end for expert swimmers and divers. The shallow end is usually about 3 feet deep, and the deep end varies from 7 to 12 feet deep. Seven feet is safe for ordinary standing or springboard diving at

ground level. For high diving the pool must be deeper in proportion to the height of dive desired. The depth is sometimes arbitrarily limited by the level of the available outlet for draining the pool. Good drainage around and under the pool is important in sections of the country where frost is experienced.

Winter treatment of a swimming pool depends on climate and construction of the pool. Few owners care to assume the expense of the heavy reinforced construction required if the pool is to be left full of water to freeze for skating or to furnish ice. Such winter use is hard on the coping, especially if it is of cut stone. Pools that are to be emptied for the winter must have good drainage, and should be protected against possible frost damage, either by covering with a portable, waterproof "roof" that can be removed and stored in the spring, or by filling with at least two feet of leaves or straw.

CHAPTER VI

SMALL FEATURES AND GARDEN FURNISHINGS

THERE is possibly nothing more attractive as a garden feature than an old-fashioned sundial. It is not only useful as an accent in our garden plan, but it has a sentimental charm going back to the gardens of our Tudor ancestors. Of course, today, we all have clocks, and watches are universal, yet it is still a pleasure to read the time upon a sundial and to ponder over the cheerful inscriptions they carry.

We commonly speak of the pedestal and the bronze horizontal plate secured to the top of the pedestal as a sundial; the term in the beginning meant merely the plate with its gnomon; but by common usage the term sundial can be considered correct when applying to the sundial proper, pedestal and base, as a whole.

As the purpose of the sundial is to count the sunny hours it would, of course, be incongruous to place a sundial where it does not secure the sunlight, no matter how well it might serve as a part of our scheme in such a location.

A sundial should be chosen which is well designed, and should have a suitable base. When the base is not given proper consideration and when the sundial is not advantageously located, much of the pleasure which would be derived from it is lost.

A charming sundial can often be constructed of local material; in many cases the material used in building the house can be used to good advantage. Often a sundial plate is seen set upon the top of a sawed-off stump, which is obviously not good taste.

One of the most interesting and useful ornaments which can be used upon our grounds is a bird bath. Too much cannot be said in its favor. It can be as beautiful as a small fountain and the birds which it attracts makes it a desirable feature.

The bird bath should be well designed so that it will add to the beauty of our grounds as well as have an attraction for the birds. A

Fig. 22—A sundial of unusual design

well-designed bird bath should have a rough surface for a foothold, and should slope gradually to the center, so that the birds can enjoy the water at any depth they choose and so that they will have ample room in which to sun themselves. When the bird bath does not have a gentle slope a few stones placed in the bowl will often serve the same purpose.

Bird baths on a pedestal are considered superior to those which are placed upon the ground, for the birds feel safe from cats and dogs when bathing in a bowl above the ground and, then, too, the birds like to perch upon any raised object rather than upon the ground. The summer bird bath may be used as a feeding platform in winter. Trees and shrubs which have berries attractive to the birds may be planted about the bird path.

The garden should not be considered as a place to stroll alone but as an out-of-doors living room. To this end we must have garden furniture to give the garden a look of an abiding place. Seats of masonry, terminating garden paths and vistas, and as built-in portions of the garden architecture, are highly desirable and make the garden seem inviting. Cut stone and imitation stone seats do not have to be removed in winter and for this reason are preferable, in many locations.

Wooden furniture is extensively used in the gardens during the summer months. Most furniture stores carry a complete line of garden furniture where selections can be made. Garden furniture should be painted white and in no case should it be painted green. White furniture presents a striking contrast to the grass and shrubbery, and although, slightly glaring when there is little color in the garden, presents a far more pleasing effect than can be secured by painting the furniture any other color.

A good color for garden furniture can often be secured by using a shade of white softened by tones of gray or cream.

Vari-colored awnings, covered swings and other portable features add much to the livability and color of the garden.

We should take care that we do not crowd too much garden ornament into too small a place, but should rather impress the observer with the restfulness and comfort of our garden rather than with its lavishness and ostentation.