AUGSBURG'S DRAWING

BOOK III

EDUCATIONAL PUBLISHING CO.

Augsburg's Drawing

BOOK III.

A Text Book on Designing and Constructive Drawing for the Fourth, Fifth, Sixth, Seventh, and Eighth Grades of Grammar Schools, and for use in High Schools, with Chapters on Brush Drawing, Wash Drawing, Water Colors, Pen Drawing. The Human Head and Figure, Chalk Modeling.

BY

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EDUCATIONAL PUBLISHING COMPANY

BOSTON NEW YORK CHICAGO SAN FRANCISCO

PREFACE.

Augsburg's Drawing System is embraced in three books, and is designed for use in graded and ungraded schools. Each subject is treated topically and is arranged so as to give the widest latitude and the greatest flexibility in teaching.

Book I. is a teacher's hand book, showing simple and effective methods of teaching drawing, including color work, in the first, second and third grades.

Book II. is a regular text book, containing the essentials of Free Hand Drawing. It may be placed in the hands of the pupils of the fourth, fifth, sixth, seventh and eighth grades, and used the same as a text book in arithmetic or other subjects. It may also be used in connection with a system of copy or blank books or drawing pads.

Book III. contains short, yet complete, courses in Brush Drawing, Wash Drawing, Water Color Drawing, Pen Drawing, the drawing of the Human Head and Figure, Decorative Design and Constructive Drawing.

CONTENTS

INTRODUCTION.

GENERAL OUTLINE.

Books II. and III. form a complete text-book in Drawing, Color, Designing and Constructive Drawing and therefore contain more than can be compassed in an ordinary school course in drawing. To meet the varying demands in this subject, and to make the books of the widest utility, the following courses have been outlined:

The Standard Course.
The Pictorial Course.
The Designing Course.
The Constructive Drawing Course.
The Ungraded Course.
The Teacher's Course.
The High School Course.

The Standard Course is both general and fundamental in character, and aims to aid in preparing the pupil for whatever calling he may follow in life: to make him a better blacksmith, carpenter, machinist, miner, farmer; to make her a better dressmaker, milliner, housekeeper, teacher; to prepare both for all of life's duties in which skill of hand and mind are factors.

The Pictorial Course is the same as the standard course, with the addition of pen drawing and the study of the human head and figure in the seventh and eighth grades.

The Designing Course contains a course in designing in the sixth, seventh and eighth grades; otherwise it is similar to the standard course.

The Constructive Drawing Course contains a course in Constructive or Mechanical drawing in the sixth, seventh and eighth grades; otherwise it, also, is like the standard course.

The Ungraded Course is a course in drawing for ungraded schools. It is arranged for one class containing two divisions: one composed of first, second and third year pupils, and the other of fourth, fifth, sixth, seventh and eighth year pupils.

The High School Course is entirely in Book III. The course is a continuation of the work of the grades in Brush and Wash drawing, Water Colors, Pen drawing, Designing and Constructive drawing.

These courses are not intended to be arbitrary in character, but suggestive. They are intended to outline, in a general way, what can be taught to advantage in each grade.

The Mediums used in this system are those used most frequently in the trades and professions, *viz.: the lead pencil, water colors, ink, and the blackboard crayon.*

Lead Pencils.—A soft lead pencil, capable of the widest range of line, should be used, one capable of making light, medium and black lines.

Water Colors.—The mechanical use of water colors should be taught in the second and third grades, and then used in all grades above the third as a common medium in all work in which color can be used to advantage.

Ink is used in pen and brush drawing, and may be used in place of the pencil in other lines of work.

Crayon is the most common medium used by the teacher in giving instruction. The blackboard has no superior as a place for drill work.

Ambidextrous or Two-Handed Drawing may be used in any grade as an exercise to gain freedom, speed and skill in the use of the hands. The exercises should not be more than five minutes long. Ambidextrous exercises may be found in Book I.; also in Book III. under the head of *Designing by Form.*

Action Drawing. It is well to take up the study of a bird and an animal in each grade. In Book I., under the head of *The Drawing of Birds* and *The Drawing of Animals*, this work is shown in detail.

Object Drawing is given a prominent place in every grade from the first to the eighth. In all of the courses much time should be given to object drawing. Pupils should be taught to seek the object as a source and perfecting element of the mental image. Object drawing should be introduced at pleasure through the year's work.

The courses in detail are as follows:

THE STANDARD COURSE.

The length of drawing period should be fifteen minutes per day.

Grade IV.

Chapter	1.	Book II.	The perspective principle.
Chapter	2.	"	The box as a type form.
Chapter	3.	"	The cube as a type form.
Chapter	4.	"	Application of the box form.
Chapter	9.	"	Object drawing.

Grade V.

Chapter	5.	Book II.	Oblique drawing.
Chapter	6.	"	Exact drawing.
Chapter	7.	"	The cylinder as a type form.
Chapter	9.	"	Object drawing.

Grade VI.

Chapter	8.	Book II.	Application of the cylinder.
Chapter	9.	"	Object drawing.
Chapter	10.	"	The triangular prism as a type form.
Chapter	1.	Brush drawing.	

Grade VII.

Chapter	11.	Book II.	Reflections.
Chapter	2.	Wash drawing.	
Chapter	9.	Book II.	Object drawing.

Grade VIII.

Chapter	3.	Water colors.	
Chapter	9.	Book II.	Object drawing.

PICTORIAL COURSE.

The length of drawing period should be fifteen minutes per day.

Grade IV.

Chapter	1.	Book II.	The perspective principle.
Chapter	2.	"	The box as a type form.
Chapter	3.	"	The cube as a type form.
Chapter	4.	"	The application of the box form.
Chapter	9.	"	Object drawing.

Grade V.

Chapter	5.	Book II.	Oblique drawing.
Chapter	6.	"	Exact drawing.
Chapter	7.	"	The cylinder as a type form.
Chapter	9.	"	Object drawing.

Grade VI.

Chapter	8.	Book II.	Application of the cylinder.
Chapter	9.	"	Object drawing.
Chapter	10.	"	The triangular prism as a type form.
Chapter	1.	Brush drawing.	

Grade VII.

Chapter	11.	Book II.	Reflections.
Chapter	2.	Wash drawing.	
Chapter	4.	Pen drawing.	
Chapter	9.	Book II.	Object drawing.

Grade VIII.

Chapter	3.	Water colors.
Chapter	5.	The human head and figure.
Chapter	9.	Book II. Object drawing.

DESIGNING COURSE.

The length of drawing period should be fifteen minutes per day.

Grade IV.

Chapter 1.	Book II.	The perspective principle.
Chapter 2.	"	The box as a type form.
Chapter 3.	"	The cube as a type form.
Chapter 4.	"	Application of the box form.
Chapter 9.	"	Object drawing.

Grade V.

Chapter 5.	Book II.	Oblique drawing.
Chapter 6.	"	Exact drawing.
Chapter 7.	"	The cylinder as a type form.
Chapter 9.	"	Object drawing.

Grade VI.

Chapter 8.	Book II.	Application of the cylinder.
Chapter 9.	"	Object drawing.
Chapter 10.	"	The triangular prism as a type form.
Chapter 6.	Designing by line.	

Grade VII.

Chapter 11.	Book II.	Reflections.
Chapter 7.	Designing by form.	
Chapter 9.	Book II.	Object drawing.

Grade VIII.

Chapter 9.	Book II.	Object drawing.
Chapter 3.	Water colors.	
Chapter 8.	Foliation.	

CONSTRUCTIVE DRAWING COURSE.

The length of drawing period should be fifteen minutes per day.

Grade IV.

Chapter 1.	Book II.	The perspective principle.
Chapter 2.	"	The box as a type form.
Chapter 3.	"	The cube as a type form.
Chapter 4.	"	Application of the box form.
Chapter 9.	"	Object drawing.

Grade V.

Chapter 5.	Book II.	Oblique drawing.
Chapter 6.	"	Exact drawing.
Chapter 7.	"	The cylinder as a type form.
Chapter 9.	"	Object drawing.

Grade VI.

Chapter 8.	Book II.	Application of the cylinder.
Chapter 9.	"	Object drawing.
Chapter 10.	"	The triangular prism as a type form.
Chapter 9.	Constructive drawing.	

Grade VII.

Chapter 11.	Book II.	Reflections.
Chapter 9.	"	Object drawing.
Chapter 10.	Isometric and Cabinet drawing.	

Grade VIII.

Chapter 9.	Book II.	Object drawing.
Chapter 3.	Water colors.	
Chapter 11.	Orthographic projection.	

THE UNGRADED COURSE.

The length of the drawing lesson should be fifteen minutes per day.

Divide the school into two divisions as follows:

DIVISION 1. First, second and third year pupils.
DIVISION 2. Fourth, fifth, sixth, seventh and eighth year pupils.

Both divisions may draw during the same period, but the teaching should alternate from one to the other.

Some subjects may be taught to both divisions in common. For example, in *Object Drawing*, the first division may draw a single leaf, the second division a spray of leaves.

The following subjects may be taught in both divisions at the same time:

Object drawing.
Memory and imaginative drawing.
Two-handed drawing.
Action drawing.
Birds and Animals.
Brush drawing.
Water colors. Book I.

The following subjects should be taught separately, alternating from one division to the other in teaching:

DIVISION 1. Book I.

Chapter 5. Place and relation of objects.
Chapter 6. The relative size of objects.
Chapter 7. Proportion.
Chapter 8. Unity.

Division 2. Book II.

Chapter 1. The perspective principle.
Chapter 2. The box as a type form.
Chapter 3. The cube as a type form.
Chapter 4. Application of the box form.
Chapter 5. Oblique drawing.
Chapter 6. Exact drawing.
Chapter 7. The cylinder as a type form.
Chapter 8. Application of the cylinder.

Encourage individual work among the larger pupils. This can be done if each has a text-book of his own, so that individual work can be done the same as in arithmetic.

TEACHERS' COURSE.

Book II. forms a teachers' course by beginning with Chapter 1 and following the order given.

HIGH SCHOOL COURSE.

Chapter 1. Book III. Brush drawing.
Chapter 2. Book III. Wash drawing.
Chapter 3. Book III. Water colors.
Chapter 4. Book III. Pen drawing.
Chapter 5. Book III. The human head and figure.
Chapters 6, 7 and 8. Book III. Designing.
Chapters 9, 10 and 11. Book III. Constructive drawing.

AUGSBURG'S DRAWING.

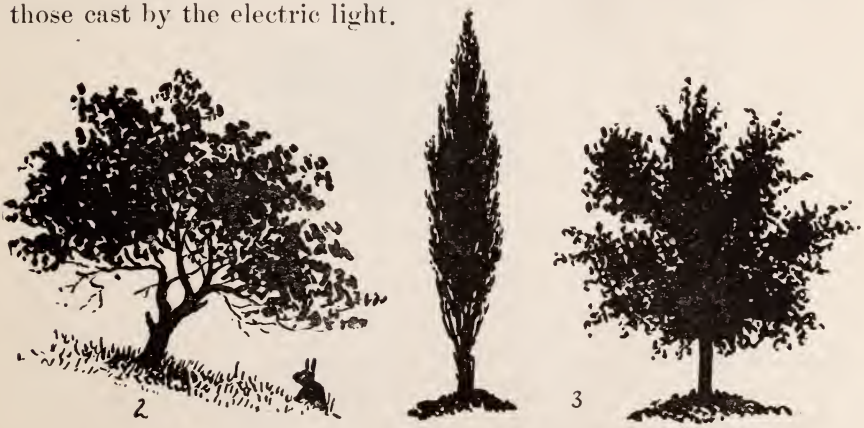
CHAPTER I.

Brush Drawing.

Brush Drawing is a term applied to drawing with the brush in one value — black as in Figs. 2 and 3; or two values — black and white as in Fig. 1; or in three values — white, black and gray, as in Fig. 34. Often more than one gray is used. Sometimes color is used in the place of the black and gray.

Brush drawing is a phase of drawing finding its suggestion in nature.

(1) In the dark shadows on a light surface, such as those cast by bright sunlight, moonlight, strong lamp-light, especially those cast by the electric light.



(2) In the appearance of an object between the observer and a strong light, such as a tree silhouetted against a light sky, or a mountain at sunset outlined against the western sky.

(3) In the appearance of objects as seen through haze, smoke, fog, or storm, when the details are eliminated and only the mass is seen.

(4) In the appearance of objects on dark days and at nightfall, when outlined against the sky or a body of water.

The Value of Brush Drawing is to lead the pupil to see the large parts more than the small, to represent the mass rather than the details, to tell the larger truths rather than the lesser, to neutralize that tendency in nearly all pupils to see and represent the little details before the larger and more important masses.

Brush drawing is an excellent preparation for water-color painting. The handling of the brush in the positive direct strokes of this work is good drill for the more delicate handling of water colors.

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Materials for Brush Drawing.—Common ink, a small camels-hair brush, and a pad of water color or drawing paper are all the materials necessary.

Drawing ink is much better than common ink as it is jet black. The browns and grays of water colors also make excellent mediums.

Nos. 3, 4, 5 or 6 round camels-hair brushes are good for this purpose. No. 3 is small, and Nos. 4, 5 and 6 each a trifle larger than the number below it. Many prefer Japanese brushes. One brush is enough.

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Objects Suitable for Brush Drawing must be strong and characteristic in outline; for example, a pear is an excellent object, on account of its characteristic outline, but an orange is not very good, because its leading feature is its color. In general, objects that are recognized by their shape are suitable for this work. Hold any object between your eye and the light, and you can easily tell whether it is suitable for brush drawing. The fol-

lowing list gives some of the most common objects that are suitable for this work:

Nearly all kinds of buds, as they appear in the spring, are good models. Let each pupil pin a twig containing two or three buds to a white card or paper, and then make a brush drawing of it. The lilac, pussy-willow, the various catkins, and later the buds of the willow, poplar, box elder, beech, birch, maple, etc., will be found interesting.

Nearly all the wild flowers have good outline. They may be placed in a small bottle by each pupil, and then drawn, bottle and all. (Fig. 37.)

Leaves of all sorts furnish a great variety of interesting forms, especially those that are complicated in outline, such as the maples, oaks, and many ferns. The clover, locust, ivy, and similar leaves are good. Pine needles are interesting. Leaves form one of the most fruitful sources for this work.

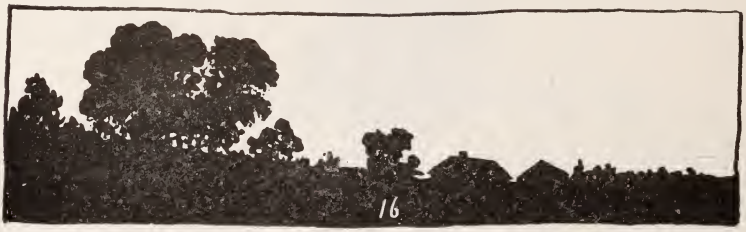
Grasses, seeds and seed-pods, both green and dried, are among the best sources for brush drawing. There is no richer field and more interesting objects than can be found among the dried grasses, weeds and pods found in profusion along the road-side and in fence corners. Nuts are interesting, if represented in clusters with a small branch and several leaves. The peanut and acorn are excellent represented alone.

Vegetables and fruits are always at hand, and many of them form good models. Gourds, squashes, onions, turnips, carrots and radishes are the best; and among the fruits are cherries, pears, grapes, lemons, bananas, currants and gooseberries. Avoid making large drawings of any of these.

Trees are exceedingly interesting and form the best of models. Most trees are good for this purpose, providing they stand alone with the sky for a background, so that they stand out prominently.

The maple, poplar, oak, pine, elm, palm, as well as many shrubs and plants, are all that could be desired.

Bits of landscape are often very effective for brush work, such as a dead tree, a rock, a bunch of grass or rushes, a mountain, bluff, or hill; an island or point of land; a gate, bars, tower, bridge, or ruins.



Articles of china and earthern ware have fine outlines and beautiful proportions. Vases, pitchers, jugs, jars and lamps, are among the best for this purpose.

Articles of wear are also serviceable, such as hats, caps, shoes, slippers, canes and umbrellas.

Objects floating on the water are excellent, such as boats, buoys, etc. Anything that is reflected in the water is interesting, such as a rock, bush, boat-house or pier.

Small articles such as may be found in the pockets of boys will be found very serviceable. Keys, knives, fish-hooks, sinkers, button-hooks, nails, and tacks are very good.

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Stuffed animals, birds and fishes are interesting. There is no better way to gain the general form and proportion of an animal, bird or reptile, than through brush drawing. The aquarium is a good source for interesting study. Often a rooster, hen, rabbit, dog or kitten may be brought into the school-room and the pupils work directly from the live model.

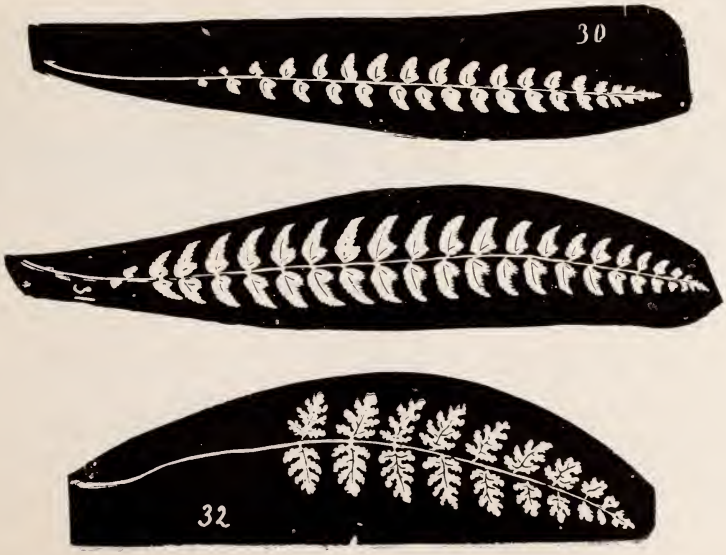
Beetles, bugs, butterflies, and insects mounted on white cards are fine models, as well as very interesting.

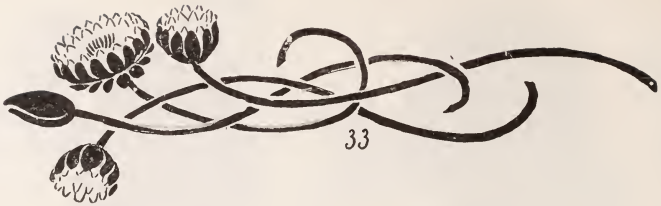
Heads in profile are and always have been favorite subjects for this kind of drawing. These are interesting, whether from a picture or photograph or from the individual.

Ask a pupil to pose before the class, and let the other pupils make a brush drawing of his head or his whole figure. There should be a light background behind the model.

GEORGE AND MARTHA WASHINGTON, FROM "SHADOW PICTURES" MADE BY NELLY CUSTIS AT MOUNT VERNON IN 1798.

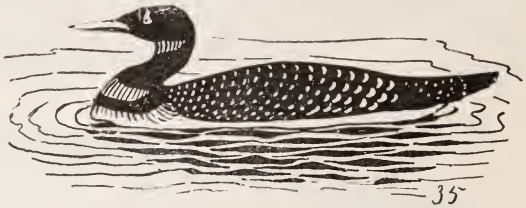
The above process of brush drawing may be reversed, as in the drawing of the ferns, the black being painted around the object, as if it were cut from white paper and pasted on a black surface. This will be found more difficult than painting the object direct.





The greatest interest and variety in brush drawing are found when using two or more values, such as combining the black and white together, as in Fig. 33. Figs. 1, 11 and 27 are also examples of such combination. The high lights on Figs. 13, 37 and 38 would also come within the range of two values.

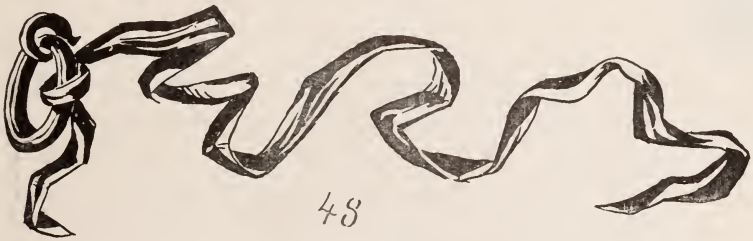
The heads, Figs. 39, 40 and 41, also show the use of two values. In this kind of work guard against large, unbroken areas of black.



Figs. 34 and 35 are examples of using three values — white, black and gray. The gray shade is made with a pen, thus combining the use of the brush and pen. This combination greatly extends the range of brush drawing and places it on a higher plane in artistic expression.

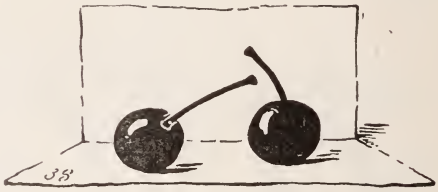
Fig. 46 shows the manner of bending leaves. Observe that a white space is left where one leaf passes behind another.

Fig. 47 shows the use of the shadow in throwing out the spray of leaves, and Fig. 48 illustrates the bending of a ribbon.



Teaching Brush Drawing.—Teach by example. Simply show the pupils how by letting them see you or some one else draw with the brush, and then let them do likewise.

The greatest difficulties are to procure suitable objects and the placing them before the pupil in the best manner for reproduction. The first difficulty is made plain under the head of "Collecting Objects" in Chapter IX., Book II. The following are some of the most simple means of placing the objects before the pupils so that they may be reproduced to the best advantage.



If the object is a bud, flower, grasses, or similar things, they may be put into a small bottle and placed on the farther left-hand corner of the desk. Each pupil should have a small bottle of his own, and be taught how to arrange and place his own model.

If the object is of the nature of small fruit, nuts, and objects that may lay on the desk, then a good way to place them is on a piece of paper folded L-shape, as shown in the illustration. (Fig. 38.)

Such objects as beetles, butterflies, bugs, etc., may be pinned or glued to a card or paper, and placed at the back of the desk.

Large objects, such as a plant, chair, or limb of a tree, may be arranged on a board across the aisle, or against a light surface where the object can be easily seen by the pupils.

Take the class out Friday afternoon and let them make a brush drawing of a tree, rock, bush, house, distant mountain or forest, as it is silhouetted against the sky. This should not be done, however, until considerable practice has been had from small objects.

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Pictures may be translated into brush drawings as an occasional exercise, but the main work should be from the object.

The pen may be used with the brush, if preferred, to put in the finer details, but the brush will be found capable of doing as fine work as the sharpest pen.

DRILL EXERCISES IN BRUSH DRAWING.

1. Place a lilac bud in a small bottle as in Fig. 37 and draw it. In like manner draw the various buds as they come out in the spring.

2. Choose some of the more simple wild flowers and draw them.

3. Draw a spray of lilac leaves, a maple leaf, an oak leaf, a clover leaf; a spray from the pepper tree or the pine.

4. Draw some of the common grasses, and weeds, both green and dried. A head of wheat, oats, rye, barley or buckwheat.

5. Draw a cluster of butternuts, walnuts, hickory nuts, acorns, horse chestnuts, hazel nuts or beech nuts.

6. Draw a maple seed, milk-weed pod, pea-pod, box-elder seed or poppy capsule.

7. Draw a carrot, a radish, a turnip or a beet.

8. Draw a cluster of cherries, plums, pears or grapes; a lemon or banana.

9. Draw a pine, maple, oak, elm or palm-tree.

10. Draw a plant of simple outline.

11. Draw a rock, end or corner of fence, bars, gate, bunch of grass, tower, bridge or some rushes.

12. Draw a jug, vase, pitcher or cup.

13. Draw a cap, hat, shoe or umbrella.

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14. Draw a boat, buoy or post in the water.
15. Draw a key, knife, fish-hook, sinker, button-hook or ring.
16. Draw a mounted bird, animal or fish.
17. Draw a rooster, hen, chick or turkey.
18. Draw a dog, rabbit, cat or kitten.

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19. Draw a horse, cow, sheep or pig.
20. Draw a beetle, bug or butterfly.
21. Draw a head in profile.
22. Draw a boy walking.
23. Draw a boy from the pose.

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CHAPTER II.

Wash Drawing and Light and Shade.

A Wash is a term applied to water tinted with ink or color, and then spread more or less evenly over the surface to be painted.

A *wash drawing* is a drawing composed of superimposed washes. Fig. 1 is a wash drawing of a half of a cocoanut shell.

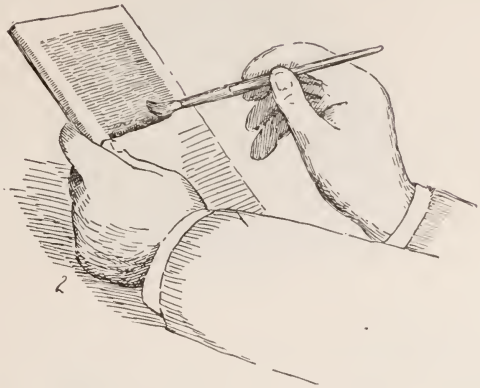
Materials for Wash Drawing are a No. 6 camels-hair brush, a bottle of drawing ink, a pad of water-color paper, a cup to hold water, a small dish in which to mix the wash, and a piece of well-worn cotton or linen cloth to use as a blotter and to clean the brush and dishes with when through using them.

Black, warm gray or cold gray of the water color box may be used in place of drawing ink if more convenient.

Preparing the Wash.—The manner of preparing the wash is as follows:

(1) Dip the brush in water and press it in the dish in which the wash is to be mixed. Continue this until there is water enough in the dish for the wash.

(2) Mix a small portion of ink with this water, and the wash is ready for use.



Applying the Wash.—Hold the drawing pad in the left hand, and incline it at an angle of about 45°, as in Fig. 2. Dip the brush in the wash, and *apply it with a full or saturated brush, working from the top downward.* Keep the brush full of the wash. The superfluous wash that is left at the bottom of the design or picture may be removed by first placing the wet brush on the cloth—this is done to draw the remaining wash from the brush—then by touching the parts with the dried brush, all superfluous color will readily be taken up. The first wash dries in a few moments, when another wash may be placed over the whole or a part of the design at pleasure.

These superimposed washes constitute the wash drawing.

NOTE.—Keep the brush full of wash or color.
Allow each wash to dry before laying the next over it.

The best way to learn how to use washes is by practice, by working with them. This can be done best by systematic drill work, similar to the following:

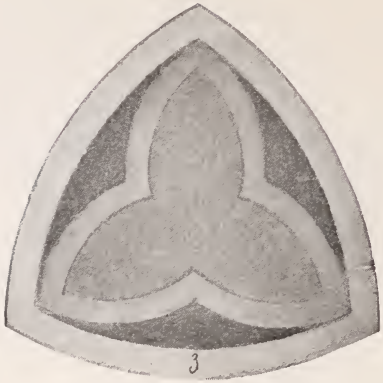
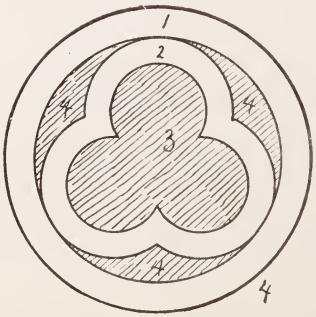


Fig. 3 is painted as follows:

(1) Place one wash over the whole design. (2) After it is dry place a second wash over all inside of the outer ring. (3) Place a third wash over the triangular spaces and inside of the second ring. (4) Place a fourth wash over the triangular spaces.

It will be seen from the above that —

A wash is simply a step or shade value based on the judgment. It is not definite, like a step on the staff in music, but varies from dark to light and light to dark. It is a variable quantity.



In general it is best to work from the whole to the part — from the large to the small — to put on the larger and lighter washes first, following with the smaller and stronger washes.

DRILL EXERCISES.

Cut from cardboard a trefoil, Fig. 4, and a quarterfoil, Fig. 5. Cut the pattern $3\frac{1}{2}$ inches in diameter. Lay these patterns on the water-color pad, and mark around them.

1. On Fig. 4 place one wash over the whole, two washes over part 2, three washes over part 3, and four washes over parts 4.

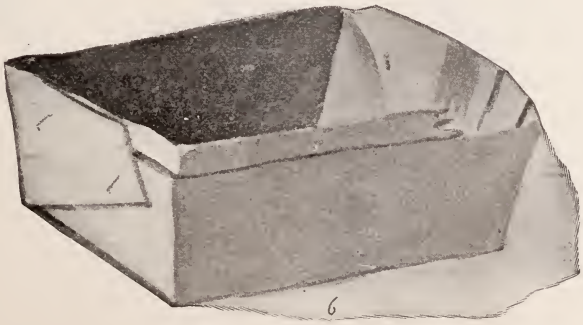
2. On Fig. 4 place one wash over the whole, two washes over part 3, three washes over parts 4, and four washes over part 1.

3. On Fig. 4 place one wash over the whole, two washes over parts 4, three washes over part 1, and 4 washes over part 2.

4. On Fig. 4 place one wash over the whole, two washes over part 1, three washes over part 2, and four washes over part 3.

5. On Fig. 5 make parts 1 and 2 black, and leave parts 3 and 4 white.

6. On Fig. 5 make parts 4 black, part 3 gray, and leave parts 1 and 2 white.

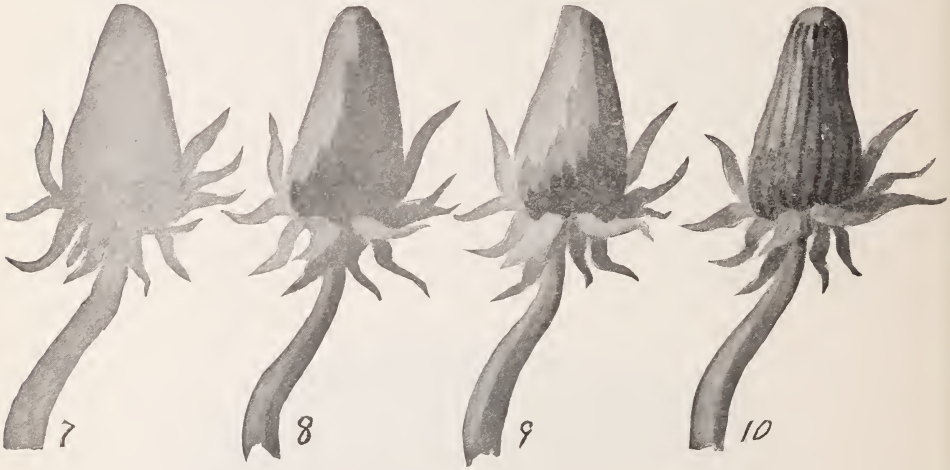


7. On Fig. 5 make part 1 black, and parts 2, 3 and 4 each a shade lighter.

8. On Fig. 5 make part 3 black, parts 4 a shade lighter, part 2 lighter and part 1 still lighter.

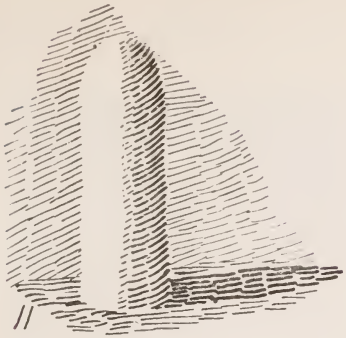
Wash Drawings and Pictures generally are made in very much the same manner as the designs Figs. 3, 4 and 5, as represented in the drill exercises given above, except that the washes are more irregular.

Look at the berry box, Fig. 6, carefully, and observe that it is represented mainly with four washes, put on in much the same manner as in Fig. 3. The details are added, after the washes have been put in place, in their proper relation.



Figs. 7–10 show how to put the washes on in detail. Fig. 7 represents the first wash, Fig. 8 the second, Fig. 9 the third, and Fig. 10 the details.

The details should generally be put in last.



11

LIGHT AND SHADE.

No Outline in Nature.— Strictly speaking, there is no outline in nature. What is commonly called outline is the beginning of one shade and the ending of another, as shown in Fig. 11.

The Office of Light and Shade in drawing is subordinate only to the idea. Yet, notwithstanding its importance, it must still be looked on as an aid to expression, a means to an end, a tool to work with. The idea is first, and the light and shade exists for the idea as completely as the lead pencil exists for the use that is made of it.

12

The Primary Use of Light and Shade is to bring out the idea and make it plain and pleasing. Some of the subordinate uses are to give *relief*, *distinctness*, *solidity and emphasis* to objects.

Relief is making an object stand out detached from the background, as shown by the post, Fig. 12.

Distinctness is the quality of being plainly seen. Fig. 12 is seen plainer than if it was in outline.

Solidity is having the appearance of substance. The shading on the rock, Fig. 13, makes it look solid like a rock.

Emphasis is making the object or idea conspicuous.

Shade and Shadow.— For convenience an arbitrary distinction is made between shade and shadow. The shade is the dark side of the object, the part opposite the light — it is on the object and a part of it. The shadow is not a part of the object, but is detached from it, and is caused by the object being in the path of the light, shutting it off and casting the shadow. See Fig. 12.

Shades and shadows have no substance, they are simply the partial absence of light. In drawing, they exist solely for the idea they help to express. It is possible and perfectly practicable to represent objects without shading or to shade objects in full, like the photograph, or partially, as in most magazine pictures. Shade, shadow and reflections have no real

existence in drawing, outside of the use made of them to express ideas.

Three Methods of Shading. — There are three general methods of shading, *the natural*, *the conventional and the ideal.*

The natural method is shading the object as nearly as possible as it appears to the eye. It is copying the shade as it appears on the object. This method is used in learning how to shade, and in making exact drawings from the object. Both the conventional and the ideal methods are based on the natural. The photograph,

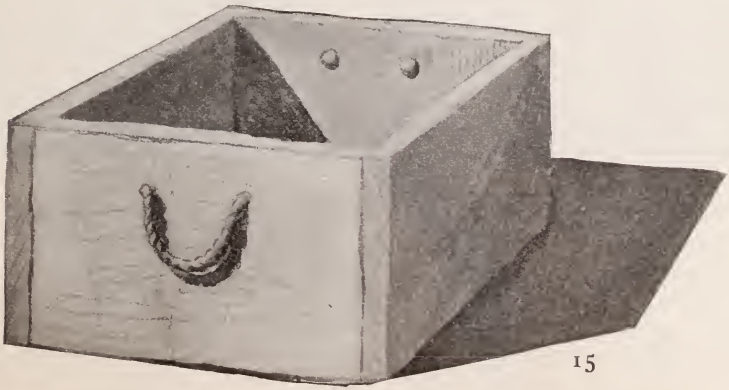


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Fig. 14, is an example of this shading, and in drawing, cast drawing comes the nearest to it.

The conventional method is shading as if the light came over the left shoulder at an angle of about 45°, as in Fig. 15. With the light in this direction the *right* faces and the *under* faces are always in shade, and the *left* faces and the *upper* faces always in light. The shadow is cast to the right and away. The conventional is used when drawing and shading conceptively. It is *one position* of the natural.

The ideal method is also conceptive, but uses shade with more freedom. The light and shade is entirely subordinated to the idea, and is used as the potter uses his clay — to bring out, make plain and beautify the idea that is being represented.

The ideal is the fruit of the study of shading from the object.

Examples of this method may be found in the illustrated papers and magazines, as it is used by the majority of skilled draughtsmen.

While these three methods are distinct, still there is no sharp line of distinction between them; they merge into one another at every point.

Variety of Light.—Light varies from the brightest sunlight through many gradations to *half light* and *diffused light;* from the brightness of noon to the darkness of night. Sunlight, moonlight, starlight and artificial light make conditions that are infinite in their variety and endless in their combinations.

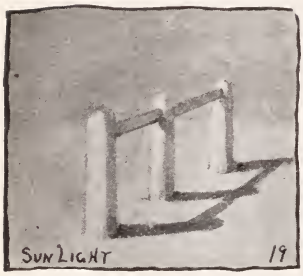
All of these conditions would be confusing if they were an end in themselves, but studied as subordinate to and attendant on the idea, they are much simplified. They are so many helps to aid in expressing thought.

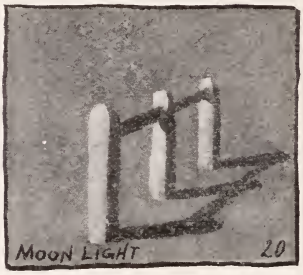
Two Classes of Light.—All of the different kinds of light may be divided into two classes, *direct light* and *indirect light.*

Direct light includes the direct light of the sun, moon, lamp and fire. Fig. 18 is an example.

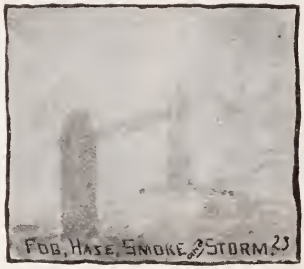
Indirect light includes half light, diffused light, reflex light,

the light through fog, haze, smoke, storm and partial darkness. Fig. 17 represents partial darkness.





Direct Light is characterized by *strong contrast between the light and shade.* The shade and shadows are definite, distinct and strongly marked. Sunlight, moonlight and firelight differ mainly in volume or degree of light. Sunlight floods the whole picture with bright light, the moon with a less quantity, and firelight with less quantity still. Sunlight and moonlight are broad in effect, flooding the whole picture alike; firelight is more local and is confined to comparatively small area.

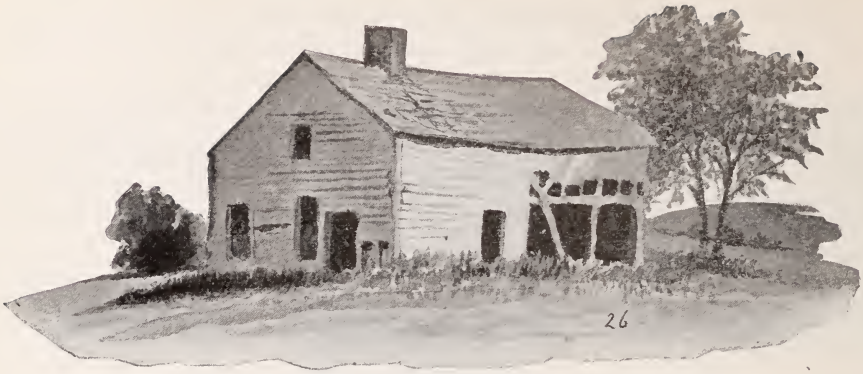


Indirect Light is characterized by *slight contrasts between the lights and darks.* In *half light*, which is diluted sunlight, such as would come through a window, the lights, shades and

shadows are quite marked, but not so strong as in direct light. Diffused light is such as we have on cloudy days, or similar conditions; there is little or no shadow and the lights and shades are not separated by any perceptible line of demarcation. Fog, haze, smoke and storm eliminate distance, shade, shadow and details, and tend to make all objects of an even shade of gray. Darkness differs from the above in being darker and showing distance. See Figs. 22, 23 and 24.

A Reflex light is light reflected into a shade or shadow by some surrounding surface. In Fig. 25 the reflex light is the light part of the shade on the left edge of the jug and next to the shadow. Hold your hand between your eyes and the light, with the fingers spread slightly, and you will see reflex lights between the fingers. *It is the reflex light that gives variety and complexity to shades and shadows.*

Light in Drawing is derived from the whiteness of the paper on which the drawing is made; that is, the whiteness of the paper showing through the pencil lines or washes makes the



various shades and shadows. Between the whiteness of the paper and the blackest marks of the pencil, or the heaviest washes, are the extremes beyond which it is impossible to go, between these two extremes all the different shades and shadows must be included. It is not always necessary to make the light and shade of the drawing of the same lightness and depth that it is on the real object; in fact this is usually impossible. It should be the aim to keep the *relative proportions* of light and shade correct.

Sunlight is much brighter than the whitest paper, and the deepest shades are deeper than can be represented by either pencil or wash, yet both of these extremes may be represented truthfully on common white paper, by keeping the relative proportions of light and shade correct.

In addition to the light from white paper, Chinese white is used as a source of light. It is used in the same manner as other water colors.

The Mass Shade.— The shade and shadow of the mass, taken as a whole, is of more importance than the shade of the details. Fig. 27 shows the mass shade, and Fig. 28 both the mass and the detailed shades. The mass shade is the one that is usually over-

looked by the beginner, as like all large parts, it is more difficult to grasp.

The easiest way to see the mass shade is to throw the head back, partly close the eyes, and look through the eye lashes. By this means the smaller details are not seen and the masses of light and shade stand out prominently.

Fig. 40 shows the mass shade of an open box, and Fig. 41 the detailed shade.

Shade Values.— The most difficult part of drawing is rendering correctly shade values, or the relative strength of the shades and shadows on an object as they appear to the eye. Only the most careful training and patient industry is able to overcome this difficulty. So great is it that many think it beyond the scope of the school-room. But while this may be true in a literal sense, still in a higher sense, we must remember these shade values are attendant on the idea and entirely subordinate to it; that as the idea grows and perfects itself, then all those parts necessary to its perfection and growth will grow with it and become a part of the completed whole.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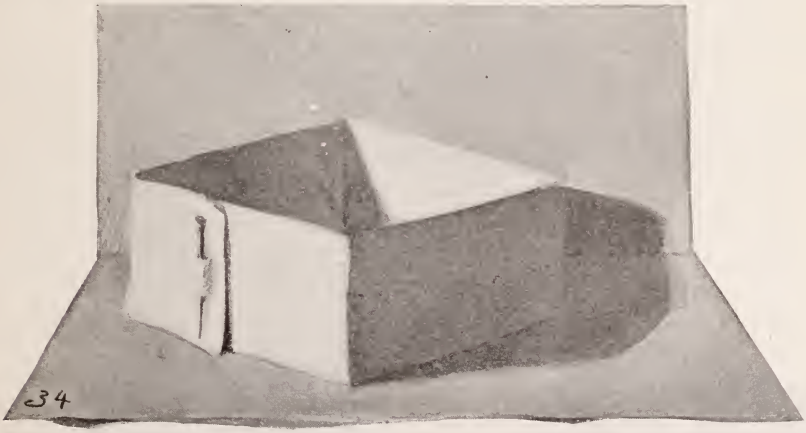
Perhaps the best way to render shade values is to ignore entirely the little shade details, reflex lights, etc., and aim to represent only the broad masses, as in the pitcher, Fig. 29. After this is done, the smaller details can be added with comparative ease. Fig. 29 has been rendered in four values.

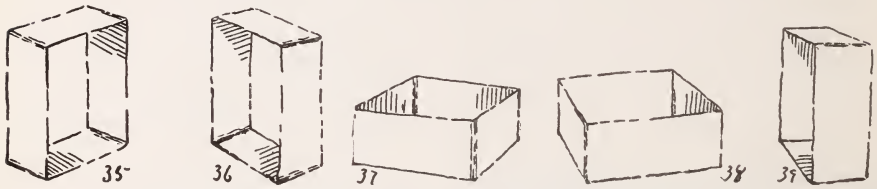
The four landscapes on the opposite page are each rendered in four values or washes, not counting the clump of trees. In Fig. 30 the sky has one wash or value, the mountain two, the hill three and the foreground four. In Fig. 31 this is reversed: the foreground has one wash, the hill two, the mountain three and the sky four. In Fig. 32 the washes are varied: the foreground has one wash, the sky two, the hill three and the mountain four. In Fig. 33 the washes are likewise varied: the sky has one, the mountain two, the foreground three and the hill four. These large values or washes are the most important and should have the closest attention.



Teaching Wash Drawing.—Use for a background and ground on which to place the model a piece of drawing paper folded in the shape of an L, and placed on the right and at the back of the desk. Use for a model a strip of drawing paper about

one inch wide and seven long, folded in the form of a square. Place the model as in Fig. 34.

Of course any other object may be used in place of the paper square, providing it is plain and simple. The above is given because each pupil can make a similar model. Practice drawing this form in various positions and in different lights, until the washes can be laid with some degree of precision and accuracy; then use various objects, such as are named in the next chapter, and in Chapter IX., Book II., under the head of object drawing.



DRILL EXERCISES.

9. Place the model in the position of Fig. 34 and make a wash drawing of it.

10. Place the model in the position of Fig. 35 and draw it.

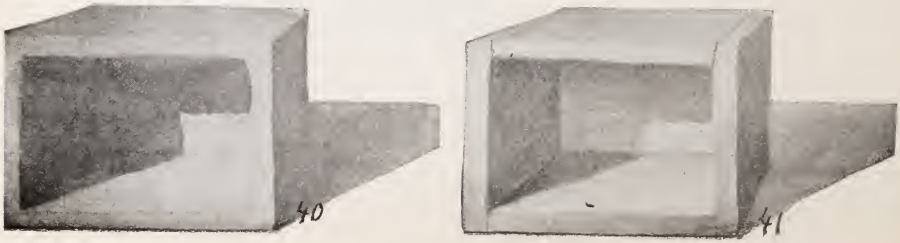
11. Place the model in the position of Fig. 36 and draw it.

12. Place the model in the position of Fig. 37 and draw it.

13. Place the model in the position of Fig. 38 and draw it.

14. Place the model in the position of Fig. 39 and draw it.

15. Make a wash drawing of a berry box.



CHAPTER III.

Water Colors.

Standard Colors are pure colors which by common consent are accepted as types. They are red, orange, yellow, green, blue and violet, and are based on the solar spectrum. These colors, or their equivalents, should be in the water color box together with warm gray or brown and cold gray or black.

Local Color is the natural color of the object seen in ordinary light. The local color is usually seen between the shade and the lightest part of an object.

A Tint is a color made lighter. In water colors a tint is formed by mixing water with the color.

A Shade is a color made darker. Shades in water colors are formed by the admixture of gray, brown or black.

A Color Scale is an orderly arrangement of a color through its tints, color and shades.

A Scale of Colors is an orderly arrangement of related colors. The solar spectrum would be a scale of colors.

Tone is a step in a color scale. It is a more general term than tint or shade.

A Positive Color is a decided or striking color. The primary are the most positive colors.

A Passive Color is a quiet color, like gray.

Luminous Colors are bright colors. Yellow is the most luminous color.

Warm and Cold Colors.— Colors tending toward orange are warm; those tending toward blue, cold.

Neutral or Normal Gray is white in shadow. A tint of black is a neutral gray.

Warm and Cold Grays.— Grays tinted with a warm color are called warm; those tinted with a cold color, cold.

Broken Colors are colors dulled by grays. For example, gray mixed with blue would dull the blue, would make it less luminous, would break its purity.

Other Terms Used in Colors *are advancing* and *receding* colors. *Transparent* and *opaque* colors. *Spectrum circuit*, *color values*, *color affinity*, *complementary colors*, *color harmony*, *space values* and *color contrasts*.

Materials.— The materials necessary for use in water colors are:

A Box of Water Colors containing the following colors; red, orange, yellow, green, blue, violet, warm gray or brown, cold gray or black.

Brushes.— A No. 6 camel's-hair brush.

Paper.— A pad of water color or white drawing paper, about 6x9 inches.

Blotter.— A piece of old cotton or linen cloth to be used as a blotter and to clean the box when through using it.

Water Cup.— A cup to hold water. A couple of butter dishes will be found serviceable, in which to mix extra washes.

The Colors.— Red is a warm color. Red mixed with other colors tends to make them warmer. Red mixed with yellow makes an orange; mixed with blue makes a violet.

The result of the admixture of colors is to lessen their purity and to make them more or less "muddy."

Orange is the warmest color. Many color-boxes do not contain orange, but depend on the admixture of red and yellow for this color.

Yellow represents light, and is an advancing color. Yellow mixed with other colors tends to make them lighter and brighter. Yellow mixed with blue makes green.

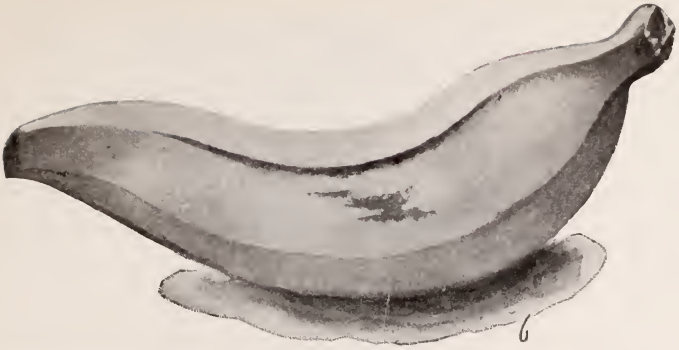
Green is a cold color, if blue predominates, but light and bright as yellow predominates. Broken greens are obtained by admixture with other colors, especially the gray.

Blue is a receding color, and represents coldness and distance. Blue mixed with other colors tends to make them colder; mixed with yellow it makes green; mixed with red it makes violet.

Violet.— Many boxes of water colors do not contain violet, but depend for it on the admixture of red and blue.

Tints and Shades.— Tints of all colors are formed by the admixture of water. Shades of red, blue and violet are approximated by the admixture of cold gray. Shades of orange, yellow, and green are approximated by the admixture of warm gray.

Washes.— A wash is water tinted with a color, and then by means of a brush spread more or less evenly over the surface to be painted. A water color drawing or painting is a number of superimposed washes representing a definite idea.



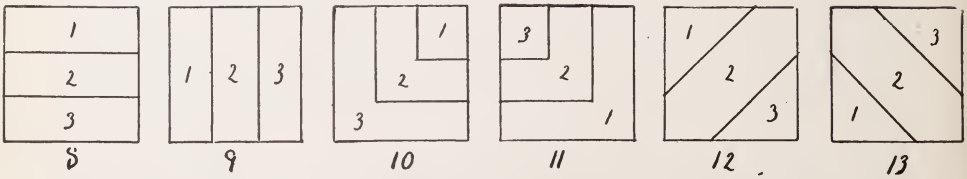
Preparing the Wash.— Prepare the wash as follows: (1) Dip the brush into water and press it into one of the compartments of the cover of the water-color box. Do this until there is water enough in the compartment for the wash. (2) Rub off a little color with the brush and mix it with the water in the compartment. It is ready now to apply to the paper.

Applying the Wash.— Grasp the water-color pad with the left hand and incline it at an angle of about 45 degrees, as in Fig. 2 in wash drawing. Dip the brush in the wash and *apply the color, with a full brush, working from the top downward.* Keep the brush full of the color wash. The superfluous color that is left at the bottom of the design may be removed by drying the brush on the cloth, and then taking up this extra color by touching it with the dried brush. A wash dries in a few moments, and then another wash may be placed over the whole or a part of the design at pleasure. These superimposed washes constitute the water-color picture.

Learning Color.— The best way to learn colors is to use them — work with colors. Simply learning their names is not enough, we must know them as we know the face of a friend. The following method is an orderly and progressive course for

learning and using color. The course is divided into five parts, each part representing one of the common mechanical difficulties of water colors. The parts are as follows:

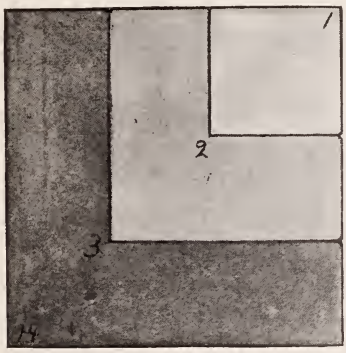
Part 1.— The plain wash.
Part 2.— The single wash.
Part 3.— The graded wash.
Part 4.— The mixed wash.
Part 5.— The wet wash.

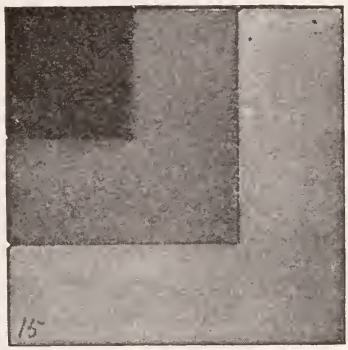


Part 1. The Plain Wash.— Cut from cardboard a $3\frac{1}{2}$ inch square. On eight separate pieces of water-color paper mark a square design and divide it into three parts, similar to Figs. 8–13.

If small notches are cut in the cardboard at the points of division, these points will be marked automatically with the pencil when the design is made, thus saving time in dividing the square into the three parts. (See designs 14 and 15.)

Color the above designs as follows: Place one wash over the whole design, a second wash over parts 2 and 3, and a third wash over the part marked 3. Make each wash a step stronger than the preceding one by the addition of more color. Two or three designs may be washed together, alternating from one to the other, thus saving the time you would wait for the washes to dry.





DRILL EXERCISES.

The aim in exercises 1 to 8 is *Delicacy of Wash;* that is, the washes are to be very light and delicate, about like Fig. 14.

The aim in exercises 9 to 16 is *Strength of Wash;* that is, the washes are to be very strong and heavy, as in Fig. 15.

Light Washes.

1. Color design 8 with three washes of red; placing one wash over the whole design, two washes over parts 2 and 3, and three washes over part 3.

NOTE.— When the design is finished it should present three light, even tints or steps of uniform variation.

2. Color design 9 with three light washes of orange.
3. Color design 10 with three light washes of yellow.
4. Color design 11 with three light washes of green.
5. Color design 12 with three light washes of blue.
6. Color design 13 with three light washes of violet.

NOTE.— If strong pencil lines are placed around the design after the washes are in place they will add to the appearance of the work.

7. Color design 8 with three light washes of cold gray or black.

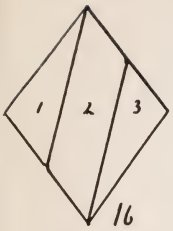
8. Color design 9 with three light washes of warm gray or brown.

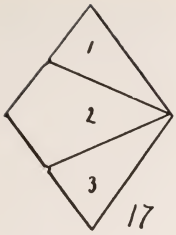
HEAVY WASHES.

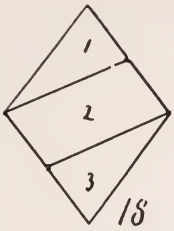
9. Color design 10 with three *heavy* washes of red.

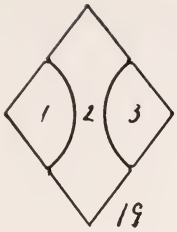
NOTE.— To make the design harmonious it may be necessary to go over it more than three times.

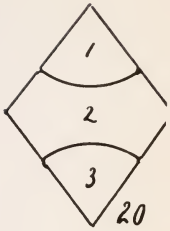
10. Color design 11 with three heavy washes of orange.
11. Color design 12 with three heavy washes of yellow.
12. Color design 13 with three heavy washes of green.
13. Color design 8 with three heavy washes of blue.
14. Color design 9 with three heavy washes of violet.
15. Color design 10 with three heavy washes of cold gray or black.
16. Color design 11 with three heavy washes of warm gray or brown.









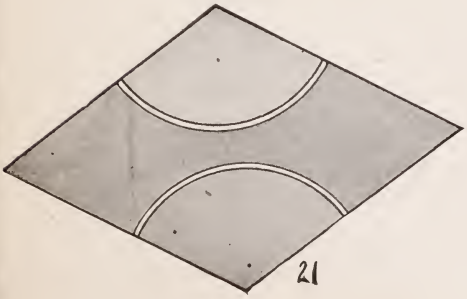


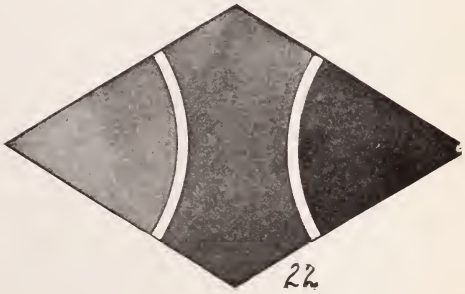
Part 2. The Single Wash.— The single wash accomplishes in one wash what was done by three washes in Part 1. Instead of placing three washes on the design, only one is used, but that one is of as many degrees of strength as there are differences in color or shade.

In exercises 1 to 8, the aim is *delicacy* of wash, as shown in design 21.

In exercises 9 to 16, the aim is *strength* of wash, as shown in design 22.

Cut from cardboard a diamond 4 inches long and 2 inches wide, and notch the edges at the points of division, as in Figs. 16–20. Use these cardboard patterns to mark out the designs, Figs. 16–20.





DRILL EXERCISES.

Light Washes.

1. Color design 16 with three light washes of red, similar to Fig. 21, using only one wash for each tint.
2. Color design 17 with three light washes of orange.
3. Color design 18 with three light washes of yellow.
4. Color design 19 with three light washes of green.

Note.—Try to put the wash in place at the first trial, but if it is necessary to go over a part of the work again to make the design harmonious, do so.

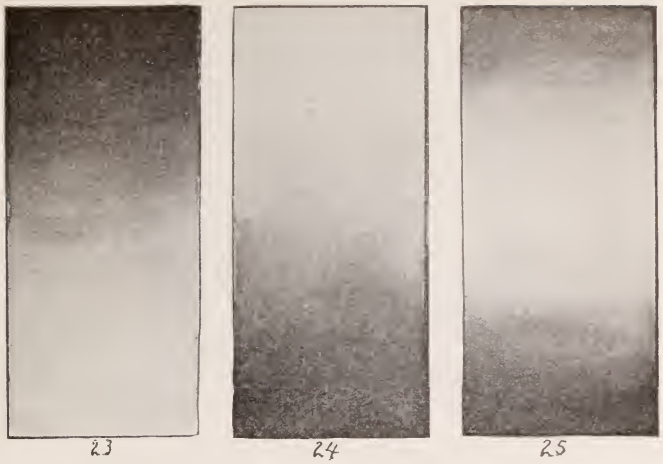
5. Color design 20 with three light washes of blue.
6. Color design 16 with three light washes of violet.
7. Color design 17 with three light washes of warm gray or brown.
8. Color design 18 with three light washes of cold gray or black.

Heavy Washes.

9. Color design 19 with three *heavy* washes of red, similar to Fig. 22.
10. Color design 20 with three heavy washes of orange.

Note.—Try the wash on a piece of blank paper before applying it.

11. Color design 16 with three heavy washes of yellow.
12. Color design 17 with three heavy washes of green.
13. Color design 18 with three heavy washes of blue.
14. Color design 19 with three heavy washes of violet.
15. Color design 20 with three heavy washes of warm gray or brown.
16. Color design 20 with three heavy washes of cold gray or black.



Part 3. The Graded Wash is one that varies from light to heavy, or from heavy to light, as Figs. 23, 24 and 25.

The graded wash may be laid as follows:

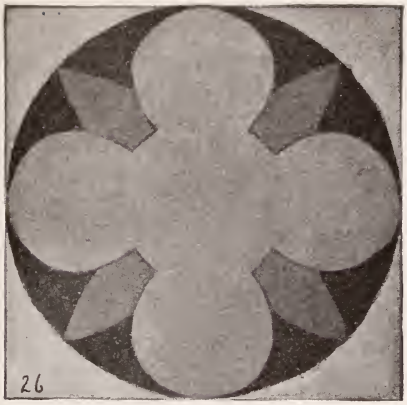
1. Draw a rectangular surface 3 or more inches wide and 6 inches long. (2) Begin at the top with the full strength of the color, and, with the brush, gradually add water to the wash after each stroke, until clear water alone remains in the brush. See Fig. 23. Add the water to a heavy wash very sparingly and mix it well in the brush before applying.

This process may be reversed by beginning with clear water and gradually adding color until the full strength is reached, as in Fig. 24.

Fig. 25 represents the double graded wash. If only one color is used, then the process is the same as in Figs. 23 and 24. If two colors are blended together, then they are put on separately; the second wash after the first is dry.

DRILL EXERCISES.

1. Make a graded wash of orange from light to heavy.
2. Make a graded wash of green from light to heavy.
3. Make a graded wash of blue from heavy to light.
4. Make a graded wash of cold gray from light to heavy.
5. Make a graded wash of warm gray from heavy to light.
6. Make a graded wash of warm gray, similar to Fig. 24.
7. Make a graded wash of cold gray, similar to Fig. 24.
8. Make a double graded wash of blue.
9. Make a single graded wash of violet.
10. Make a double graded wash of red and orange.
11. Make a double graded wash of cold and warm gray.
12. Make a double graded wash of yellow and blue.
13. Make a double graded wash of orange and blue.



Part 4. The Mixed Wash. — Theoretically, by mixing colors together any color can be imitated from the lightest and most delicate tint to the heaviest and darkest shade, but in practice this is modified by the imperfections in the pigments themselves. Some pigments are nearly perfect, washing smoothly, mixing well with other colors, transparent, permanent and retaining their brilliancy under nearly all conditions; while other pigments are poor washers, opaque, losing their brilliancy easily, and fading when exposed to bright light.

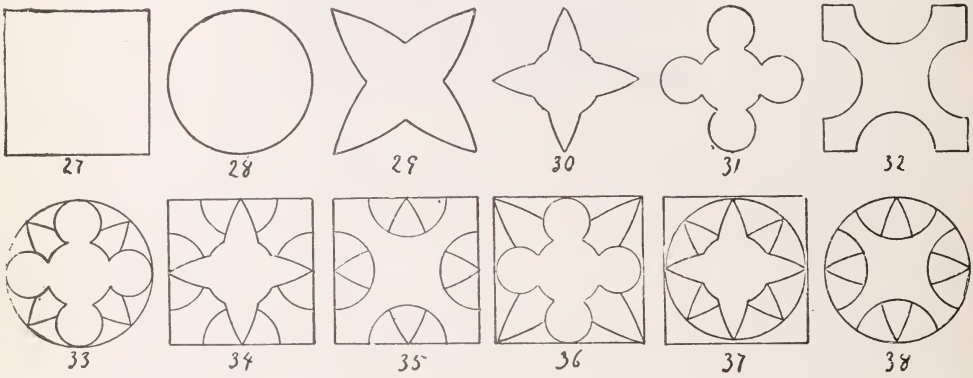
Experience alone can teach the possibilities and limits of each color.

In the following designs the aim is to make each design *pleasing* and *beautiful*. This can be done with every combination given in the exercises below.

No restriction whatever is imposed on the pupil, except to designate the colors to be used.

The *plain*, *single* or *graded* wash, or all together, may be used at pleasure.

Figs. 27 to 32 are figures cut from cardboard. Each one is $3\frac{1}{2}$ inches in width and height. By combining these cardboard figures, any number of pleasing designs may be made as shown by Figs. 33 to 38. These designs are made by laying the cardboard figures on the water-color paper and marking around them. For example, Design 33 is made by combining forms 28, 31 and 30. Design 34 is made by combining forms 27, 30 and 32. Design 35 is made by combining forms 27, 32 and 30. Design 36 is made



by combining forms 27, 31, and 29. Design 37 is made by combining forms 27, 28 and 30; the latter form is used twice. Design 38 is formed by combining 28, 32 and 30.

Care must be used in making the designs *not to cross a line* in marking out the forms with the pencil.

The amount of color to be used and the design should be left entirely to the judgment of the pupil.

Passing one color wash over another has nearly the same effect as mixing them together and then applying them as one wash.

DRILL EXERCISES.

Make a design by combining any three of the above forms, Figs. 24–32, together and painting them with the following colors mixed together. See Fig. 26. Use the equivalent of three washes.

1. Cold gray and red.
2. Cold gray and orange.
3. Cold gray and yellow.
4. Cold gray and green.
5. Cold gray and blue.

NOTE.—A design may be washed over almost any number of times until the exact effect is secured.

6. Cold gray and violet.
7. Cold gray and warm gray.

NOTE.—Use a piece of blank paper to try the wash before applying it to the design.

8. Warm gray and red.
9. Warm gray and orange.
10. Warm gray and yellow.
11. Warm gray and green.

NOTE.—Mixing colors together tends to mar their purity and brilliancy, but not always their beauty.

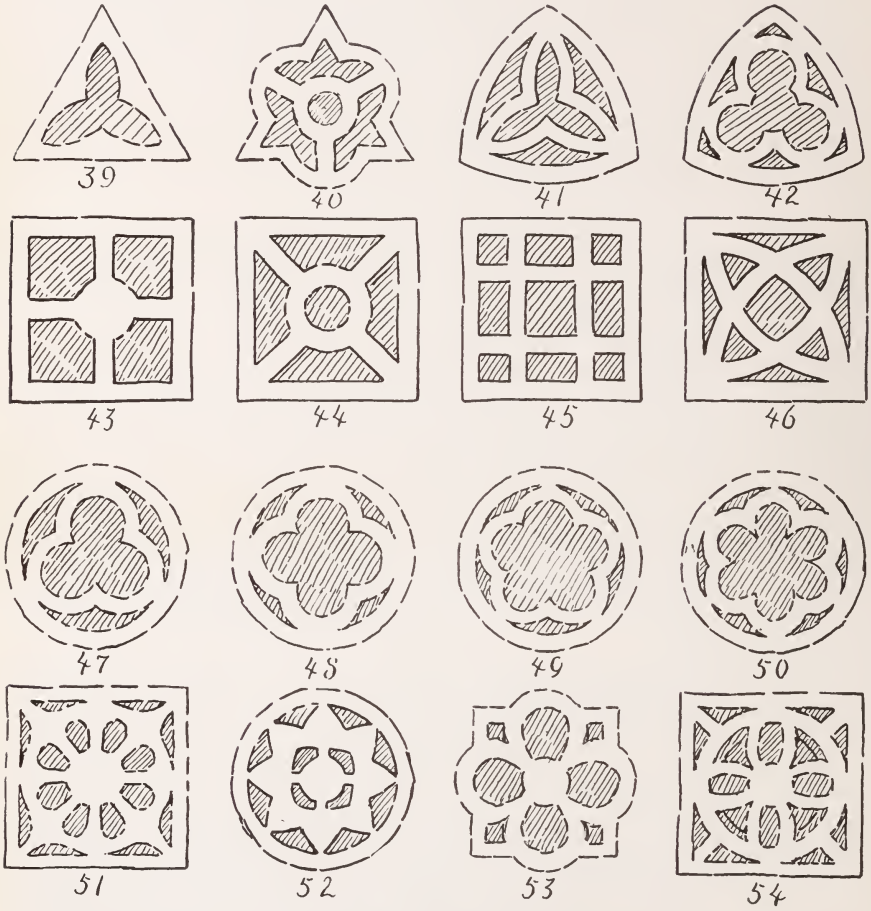
12. Warm gray and blue.
13. Warm gray and violet.

NOTE.—Washes may be mixed together and then applied, or one placed over the other in their pure state.

Stencils are patterns cut from cardboard or similar material, and are used to facilitate the reproduction of designs for coloring.

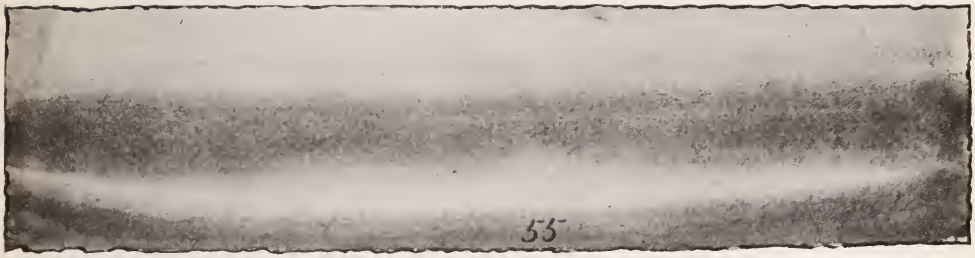
Figs. 39–54 are drawings representing stencil designs suitable for this work. Cut the stencils from pieces of cardboard 4 inches square. Make them as perfect and finely proportioned as possible. The shaded portions represent the parts cut away. Lay these card-

board stencils on the water-color paper and mark them out. Color them similar to Fig. 26.



The designs are arranged to take from two to five values or washes. For example, Fig. 39 is designed for two washes, Fig. 41 for three, and Fig. 54 for five, though a less number may be used.

In the following drill exercises one stencil may be used for all the exercises, or a variety of stencils, according to the desire of the teacher or pupil. *The aim is to learn color.*



Paint a design with the following colors mixed together.

14. Blue and red.
15. Blue and orange.
16. Blue and yellow.
17. Blue and green.
18. Blue and violet.
19. Green and red.
20. Green and orange.
21. Green and yellow.
22. Green and violet.
23. Yellow and red.
24. Yellow and orange.
25. Yellow and violet.
26. Red and orange.
27. Red and violet.
28. Violet and orange.

Part 5. The Wet Wash.— Applying a wash to dry paper is called a *dry wash*: applying a wash to moist or wet paper is called a *wet wash*. All of the washes thus far have been dry washes. Fig. 57 is an example of a dry wash. Observe that the washes are distinct and do not run together; there is no blur, the edges are sharp and well defined.

Fig. 58 represents the wet wash. Observe that the edges are soft and run together. The paper was wet enough for the wash to spread, hence the softened appearance of the edges.

Between Figs. 57 and 58 there are all degrees of the wet and dry washes.

Fig. 7 is a combination of the wet and dry wash. The tree representing the dry wash and the reflection the wet wash. The tree, Fig. 68, represents the wet wash and Fig. 69, the same tree in dry wash. After Fig. 68 is dry the limbs and other details are added with the dry wash.

Use of the Wet Wash.— In general, the wet wash is to lay the foundation of the picture — to lay in the broad masses — and the dry wash is for the details. Both are used in the same picture and at the pleasure of the draughtsman. Figs. 55 and 56 represent the combination of the wet and dry wash in the same picture. Fig. 55 represents the foundation of the picture laid with the wet wash, and to this same picture in Fig. 56 the distant mountain and the foreground have been added.

When laying on the dry wash, the paper is usually inclined at an angle, but when the wet wash is put on, it lies flat in a horizontal position. The process is as follows:

(1) Wet the paper with water until it has become completely saturated — wet through. (2) Lay the paper flat on a horizontal surface. (3) Partially dry the surface with a dry cloth. (4) It is now ready for painting. If the water-color paper is detached from the pad and immersed in water and then laid horizontally on

a wet towel it will keep moist an indefinite length of time and give ample time for work.

High lights, and other light places, such as in cloud and water effects, may be represented by means of *sopping out* the color with the dried brush or a piece of blotting paper, or a bit of sponge sharpened, with scissors, to a point.

The above method is hardly practical for class work, but individuals may use it to advantage.

The following methods, however, may be taught to the whole class.

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The radish, 59, may be painted as follows:

(1) Wet the paper with the brush in the space occupied by the radish. (2) With the brush well loaded with color, paint the radish with two or three strokes of the brush, leaving the color to blend in toward the high light. With the dried brush the color may be drawn towards the proper places and modified to suit. (3)

If necessary, finish with the dry wash. Similar objects may be painted in the same manner.

Fruits, autumn leaves, or any object where the colors are blended together, as in the peach, Fig. 60, may be painted as follows: (1) Paint with the lighter local color and let dry. (2) Wet the drawing with clear water, then *drop* in the darker color from the end of the brush. The color may be further modified with the dried brush.

The two colors may be put on at the same time, if more convenient, by wetting the paper the same as in painting the radish, Fig. 59.

Water Color Elements.— In water color drawings the following elements are to be considered:

Form	High lights
Local color	Reflex lights
Shadows	Color values
General shade	Shade values
Detailed shade	

Local Color is the real color of the object seen in ordinary light. The local color is seen plainest between the shade and the lightest part of the object. Local color is modified by *light*, *shade*, *air* and *distance*.

The General or Mass Shade is the shade of the whole object as seen in shadow, and as distinguished from the shade of a part or the detailed shade. Fig. 61 represents the general shade of the rock, and in Fig. 62 the detailed shade has been added.

The High Light is the complete reflection from a smooth surface, as shown in the light spots in Fig. 67.

A Reflex Light is light reflected into a shade. See Fig. 25 in wash drawing.

Color Value is the relative strength of the colors in a picture. For example, in Fig. 1 it is the relative strength of the color in the markings on the wings of the butterfly. In Fig. 57 it is the relative color strength of the sky, mountain, lake, road, trees and foreground.

Shade values are in light and shade what color values are in color. In water colors shade and color values are nearly synonymous terms, as they merge into each other at almost every point. Their main difference is that one relates to shade, the other to color. In teaching they should be kept separate as much as possible.

In Fig. 66, the squash is painted in three shade values, if we refer to black and white, or in three color values, if we refer to color. The cup, Fig. 63, is painted in five values, the bits of landscape, Figs. 2, 3 and 4, in three values. (See shade values in wash drawing.)

What Elements to Represent.—It is evident that a class of pupils cannot represent all of the above elements at once and in the same picture. Even an experienced artist has trouble to do

this, but, if the elements are separated, this can be done with a fair measure of success. The elements may be represented in groups similar to the following:

The form and local color, as in the tree, Fig. 64; the dandelion, Fig. 65; the butterfly, Fig. 1; the rose, Fig. 5 and the three bits of landscape, Figs. 2, 3 and 4. This is the most simple combination, and will give excellent results in proportion to the truthfulness with which each element is rendered.

The form, local color and shadow, as in Fig. 66. By letting a strong light fall directly on the object this condition can be represented quite accurately.

The form, local color and high light. All polished surfaces reflect light, more or less. Reflection is a characteristic of glass, glazed ware, water, fruits with smooth skins and similar surfaced objects. A dark colored object similar to the teapot, Fig. 67, will give the best results. See the grapes and cherries in Brush Drawing and Fig. 29 in Wash Drawing.

Form, local color and general shade. The general shade is the shade of the whole, the detailed shade is the shade of the part. Any object between the observer and the

light will show a general shade, as the rock in Fig. 61. This may be seen by throwing the head back, partly closing the eyes and looking through the eyelashes. In this general shade is also seen the shade of the details, as in Fig. 62.

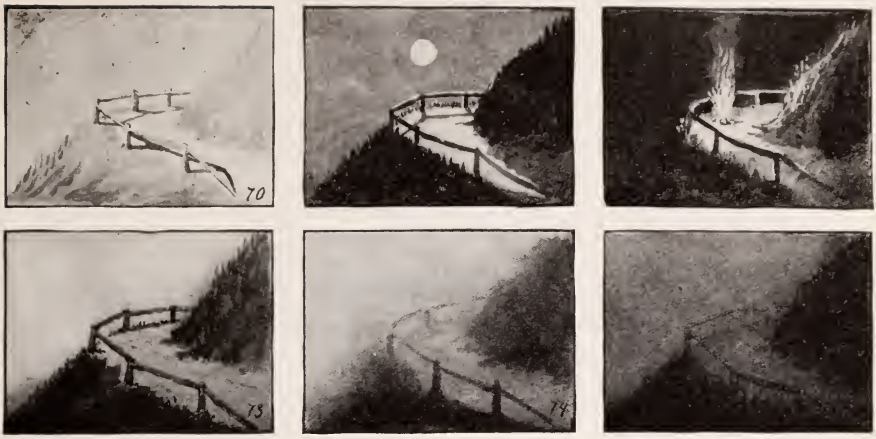
Memory and Imaginative Painting.— Figs. 70, 71 and 72 are examples of the three kinds of direct light — *sunlight*, *moonlight* and *artificial light*.

Figs. 73, 74 and 75 are examples of three phases of indirect light, *diffused light*, *fog* and *darkness*. (See Wash Drawing.)

Using Figs. 70–75 as examples, paint the most simple landscapes, such as Figs. 2, 3, 4, 57 and 64, in sunlight, moonlight, diffused light, fog and darkness.

DRILL EXERCISES.

1. Paint Fig. 57 in bright sunlight.
2. Paint Fig. 57 in moonlight.
3. Paint Fig. 57 in indirect light.
4. Paint Fig. 57 in a fog.
5. Paint Fig. 57 in darkness.
6. Paint Fig. 57 as a sunset.
7. Paint Fig. 2 in a fog.
8. Paint Fig. 2 as a moonlight.
6. Paint Fig. 7 as a sunset.
10. Paint Fig. 2 as a sunset.
11. Paint Fig. 3 as a moonlight.
12. Paint Fig. 3 in darkness.



Objects Suitable to Paint.

Fruits should be of decided colors as a red, yellow, or green apple; pears, peaches, tomatoes, plums, lemons, currants, grapes, cherries and quinces. A spray of the above containing a number of leaves is better still.

Vegetables — radishes, carrots, cucumbers, pumpkins, gourds and crook-neck squashes are among the best.

Flowers that are simple in form and color are good, such as the sunflower, yellow Marguerite, some pansies, the yellow chrysanthemum, sweet pea, some poppies, water lily buds, roses, rose bud, tulip, buttercup, iris, marigold, anemone, bluet, daffodil, forget-me-nots, geranium, narcissus, and similar flowers.

Grasses and similar growths, such as the clover, sorrel, flax, oats, alfalfa, rushes, the sprouting bean, pea, corn and wheat. Many weeds are very interesting and make excellent models.

Trees are among the best of models, providing the form and local or general color alone are reproduced, otherwise they are confusing.

Buds and Leaves are always good for this work. A twig containing several leaf buds, or a spray of leaves, should be chosen rather than one bud or leaf. Autumn leaves are excellent for the blended wash.

Pottery.—Bright colored articles of pottery of simple form and free from ornament make good models. Japanese lanterns and bright colored dolls are also good.

Birds.—Some birds, like the blue-bird, robin, oriole, or yellow bird, may be used, if stuffed specimens can be procured. Butterflies are excellent; their bright colors and strong markings make them especially adapted for this work.

Bits of Landscape.—A stump, log, large stone, rocks, bunch of grass, a bluff, water-trough, corner of fence, stone wall, gate, bars, old mill, old tower, old bridge, haystack, bulrushes, dead tree, foot bridge, road, spring, shock of corn or wheat, also any object projecting from the land into the water, such as point of rocks or an old tree trunk.

CHAPTER IV.

Pen Drawing.

Pen drawing is a method of expression, and like all methods, is learned by imitation — by copying. There is nothing in the object to show the technical means of its reproduction; this is the office of the method. The object is the source of the mental image or idea, and the method shows how to represent the mental image on a flat surface.

Materials.— The materials necessary for pen drawing are pens, ink and paper.

Pens.— Steel pens are used. They should be fine and flexible, capable of making a wide range of lines.

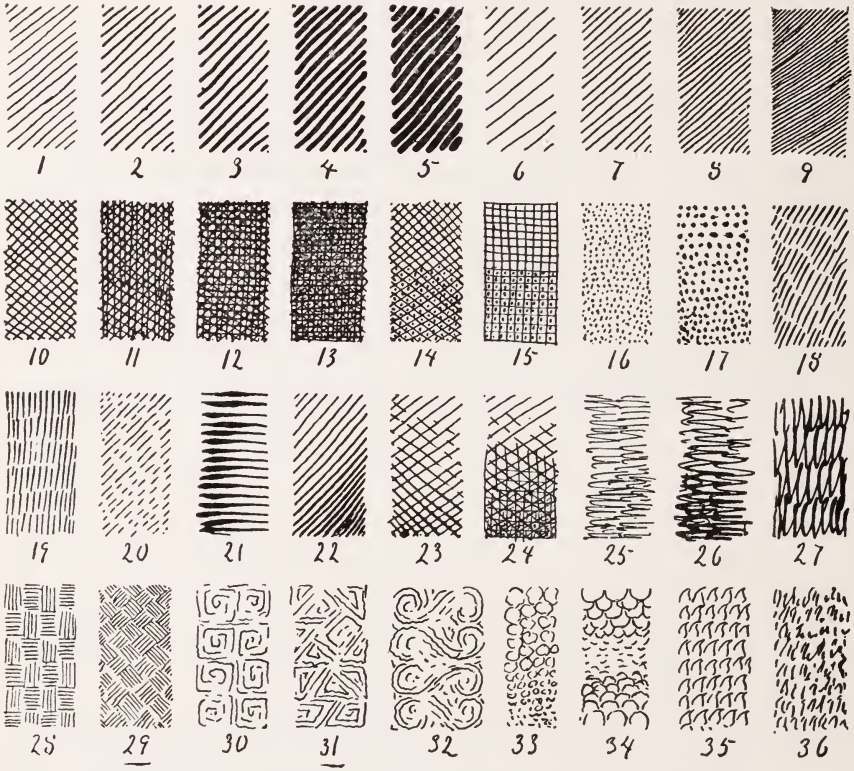
Ink.— Drawing ink is the best kind to use. It should be jet black and flow freely and evenly.

Paper.— The paper should be heavy, smooth and unruled. Cardboard and the various papers prepared for pen drawing are excellent. For general practice the paper should be cut $5\frac{1}{2}$ by 7 inches or even smaller. When drawing, the paper should rest on a smooth firm surface.

Holding the Pen.— There is no particular way to hold the pen or place the paper. The general rule is to hold the pen in such a manner as to give the most freedom and ease, and to place the paper so the light will come from the left side.

Lines.—One of the most desirable ends in successful pen drawing is to acquire a wide range of line — to be able to translate

with the line various surfaces and textures. Figs. 1–36 represent some of the various kinds and forms of line by which lights, darks and textures may be rendered. These line forms are intended to be suggestive — to show how a surface may be represented.



Surfaces and shades may be rendered:

(1) By varying *the size of the line*, as in Figs. 1–5.

(2) By varying *the distance between the lines*, as in Figs. 6–9

(3) By *cross hatching*, as in Figs. 10–13.

(4) By *dots*, as in Figs. 16 and 17.

By varying the size of the dots and their distance apart, these dots may be given a wide range.

(5) By *cross hatches* and *dots*, as in Figs. 14 and 15.

(6) By *short strokes*, as in Figs. 18, 19 and 20.

(7) By *graded line* and *hatches*, as in Figs. 21–24.

(8) By *broken*, *sketchy* and *irregular lines*, as in Figs. 25, 26 and 27.

(9) By *peculiar arrangements of lines*, as in Figs. 28–36.

An object may be rendered in outline and by means of light and shade in many ways; in almost an infinite number. In Figs. 37–45, a cross is thus represented in a number of ways, to show some of the various means of reproducing the same object.

Fig. 37 is drawn in unaccented outline.

Fig. 38 is in accented outline — the nearer lines being stronger than those farther away.

Fig. 39 is in broken line. The broken lines have a very wide range in both variety and utility, and should be closely studied.

Figs. 40–45 show the various means of representing the cross without outline.

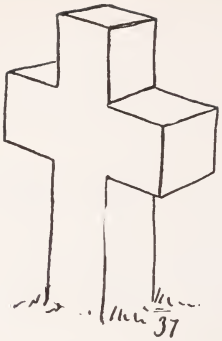
SUGGESTIONS.

Keep the pen clean.— Wipe the pen with a sponge or damp cloth whenever it becomes clogged.

It is best to keep the ink corked, even when in use, for it is not very inconvenient to lift the cork with the left hand and replace it each time ink is taken. The ink will keep better and last longer by so doing.

Make a light outline of the drawing, with a lead pencil, before drawing with the pen. By so doing the whole attention may be given to the pen work.

For purposes of study make a collection of magazine pictures showing how others have handled the subject. Remember



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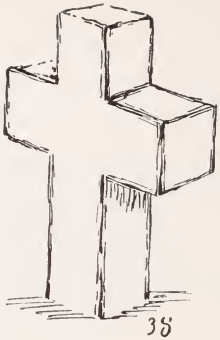

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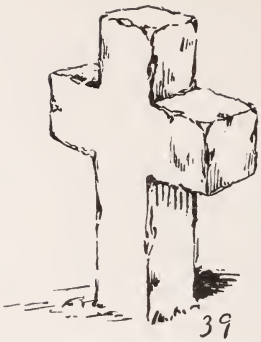

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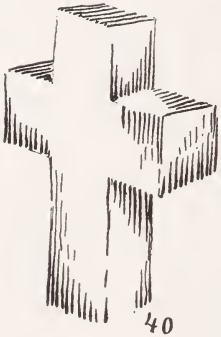

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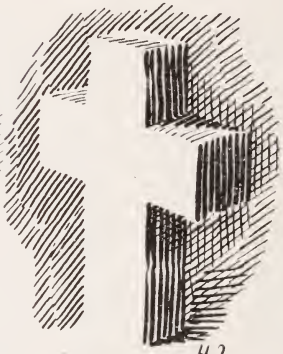

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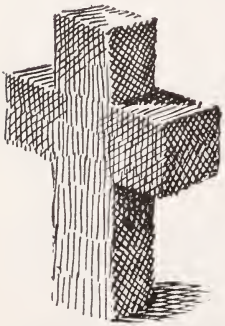

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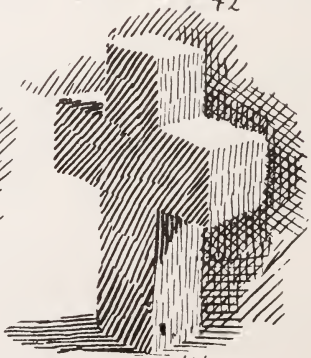

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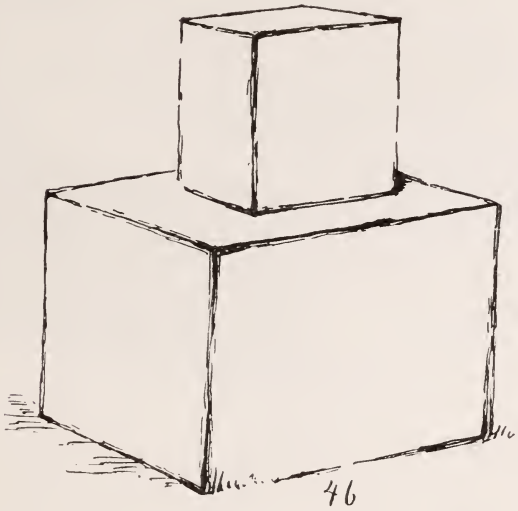
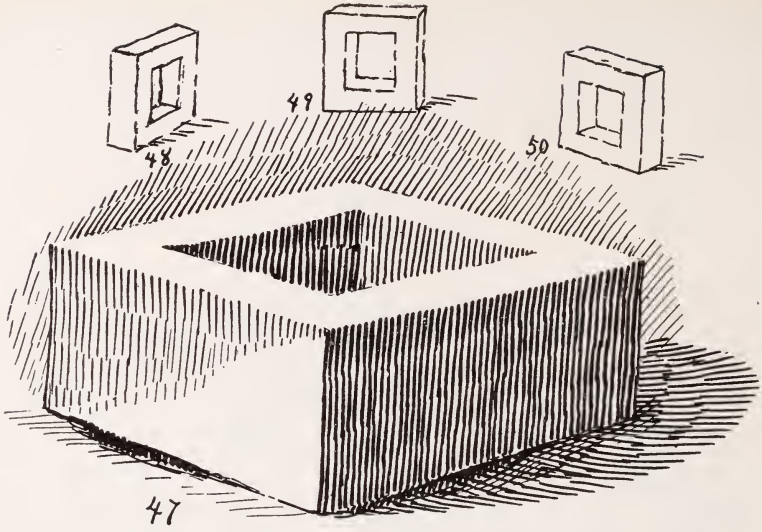
that the pen drawings seen in magazines are greatly reduced in size, therefore much finer than the originals. The drawings in this chapter are about the size of the original drawings.



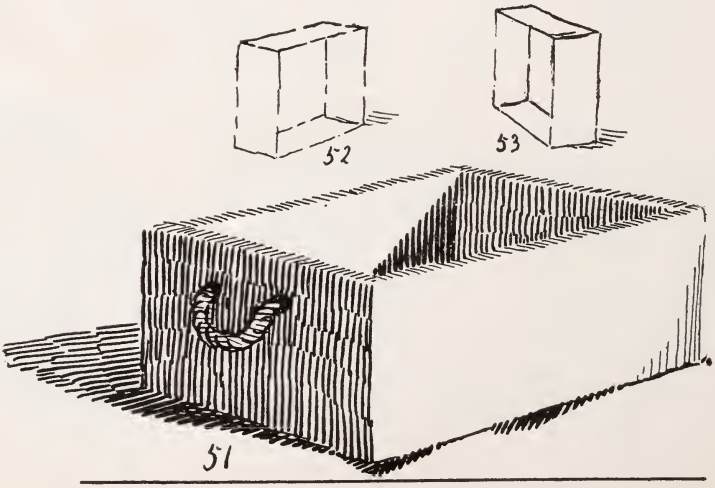
DRILL EXERCISES.

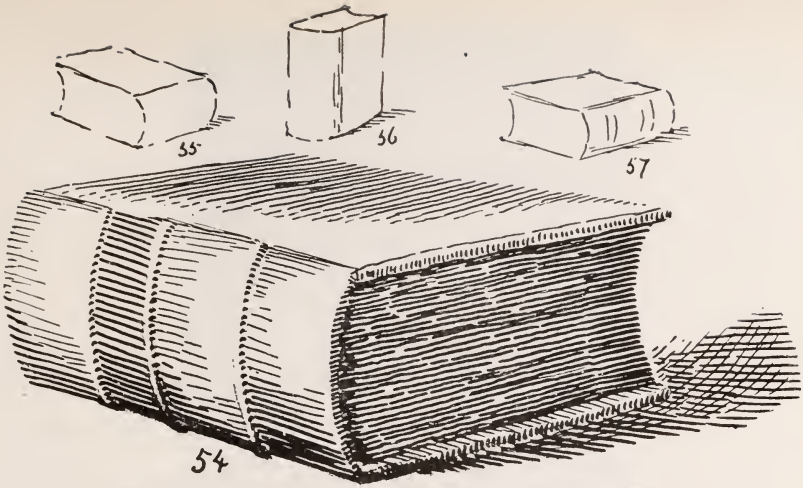
The following drill exercises are for the purpose of acquiring the various methods of using the pen in the most simple ways. The irregular and more complicated forms are omitted entirely.

1. Draw Fig. 38.
2. Draw Fig. 46.
3. Draw Fig. 47 in accented outline the same as Fig. 38. Draw Fig 48 in the same manner. Fig. 49. Fig. 50. Fig. 51.
4. Draw Fig. 39.
5. Draw Fig. 46 with broken lines, the same as Fig. 39.
6. Draw Fig. 47 with broken lines. Fig. 48. Fig. 49. Fig. 50. Fig. 51.



7. Draw Fig. 40. Draw Fig. 43.
8. Draw Fig. 41. Draw Fig. 44.

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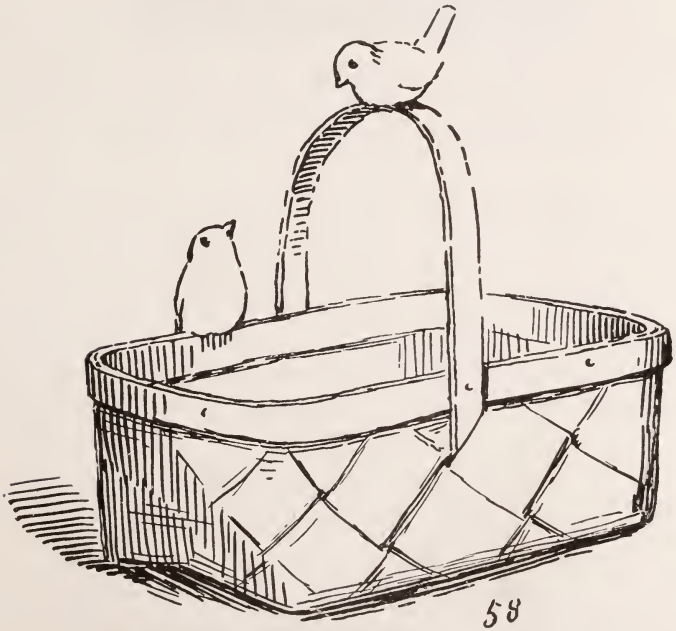
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9. Draw Fig. 45.
10. Draw Fig. 47.
11. Shade Fig. 48 similar to Fig. 47.
12. Shade Fig. 49 in the same manner as Fig. 47.
13. Shade Fig. 50 in the same manner as Fig. 47.
14. Shade Fig. 48 in the same manner as Fig. 47.
15. Draw Fig. 51.
16. Shade Fig. 52 similar to Fig. 51.
17. Shade Fig. 53 in the same manner as Fig. 51.
18. Shade Fig. 51 in the same manner as Fig. 47.
19. Shade Fig. 46 in the same manner as Fig. 47. As Fig. 51.
20. Shade Fig. 48 in the same manner as Fig. 47.
21. Draw Fig. 54.
22. Place a dictionary in the position of Fig. 55, and draw it.
23. Place a dictionary in the position of Fig. 56, and draw it.
24. Place a dictionary in the position of Fig. 57, and draw it.
25. Draw the basket, Fig. 58.

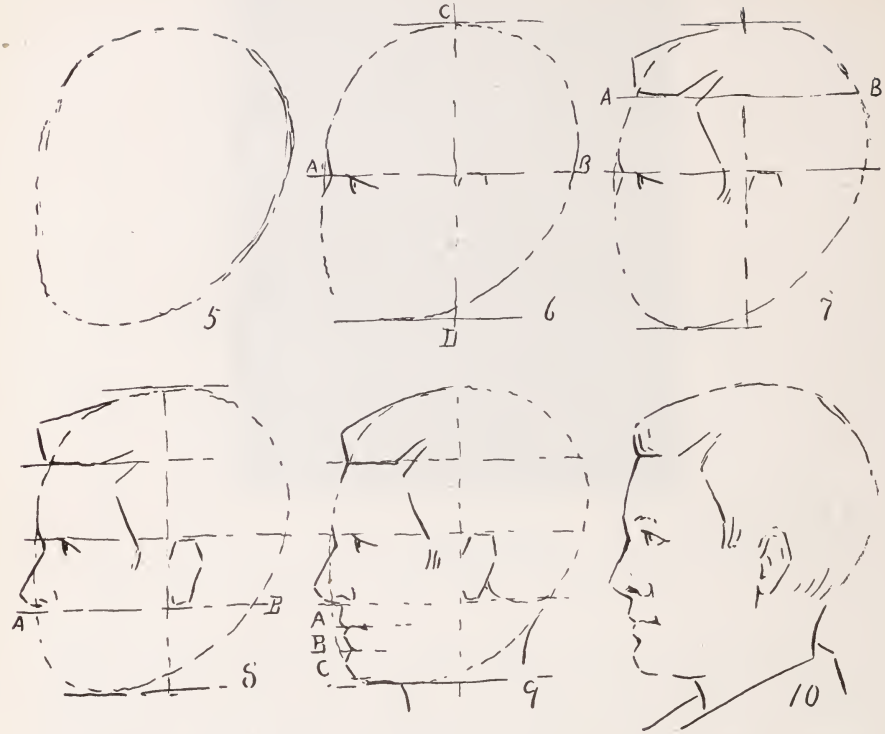
CHAPTER V.

The Human Head and Figure.

Perhaps there is more real desire on the part of pupils to draw a picture of the human head than to draw any other object in the world. But it is not practical to place a human head before the pupils and say, "Draw what you see," without having previously developed a plan to show them how, and to make them familiar with the place and proportions of the different parts of the head.

The following is a good method of teaching the drawing of the human head:

1. Teach the general shape of the head.
2. Teach the position and proportion of each part of the head.
3. Teach how to draw each part of the head.
3. Draw from the real head.



Shape of the Head.— Choose a pupil to come forward and stand before the class. Ask the pupils to look at the head, side view, and note the general shape. They will see that the general shape is oval, similar to Fig. 5. See also Figs. 1, 2, 3 and 4. Draw this oval form on the blackboard, about two feet long, similar to Fig. 5.

The Eye, Root of Nose and Top of Ear.— Draw a light horizontal line midway between the top and bottom of the oval, A, B, Fig. 6. Ask the pupils to observe on the model's head points about half way between the top of the head and chin. Let

them measure by sighting with their pencil, if necessary. They will find that the *root of the nose*, *the eye* and *the top of the ear* are about on this half way line. Draw a line down through the center of the head vertically, as at C, D, Fig. 6, and ask if the ear is back of this line or in front of it. Generally the ear is back of this line. Put these facts in the oval on the blackboard as in Fig. 6.

The Top of the Forehead.— Draw a horizontal line half way between the top of the ear and the top of the head, see A, B, Fig. 7. Place a crayon on top of the head of the model, and ask for the half way point between it and the top of the ear. The *top of the forehead* will be found about half way. Mark this in the drawing on the blackboard, as at A, B, Fig. 7.

The End of the Nose, the Lobe of the Ear and the Base of the Skull.— Draw a line half way between the eye and the bottom of the chin, as A, B, Fig. 8. Ask the pupils for the points on the model that are about half way. They are the *end of the nose*, the *lower point of the ear* and the *base of the skull*, or top of the neck. Mark these in the drawing on the blackboard, as in Fig. 8. Ask the pupils to feel on their own heads that these three points are about even with one another.

Upper Lip, Lower Lip and Chin.— Divide the lower part of the drawing into three equal parts, as A, B, and C, in Fig. 9, and it will be found that these thirds will about mark the *upper lip*, *lower lip* and *chin*, while the division points will mark the *mouth* and *upper point of the chin*.

Of course these facts are general and will not exactly conform to every head, but still they will serve to form a standard that will greatly assist the pupil when drawing from the real head.

It is not enough to simply know these facts. They must be learned so well that they can be used. The use that can be made

of them is the test of understanding them. The following exercises are for the purpose of learning the above facts.

1. Draw Figs. 31 and 35 on the blackboard. Ask two pupils to step to the blackboard and mark the position, as the teacher calls for them, of the root of the nose; the eye; the top of the ear; the top of the forehead; the end of the nose; the whole ear; the top of the neck; the upper lip; the lower lip; the chin; the neck.

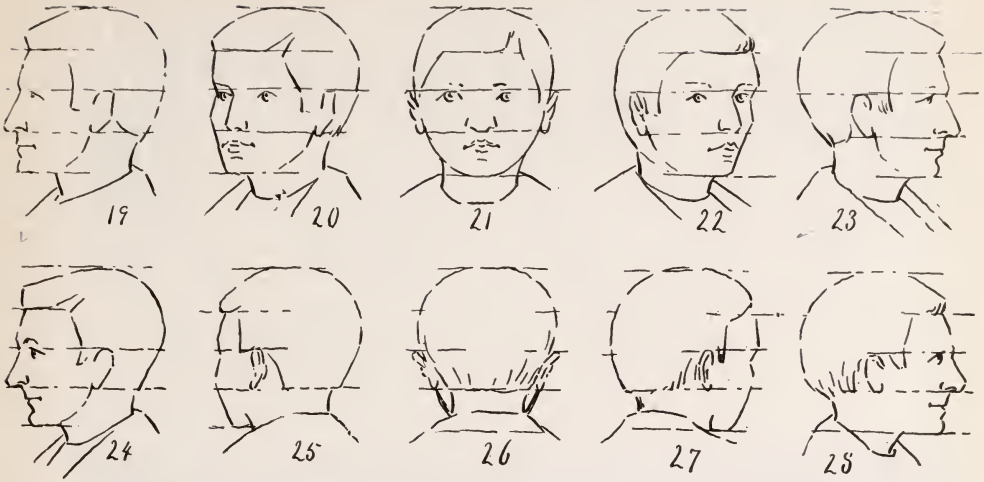
2. Let the pupils draw an oval, similar to Fig. 31, on their tablets, and place in position and in the following order, the eye, root of nose, top of ear, top of forehead, end of nose, lobe of ear, top of neck, upper lip, mouth, lower lip, chin and neck.

At this point it is well to teach the shape of the ear, nose, mouth and eye. This can be done by the pupils copying each separately until they are well acquainted with the general form and can reproduce them from memory.

3. Let the pupils draw an oval on their tablets similar to Fig. 31, and place in position the features in the following order: neck, ear, nose, eye, hair, mouth and chin.

4. Let the pupils draw an oval, similar to Fig. 35, on their tablets and add to it in the order given, the nose, ear, eye, neck, hair, mouth and chin.

Have exercises similar to the above until the pupils can place the parts of the head in the right place, form and proportion with some degree of accuracy.



Figs. 19, 23, 24 and 28 represent the *side views* of the head. Figs. 20, 22, 25 and 27 represent the *quarter views*. Fig. 21 represents the *front view* and Fig. 26 the *back view*. All that has been said of the side view in connection with Figs. 5 to 10 is also true of the front and quarter views, *viz.:*

That the general shape of each is oval.

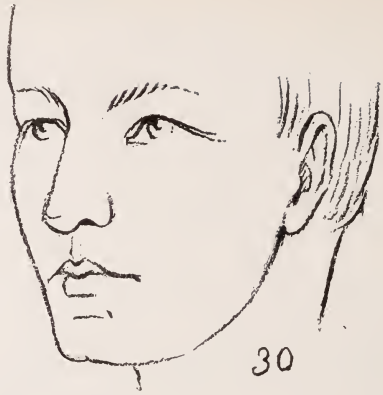
That the root of the nose, eye and top of ear are in the same horizontal line about half way between the chin and the top of the head.

That the top of the forehead is about half way between the top of the ear and the top of the head.

That the end of the nose, the lobe of the ear and the base of the skull are in the horizontal line about half way between the chin and the eye.

That if the lower quarter be divided into thirds they will be occupied by the upper lip, lower lip and chin.

Fig. 29 shows the eyes, nose, mouth and ears as seen in the front view, and Fig. 30 represents the same as seen in the quarter view.



The front view and the quarter views are taught in the same manner and by the same means as shown in the side view in Figs. 5–10.

5. Draw Fig. 33 on the blackboard, about 18 inches long. Ask a pupil to come to the blackboard and mark the position

of the eyes; the top of the ears; the parting of the hair; the ears; the end of the nose; the mouth; the chin.

6. Have the pupils draw on their tablets, Figs. 33, and put in position — the eyes; the top of the ears; the parting of the hair; the end of the nose; the ears; the mouth; the chin; the neck.

7. Have the pupils draw on their tablets, Fig. 32, and mark the position of the eyes; root of nose; top of ear; parting of the hair; the nose; the ear; the mouth and chin.

8. Draw Fig. 34, and add the different features.

9. Draw Fig. 38, and add the ears and hair.

10. Draw Fig. 37, and add the ears and hair.

11. Draw Fig. 39, and add the ears and hair.

Drawing the Head from Life.— Begin to study and draw the real head along with the study of above exercises. Both are mutually helpful. The drawings show how to study and what to look for on the real head; they are the source of the method, while the real head is the source of the idea.

Posing the Pupil.— The pupils should take turns in posing and the poses should not be over ten or twelve minutes long.

It is scarcely practical for all the pupils in the class to draw from the same model. There should be as many models as is necessary for each pupil to draw under favorable conditions. The model should be placed somewhat higher than the other pupils, and should be posed by the teacher.

Copying heads such as are found in magazines and other periodicals is permissible if the motive is worthy. The motive should be to learn the human head and the best methods and means of representing it. To this end it is well to collect the pictures of heads and paste them on cardboard to be used for studying.

THE HUMAN FIGURE.

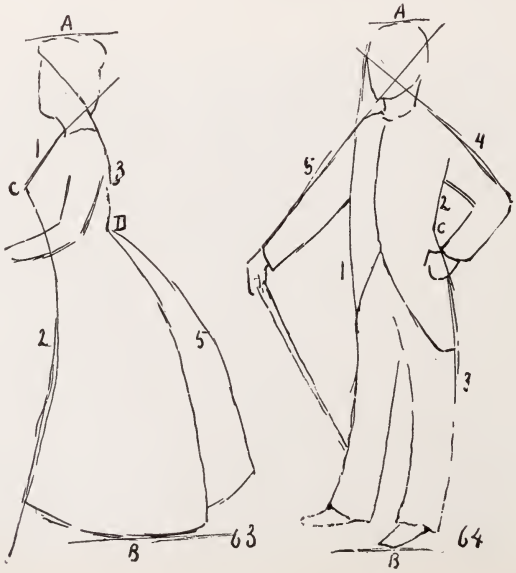
The General Plan is to begin the drawing of the whole human figure at once and to gradually teach the following:

The general facts of the human figure.

The position and proportion of each part.
How to draw each part.
The joints and their limitations.

Posing.— Have a pupil step upon a table or similar elevation where all can see him under favorable conditions. Place him in as simple a pose as possible. Let the pupils draw from this pose five to ten minutes. In this time there should be no attempt at making a complete drawing; the aim being to reproduce the large parts as in Figs. 51–62.

Unity.— The tendency among pupils in beginning to learn how to draw is to see and represent the small parts rather than the large ones. Pupils must be taught to see the hand before the fingers; to see the head before the eyes, nose and mouth; the arm before the wrinkles in the sleeve; the long lines before the short



ones — to see the whole before the part. To do this — to represent the general proportions with some degree of accuracy — is the first end to be accomplished. If this is done, the details will give very little trouble and will fall easily into place.

The Method.— There is no well defined method of drawing the human figure that is simple, direct and easy to understand. The following is perhaps as simple and direct as any:

1. Take the length.
2. Draw the long lines.
3. Locate the principal points.
4. Block in.
5. Finish.

Take the Length as in A, B, Figs. 63 and 64. Drawings are usually limited in size to a particular space which they are to fit into agreeably. The size of the paper is the usual limit of the drawing.

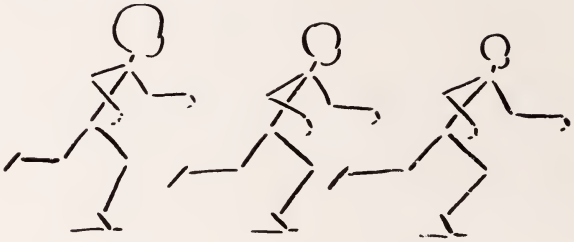
Drawing the Long Lines.— The general direction of the long lines give the character and action to the pose. These lines should be established first, as it is not easy to change the action after these lines are in place.

In Figs. 63 and 64 the heads were drawn first and then the long lines about in the order of their numbering. Such lines should be drawn with the greatest freedom and with the unaided hand; then they may be varified by means of simple measurements and tests with the pencil.

"Blocking in" and Finishing.— Always "block in" with light lines before finishing. These drawings are all carried through the "blocking in" point and left in that condition. This is about as far as a drawing can be carried in the class-room.

For examples of finished work, cut drawings from magazines and other periodicals to show the different degrees of finish in

drawing, as well as the different kinds of work. Use these illustrations as examples in posing and for study.



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Suggestions for Observation.

The head varies less in size from childhood to maturity than any other part of the body, and for that reason is the most stable unit of measure. A child two years old is less than four heads tall. This gradually increases to four, five, six, seven and even eight heads in maturity. The size of a well-formed figure may be taken at seven and one half heads, as shown in Fig. 68. The size of the head as compared with the body is one of the characteristic differences between children and grown people. Figs. 65, 66 and 67 are the same size and proportion, except the head; and this proportion suggests the child in Fig. 65, the youth in Fig. 66 and the man in Fig. 67.

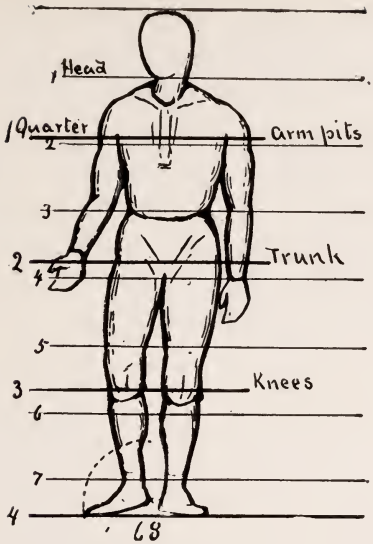
The standard proportion of a well shaped man is about seven and a half heads. This division is serviceable in many ways, but the division of the human figure into quarters is generally more practical. It ranges as follows:

First quarter, from the top of the head to the armpits.

Second quarter, from the armpits to the bottom of the trunk.

Third quarter, from the trunk to the knees.

Fourth quarter, from the knees to the sole of the foot.



The hand reaches to about the middle of the thigh when dropped naturally at the side. The elbows are about even with the belt.

The body, from the shoulders to the belt, does not vary much from a square, in the front and back views.

In children, the distance from the shoulders to the belt is about one third the distance to the feet. In adults it is about one quarter.

There is a tendency in first efforts to represent the feet, hands and head too small. Guard against this. The feet are half the length of the leg from the knee to the sole of the foot. The hand is about the length of the face, from the chin to the parting of the hair.

While the above facts may be aids in drawing the human figure, still they are only aids. The judgment is the final test, it is the supreme court to which the relative size and the correctness of all proportions are referred as to whether they are right or wrong.

The ability to draw the general proportions and to keep the relative size of the parts should become largely automatic, so that the attention may be given solely to the idea the figure is to represent.

Memory and Imaginative Drawing is the real test of what the pupil understands. Frequently have exercises in memory and imaginative drawing. In general, figures representing action cannot be obtained from a pose, but must be gotten through study, observation and thought.

The following are excellent subjects to observe and represent in action:

walking
running
climbing
playing horse
playing marbles
shooting a gun
shooting a pistol
shooting a bow
throwing a spear
rolling a hoop
rowing a boat
paddling a canoe
playing tag
swimming
diving
fishing
riding a bicycle
pulling a rope
flying a kite
coasting
catching a ball
throwing a ball
jumping
dancing
shoveling
pounding
nailing
hoeing
mowing
spading
pitching hay
picking up
drawing a wagon
pushing a cart
sowing seed
pushing a wheelbarrow
climbing a ladder
carrying a pail
carrying a rock
carrying a post
blowing a horn
playing the piano
playing the violin

69

70

71

SUGGESTIVE EXERCISES.

1. Prepare a pose similar to Fig. 69; allow ten minutes for the drawing.

NOTE.— The light lines that cross the face are direction lines to find the slope of the shoulders.

2. Prepare a pose similar to Fig. 70; allow ten minutes for the drawing.

3. Prepare a pose similar to Fig. 71; allow ten minutes for the drawing.

4. Prepare a pose similar to Fig. 51, and draw it.
5. Prepare a pose similar to Fig. 52, and draw it.
6. Prepare a pose similar to Fig. 53, for the class to draw.
7. Prepare a pose similar to Fig. 54, for the class to draw.
8. Prepare a pose similar to Fig. 55, for the class to draw.
9. Prepare a pose similar to Fig. 56, for the class to draw.
10. Prepare a pose similar to Fig. 57, for the class to draw.
11. Prepare a pose similar to Fig. 58, for the class to draw.
12. Prepare a pose similar to Fig. 59, for the class to draw.
13. Prepare a pose similar to Fig. 60, for the class to draw.

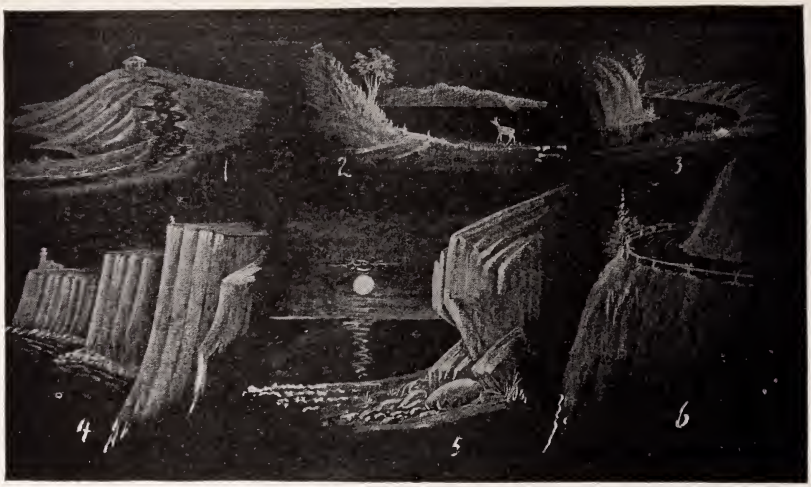
14. Prepare a pose similar to Fig. 61, for the class to draw.
15. Prepare a pose similar to Fig. 62, for the class to draw.
16. Prepare poses similar to Fig. 64, 73, 80.

NOTE.—Poses of all kinds may be gotten from the various magazines and papers. If these clippings are well chosen they may be pasted on pieces of cardboard and used for study as well as a source for poses.

17. Represent a boy walking.
18. Represent a boy running.

NOTE.— It is well to have a number of lessons on the same action, as long as you hold the interest of the class. For example, the single action of running away may be represented in many positions; a boy or girl may be made to run to the right, to the left, front, back, run fast, slow, etc.

19. Represent a boy jumping over a stone.
20. Represent a girl jumping a rope.
21. Represent a boy pushing a cart.
22. Represent a woman sweeping.



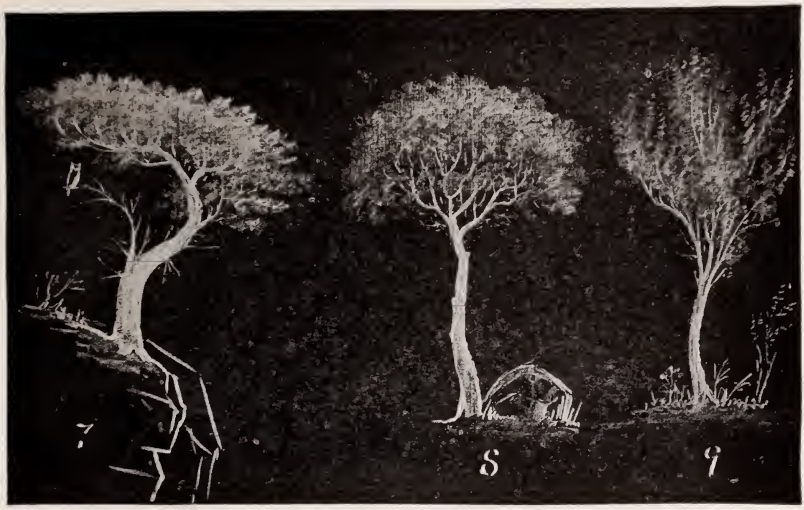
CHAPTER VI.

Chalk Modeling.

Function of Chalk Modeling.— Chalk modeling is not so much a medium to represent nature as to represent some truth of nature, some thought about nature. It is to bring out an idea, emphasize it, and make it plain. We cannot represent all the eye sees nor all the mind thinks. Perhaps the less number of ideas we try to represent the better. A single idea clearly pictured is more than an attempt at many. The "supreme excellence is simplicity" and simplicity is oneness. It is the chief function of chalk-modeling to *represent*, not *imitate*, to *translate*, not *copy*, to interpret ideas and express the individual thought about them rather than become a human camera receiving whatever is before the eye.

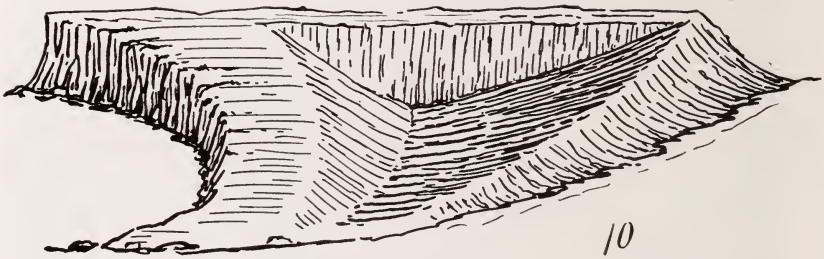
Chalk modeling is modeling with chalk on the blackboard very much as one would model in clay. This method of modeling is perfectly practical and can take the place of clay and sand modeling with but a small fraction of the time. Chalk modeling is

rapid work, so rapid that a class can use it and be back in their seats while getting ready for modeling in either clay or sand.



Unity of the Idea.—Chalk modeling includes both line and mass. The mass is used to represent the large parts, such as the body of a mountain, valley, or hill, and the line to represent the smaller details, such as the grasses, branches, stones and pebbles. Mass drawing and line drawing are not antagonistic, but mutually helpful. Their mechanical process differs somewhat, but the mental process is the same. An idea may be reproduced many ways — by many processes — and not change. For example, the tree, Fig. 8, may be drawn in outline or in mass; it may be represented with lead pencil, crayon or charcoal; it may be painted in oil or water colors, cut from paper with scissors, modeled in clay, carved in wood, chiseled from stone, etched in copper, engraved on steel or drawn on a lithographing stone, without changing the idea at all. The idea does not change, the

mental process does not change, but the medium or mechanical process does change. If we know the idea so well that we can reproduce it in any one of the above processes we can reproduce it in all as soon as we have overcome the mechanical difficulty of working in each. The idea is spiritual and does not change, the medium is material and does change.



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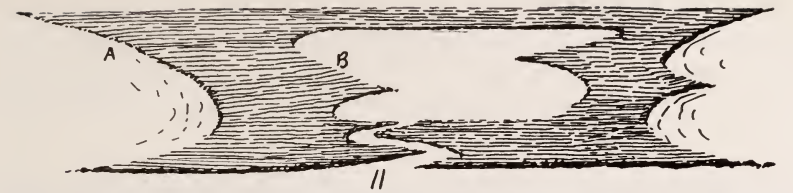
Lines.— *It is the chief function of a line to show direction.* The mass represents the surface, the lines the direction of this surface. Fig. 10 represents an imaginary arrangement of surfaces to show how the different plains and slopes are represented.

In this observe that the direction of the line indicates the direction of the surface—the vertical lines indicate a vertical surface, the horizontal lines a horizontal surface, the oblique lines an oblique surface, and curved lines a curved surface.

Both the side and the end of the crayon are used in chalk modeling—the side to represent the masses and the end to mark in the details. If the crayon is grasped between the thumb and *three* fingers, lines may be made varying in width from the full length of the crayon to those made with the end. Pieces of crayon about an inch in length are the most serviceable. A soft lead pencil with a blunt point lends itself to this work very perfectly.



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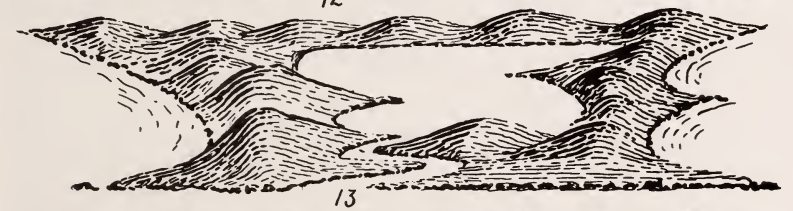

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Flat Surfaces.— A flat surface is represented by horizontal lines. In Fig. 11 the main horizontal lines are the *shore lines*; these give character to the surface more than the fine lines that represent the surface. Those shore lines which are drawn oblique, such as A and B, are in reality horizontal — they are horizontally curved lines. Figs. 11–14 represent an island and in the midst of the island a lake.

Fig. 11 is merely a flat surface. In Fig. 12 this flat surface has been elevated, forming a low plateau. In Fig. 13 the surface has been broken up into round-top hills, and in Fig. 14 into mountains. These four drawings contain nearly all the mechanical elements of chalk modeling.

Observe in all of the drawings (1) that the shore lines toward you are accented and those away from you unaccented. (2) That the horizontal distances are long and the vertical distances short.

Measure the whole length of the island with your pencil and compare it with the vertical width. Compare the length and width of the lake in the same manner.

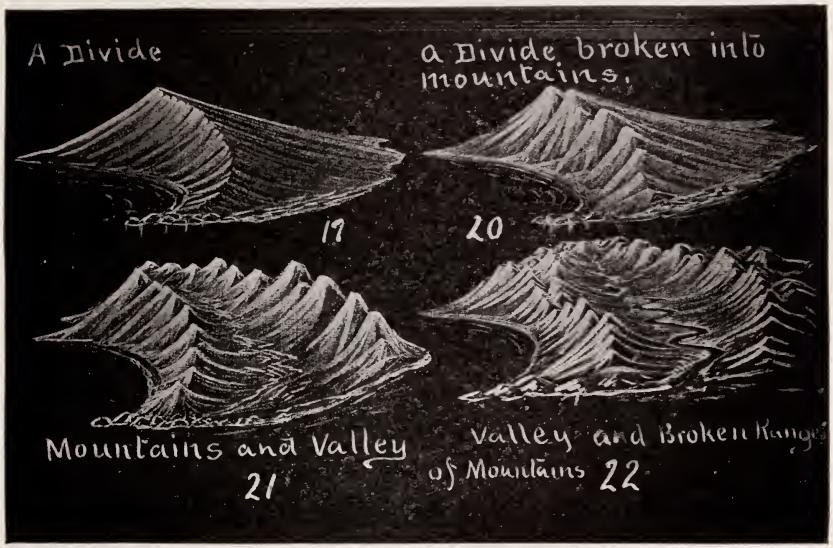
A great rule to follow in chalk modeling as well as in picture making generally is *make the horizontal distances long and the vertical or receding distances short.*

15 16

17 18

Mountains.—Fig. 15 represents a single ridge or divide sloping to the right and left. In Fig. 16 this ridge is broken into a regular range of mountains. In Fig. 17 the range is more

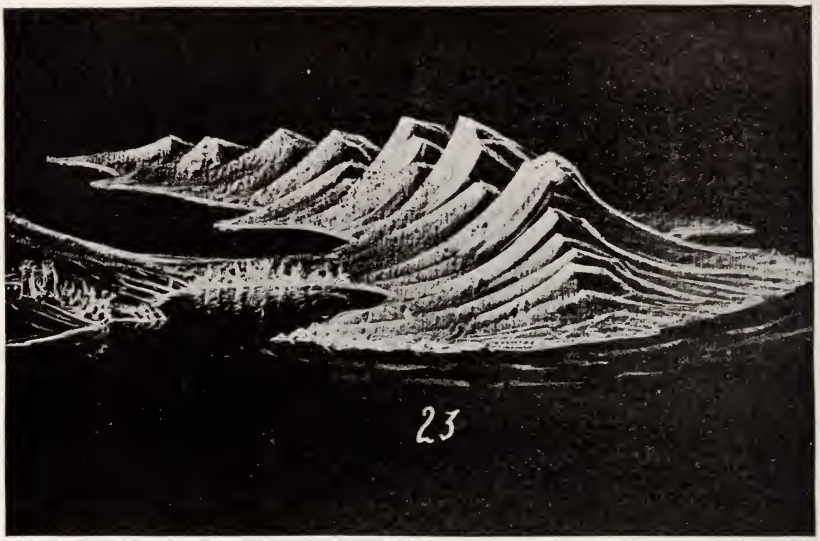
irregular, the separate peaks not being in a continuous line; and in Fig. 18 the range is still more broken and rougher in appearance. Figs. 15–18 are intended to be progressive in showing the working of the same principle.



Figs. 19–22 are practically the same as Figs. 15–18, but represented with crayon on the blackboard. In Figs. 21 and 22 a valley is represented in each.

Figs. 23 and 24 are excellent examples showing the handling of the crayon. Observe in particular the strength and firmness of the lines of the left slopes as compared with those of the right.

In chalk modeling one must not try to represent everything, but to pick out some central truth and then to represent it with all the directness possible. For example, Fig. 24 represents a cañon in the mountains. Observe in the representation that trees,



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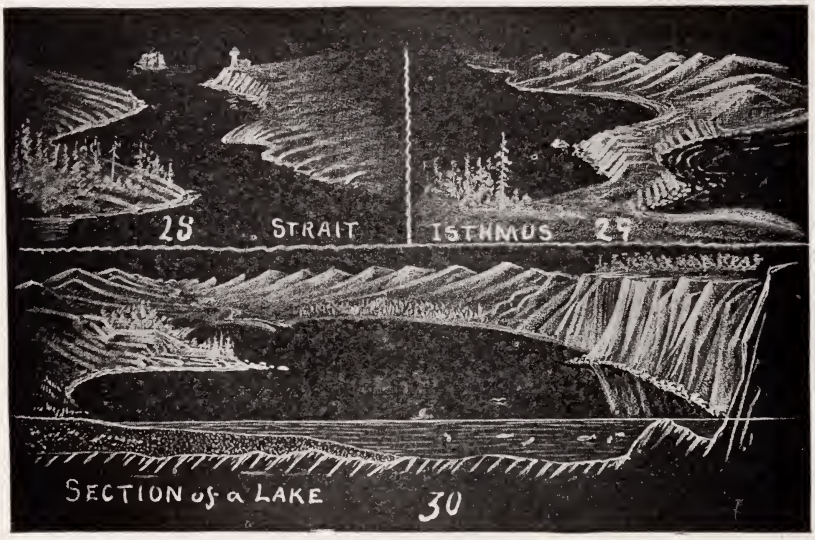
bushes, boulders, trails, and everything a cañon contains are omitted, except the cañon itself.

Figs. 25–27 are examples of directness in representing the idea. One is apt to be confused with the multiplicity of details and the many phases of the idea which nature presents, but if the abstract question is asked, What is a cañon? What is a mountain? What is a valley? What is a lake? and the answer in its simplest form is kept before the mind, it will greatly aid one in representing the idea with simplicity.

Accuracy and Exaggeration.—Technical accuracy cannot be expected in the representation of general truths. In chalk modeling the vertical distances must be more or less exaggerated as compared with the horizontal distances. This is especially true in the representation of large areas, such as a state, watershed or river system. For example, the depth of the lake, Fig. 30, would be imperceptible if made in exact proportion to its width, and the highlands of California, Fig. 35, would



be more than twenty miles high if drawn in proportion to the horizontal distances. The aim is to make the idea that is being represented as plain and truthful as possible, not truthful in technical accuracy and proportion, but truthful in idea. A valley is not less a valley because the enclosing hills and mountains are exaggerated, nor is it necessary to represent all the curves in a railroad to show that it extends from New York to Chicago. It is when the likeness of a particular object is wanted that accuracy of all proportions is necessary.

Map Sketching.—The aim in map sketching is:

(1) To lead the pupil to grasp the map as a whole. To see it with the mind as we see a circle or square, to see the general shape or form. To see that North America is triangular. (Figs. 31 and 32.)

(2) To see the general proportion and relation of the parts to the whole, as the proportion and relation of Alaska, Hudson Bay, and the Gulf of Mexico to North America. (Fig. 32.)

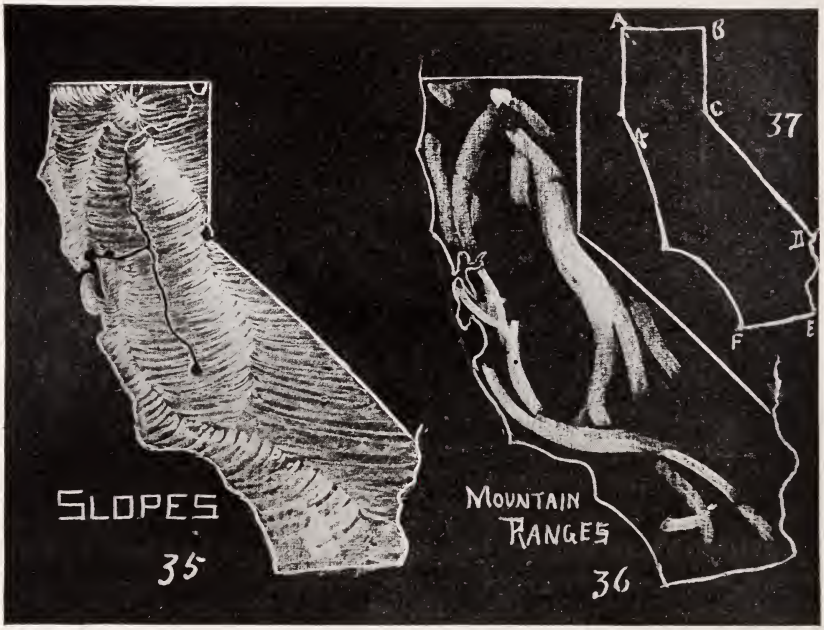
(3) To see the great slopes, the flow of waters, the trend of the coast, and the highlands and lowlands. (Figs. 33 and 34.)

To lead the child to see and grasp the above is perhaps easiest done through some familiar measure, through some familiar form he already knows. The most familiar figures for this purpose are the geometrical forms — the triangle, square, diamond, rectangle or oblong, circle, oval, and ellipse. (See Chapters VII. and VIII., Book I., for the teaching of these forms.)

There are few forms of land or water that cannot wholly or in part be seen through these geometrical figures. For example, North America is in general triangular in shape. (Fig. 31.)

NOTE.— To draw the general proportion of North America, Fig 31: (1) Draw the right angle E A D. A B is one quarter of this angle. (2) Draw A B any length, according to the size of the map. (3) The angle B is a right angle and B C is equal in length to B A. (4) A D is a vertical line and from D curves uniformly around to C. (5) Add Alaska, Lower California and Central America, and cut out Hudson Bay and the Gulf of Mexico, as in Fig. 32. Have the map before the pupil when studying it.

Alaska is also triangular. (Fig. 32.) Labrador is a triangle with one angle at Lake Ontario. The main part of Hudson Bay is round and the Gulf of Mexico is elliptical.



NOTE — Often a single line as a *unit of measure* is very serviceable in sketching in the proportion as, for example, in drawing California. Fig. 37 is drawn as follows: (1) Draw A B the northern boundary and take it for the *unit of measure*. (2) B is a right angle and B C is equal to A B. (3) From A through C draw C D, making C D twice A B. (4) Draw D E and E F about two-thirds as long as A B. (5) From A draw a vertical line to a point opposite C (Pt. Arena). (6) Pt. Concepcion is at the opposite of D and a little to the left of C. The point F is under the middle of C D. San Francisco Bay is opposite the angle C. The northern part of the state forms nearly a square The state is a little longer than three tim s A B, the unit of measure. Have a large accurate map before the pupils when studying these facts.

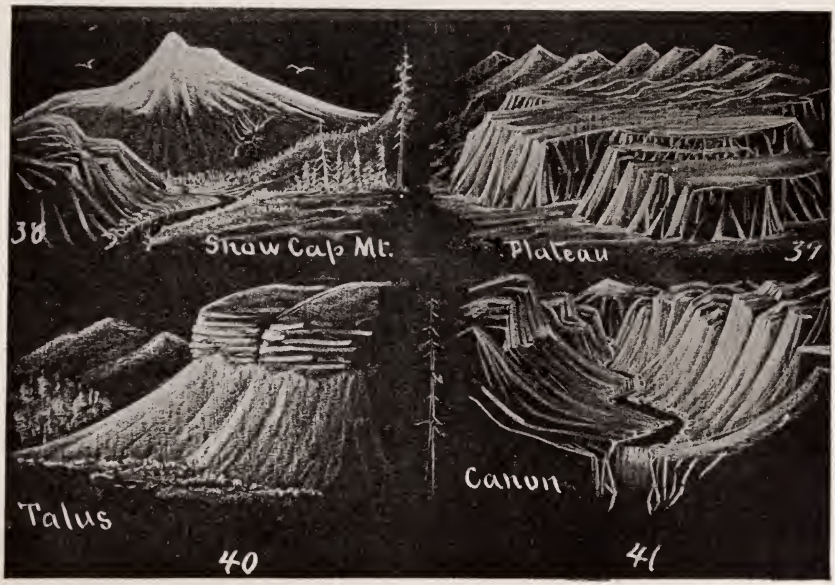
Suggestions in Map Sketching.—See the whole before the part. The general shape of the map is more important than the part.

Don't represent too much. A single big truth is often more than many little ones. If we see the dents in the coast we lose sight of the continent.

The mountains are only wrinkles on the plateau and the hills but a roughness of the great slopes. The highlands and the great slopes are more important than the mountains and hills.

If we look for the bends and turns in the river we lose sight of the stream. The flow of rivers indicating the trend of the land should be first.

The general trend of the coast is more than the bays and inlets.



Chalk Talks.—A chalk talk is reproducing on the blackboard a drawing that has been memorized. The talk may or may not be accompanied by verbal language.

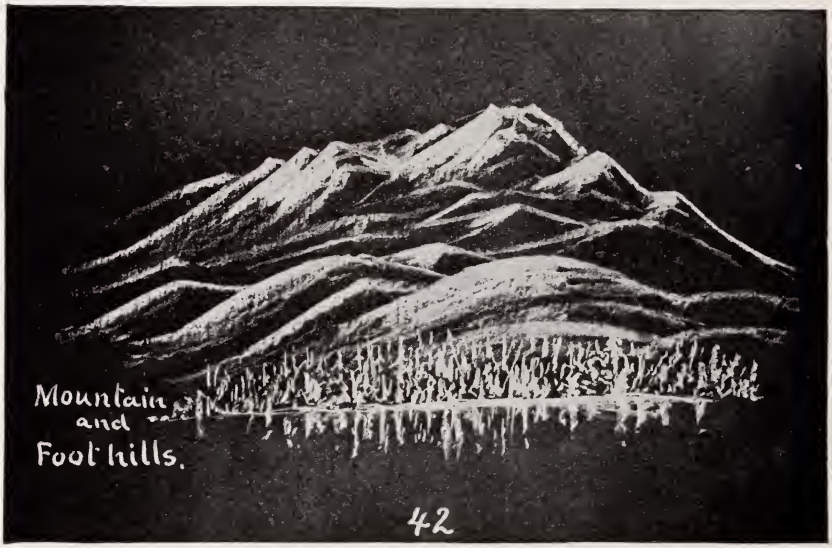
Chalk talks are valuable:

Because of the clearness and definiteness of the thought required in preparing them.

Because of the skill, freedom and speed acquired in using the hands rapidly toward a definite end.

Because the knowledge thus acquired is permanent.

Because they are interesting; so much so, that when successfully tried, an entertainment or Friday afternoon exercise will not be complete without several.

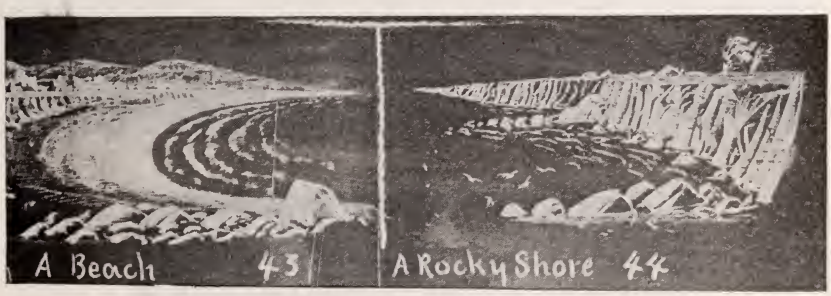


Preparing a Chalk Talk.—The method of preparing a chalk talk is to draw the picture representing the idea over and over until it is memorized—until it can be reproduced from memory quickly,

easily and with a fair degree of accuracy. The first drawing in the memorizing process should be drawn slowly and much thought given to it, and then in each succeeding one to make the drawing more rapidly.

A chalk talk should not require more than two minutes in its delivery and one minute should be the average time.

Groups of from two to five pupils may give their chalk talks at the same time, providing there is no oral language to go with them.



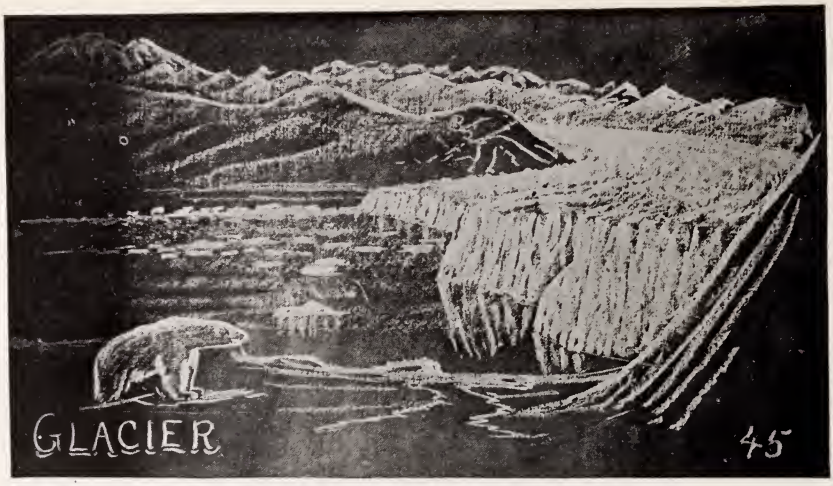
Sources of Chalk Talks.—Chalk talks may be drawn from all sources; there is no limit. Ideas of form, size, and relation, forms of land, water and air, events of history, facts of geology, the achievements of science, and the triumphs of art, all lend themselves as sources from which these pictures may be drawn.

Many of the drawings in this book and Books I. and II. form excellent chalk talks. Chapter X., Book I., is a complete talk ready for use.

Excellent "chalk talks" may be made in both brush drawing and water colors.

Chalk modeling is a source of very effective chalk talks.

The following subjects are sources from which very interesting talks may be gotten. They may be given singly or in groups.


GLACIER
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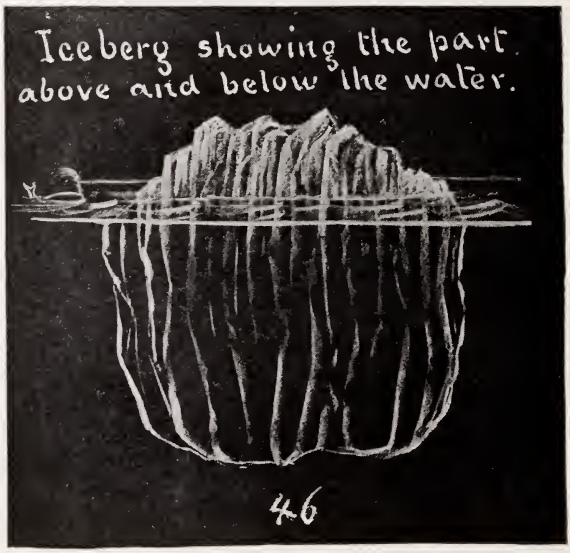

Iceberg showing the part above and below the water.
46

Trees—leaves, buds, flowers and fruit from each kind of tree, shrub and plant.

Fruits—vegetables, nuts and seeds.

Bridges—stone, swing, arch, truss, cantaliver and suspension.

Houses—Colonial, Mission, Gothic, English, French, German and Italian.

Churches and Temples—Egyptian, Greek, Roman, Byzantine, Saracenic and Gothic.

Sailing Boats—sloop, schooner, brig, brigantine, bark, barkentine and ship.

Steamboats—side-wheeler, stern-wheeler, screw-propeller, tug, steam barge, whale-back, ocean steamer and battle ship.

Fences—stone wall, hedge, board, rail, picket, iron and wire.

DRILL EXERCISES.

The following objects are excellent subjects for chalk modeling:

Springs—cold, hot, well, flowing well, geysers.

Streams—rill, rivulet, brook, canal, creek and river.

River—still water, rapids, waterfall, cascade, high bank, low bank, bluffs, rocky shore, marshy shore, bends, bars, delta, estuary.

Water—bay, strait, inlet, sound, gulf and waves.

Land—island, peninsula, isthmus, point, promontory, plain, valley, hills, mountains, plateaus.

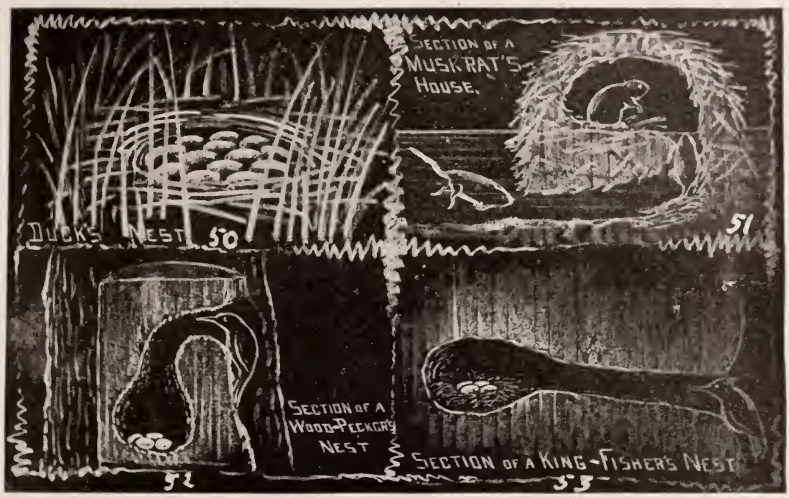
Shores—Sandy beach, rocky shore, swampy shore, sand dunes, low shore, bold shore.

Islands—flat, rocky, volcanic, islands formed from bars.

Plains—grassy, wooded, desert, plateau, level, rolling.

Valleys—dells, cañon, gorge, pass, gully, gulch, ravine.

Slopes—smooth, rough, steep, gradual, long, short and broken.


SECTION OF A
MUSK RAT'S
HOUSE.
51
DUCKS NEST 50
SECTION OF A
WOOD-PECKER'S
NEST
52
SECTION OF A KING-FISHER'S NEST
53


BROOK 54
RIVER 55
SLOUGH 56
WINTER 57

Mountains — volcano, rocky, round top, symmetrical, bold and low.

Hills — partings, ridges, knolls, bluffs.

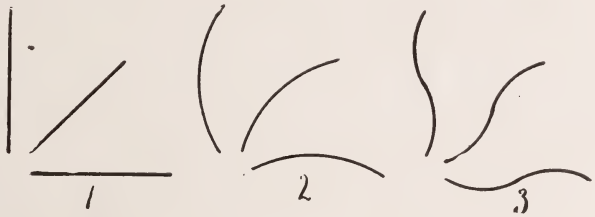
Sections — Section of a lake, spring, well, sand bar, river. Section of burrows, such as the woodchuck, chipmunk, musk rat and kingfisher. Sections of nests, such as the squirrel, woodpecker and swallow.

CHAPTER VII.

Decorative Design.

The aim of this course is twofold: (1) To give a short, direct, yet complete course in the elements of decorative design. (2) To develop skill, freedom and speed in the use of the hands.

The course is divided into three general parts: (1) Lines, (2) Forms, (3) Ideas.



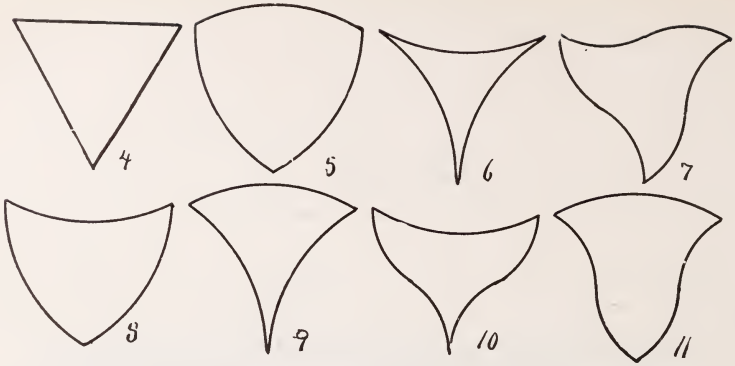
LINES.

Lines are divided into three general classes: *Straight lines*, *curved lines* and *angular lines*.

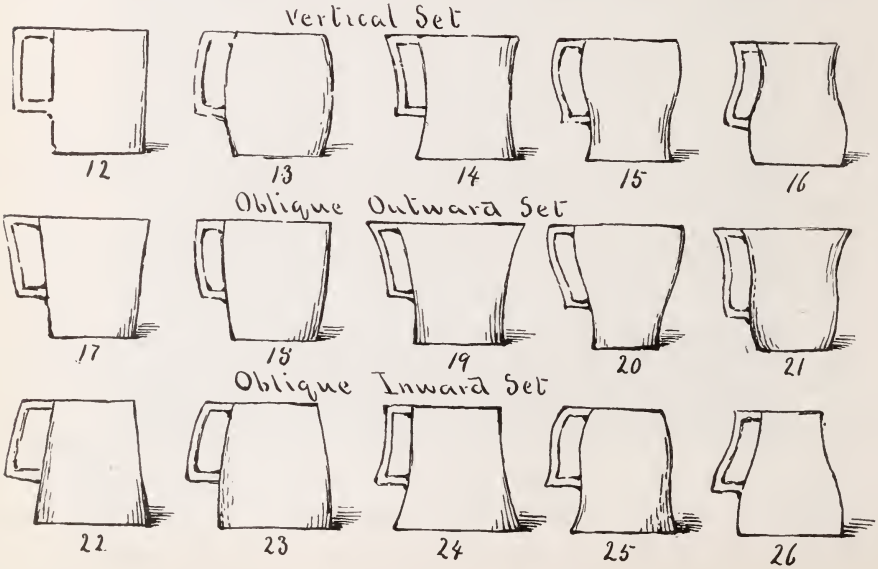
Straight Lines are divided into *vertical*, *horizontal* and *oblique lines*. Fig. 1.

Curved Lines may be vertical, horizontal or oblique, as in Fig. 2. Fig. 3 represents the *double curve*, which may also be vertical, horizontal or oblique.

When the curved lines, represented by Fig. 2, curve outward, as in Fig. 5, they are called *outward curves*, and when inward, as in Fig. 6, *inward curves*. The principal use of these lines in

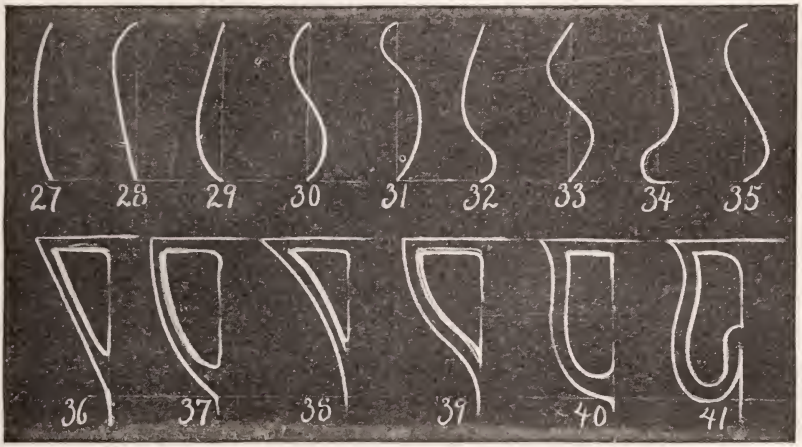


designing is to *modify the shape of forms*. For example, Fig. 4 is an equilateral triangle. In Fig. 5 the shape has been modified by substituting for the straight lines of Fig. 4 *outward curved* lines, and in Fig. 6 *inward curved* lines, and in Fig. 7 *double curved* lines. In Fig. 8 the inward curved line has been substituted in one side and outward curves in the other two sides. Fig. 9 is the



reverse of Fig. 8. In Figs. 10 and 11 the sides are double curves and the tops single curves; they are the reverse of each other. Any form or line may be modified in a similar manner.

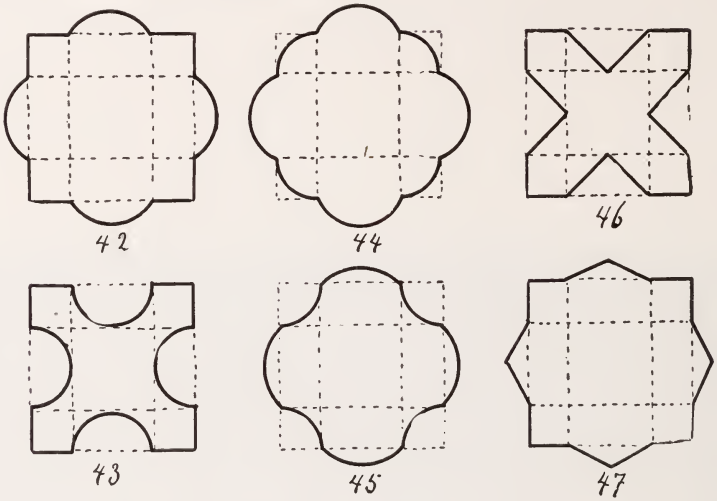
The practical application of the use of these lines is seen in modifying the shape of the cup (Figs. 12–26). Cup 12 is composed of vertical and horizontal lines. *The vertical lines alone are changed.* The vertical lines of cup 12 are changed to *outward* curves in cup 13, *inward* curves in cup 14, and *double* curves in cups 15 and 16. The vertical lines in cup 12 are changed to *oblique outward* lines in cup 17 and to *oblique inward* in cup 22, and then each one is modified, as in the vertical set.



Curved lines may be further modified by making them *irregular*. Fig. 27 is a *regular curve*, that is, it is a part of a circle, but Figs. 28 and 29 are irregular. Fig. 30 is a regular double curve, and Figs. 31–35 are irregular double curves. *The variety is infinite.*

This method of modifying forms by changing the line is chiefly useful in giving the mind a regular pathway along which it may

travel when representing objects, choosing that which is best suited for the end in view. For example, if a handle is to be fitted to a pitcher or vase the mind can readily adapt one by this process, as in Figs. 36–41, which is handle 36 modified by the *outward, inward and double curves.*



Figs. 42–47 are squares, with each side divided into three parts. One or all the parts of each side may be changed by changing the parts to outward or inward curves. In Fig. 42 the middle spaces of the lines are changed to outward curves, and in Fig. 43 this is reversed. In Fig. 44 all of the parts are changed to outward curves, and in Fig. 45 part to inward and part to outward curves. Figs. 46 and 47 are the reverse of each other, and angles are used in the place of curves.

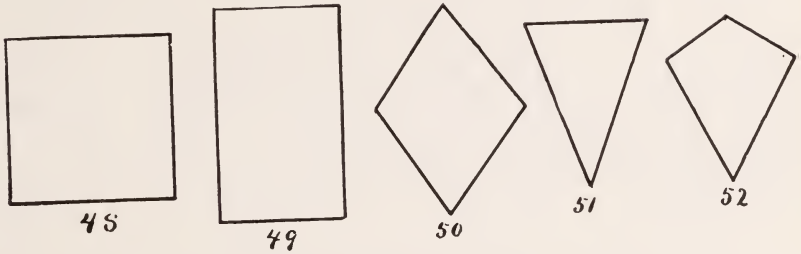
Suggestions for Work.— Do not use instruments of precision, such as compasses, rulers, measures, etc.; they only prolong the course, lessen the results, and defeat a most important end — skill of the hand.

Use the unaided hand and eye, or more properly speaking, the mind, in all of this work. Trust the hand, trust the eye, and they will become swift, accurate and true.

Work for skill and power rather than to produce a pretty drawing. Accurate drawings, made at the expense of freedom, are not good.

Do not form the habit of constantly erasing. Do not erase at all. Erasing implies incomplete thought. The remedy is *complete thought.*

Do not be afraid of making mistakes, but let your drawings be full of "tries." Show the actual battle — misplaced lines, faltering curves and all, as shown in Figs. 64–67.



DRILL EXERCISES.

In the following ten exercises substitute in place of the straight lines of the figures, *inward*, *outward* and *double curves* after the manner of the triangles, Figs. 4–11.

1. Draw *with light lines* three squares similar to Fig. 48. Substitute *inward curves* in one, *outward curves* and *double curves* in the others.
2. Modify the rectangle, Fig. 49, in four ways.
3. Modify the diamond, Fig. 50, in five ways.
4. Modify the triangle, Fig. 51, in six ways.
5. Modify the kite form, Fig. 52, in eight ways.

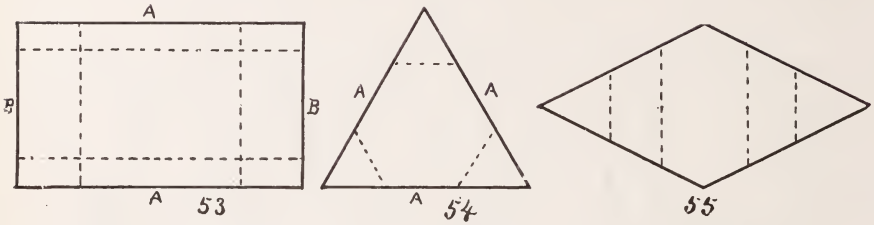
6. Modify square 48 by substituting line 31 in place of the straight lines.

7. Modify square 48 by substituting line 33 in place of the straight lines.

8. Modify triangle 4 by substituting line 32 in place of the straight lines.

9. Modify triangle 4 by substituting line 33 in place of the straight lines.

10. Modify triangle 4 by substituting line 35 in place of the straight lines.



11. Modify rectangle 53 by changing parts A and B to outward curves.

12. Modify rectangle 53 by changing parts A to inward curves and parts B to outward curves.

13. Modify rectangle 53 according to your wish.

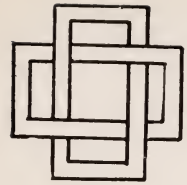
14. Modify triangle 54 by changing parts A to outward curves.

15. Modify triangle 54 by changing parts A to inward curves.

16. Modify diamond 55 after the manner of Fig. 47.

17. Modify diamond 55 after the manner of Fig. 42.

18. Modify diamond 55 according to your fancy.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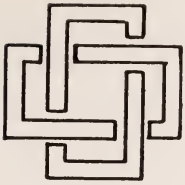
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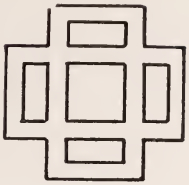
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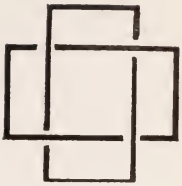
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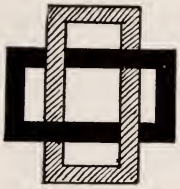
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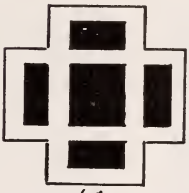
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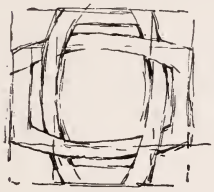
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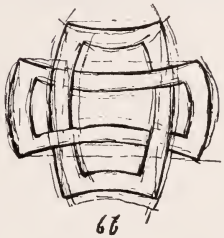
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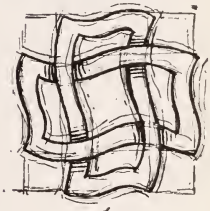
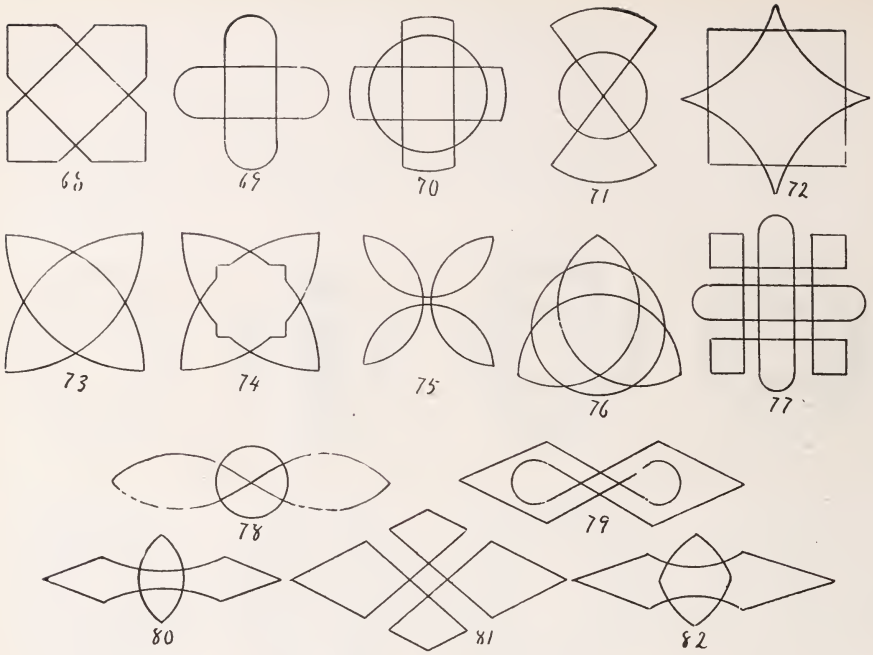

67

Interlacing Work, sometimes called *strap work* and sometimes *twisted rope*, consists of lines, bands, or forms, interwoven or plaited together, similar to the plaits in a basket. Figs. 83 and 84.

Figs. 56–67 represent two rectangles or oblongs woven together. Fig. 56 may be taken as the type, and Figs. 57–63 represent different methods of treatment.

Figs. 58 and 62 are not interwoven.

Figs. 64–67 show the method of work, and also how Fig. 56 may be modified by the substitution of *inward*, *outward* and *double curves*.

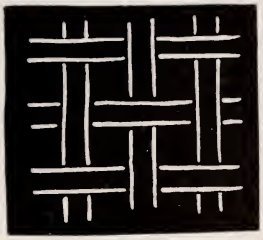


DRILL EXERCISES.

In the following exercises Figs. 56–63 are used as types for the treatment of the various designs, and are referred to by number.

1. Interweave design 68 after the manner of 56.
2. Interweave design 68 after the manner of 58.
3. Interweave design 68 after the manner of 64.
4. Interweave design 69 after the manner of 60.
5. Interweave design 69 after the manner of 57.
6. Interweave design 70 after the manner of 59.
7. Interweave design 70 after the manner of 56.
8. Interweave design 71 after the manner of 60.
9. Interweave design 71 after the manner of 58.

10. Interweave design 72 after the manner of 58.
11. Interweave design 73 after the manner of 58.
12. Interweave design 73 after the manner of 60.
13. Interweave design 74 after the manner of 59.
14. Interweave design 74 after the manner of 56.
15. Interweave design 75 after the manner of 61.



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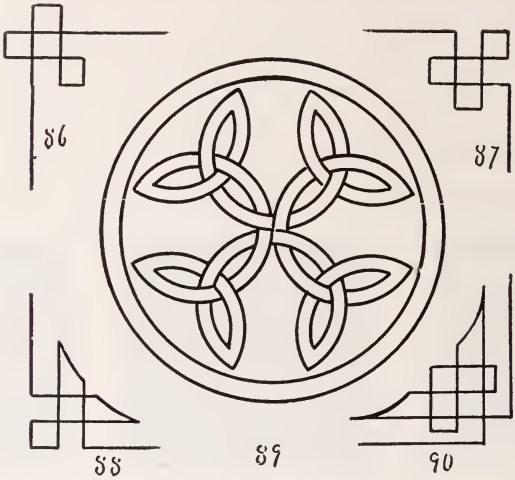
85

16. Interweave design 76 after the manner of 59.
17. Interweave design 76 after the manner of 60.
18. Interweave design 77 after the manner of 59.
19. Interweave design 77 after the manner of 56.
20. Interweave design 78 after the manner of 60.
21. Interweave design 79 after the manner of 57.
22. Interweave design 80 after the manner of 63.
23. Interweave design 81 after the manner of 56.
24. Interweave design 82 after the manner of 60.
25. Substitute triangles in place of the squares in design 72, and finish after the manner of 60.

Figs. 86–90 are designs for corners. They may be of more than one line, and interwoven the same as Figs. 56–67.

26. Interweave corner 86 after the manner of 56.
27. Interweave corner 87 after the manner of 58.
28. Interweave corner 88 after the manner of 57.
29. Interweave corner 90 after the manner of 56.
30. Interweave design 85 after the manner of 59.



Designs 85, 89 and 93 are based on the square. Designs 91 and 94 are based on the hexagon or double triangle.

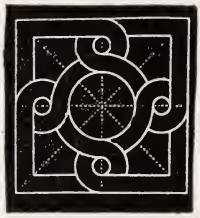
31. Interweave design 91 after the manner of 60.

32. Interweave design 92 after the manner of 57.

33. Interweave design 93 after the manner of 59. Design 93 is the same as 73 doubled.

34. Interweave design 94 after the manner of 60.


91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94

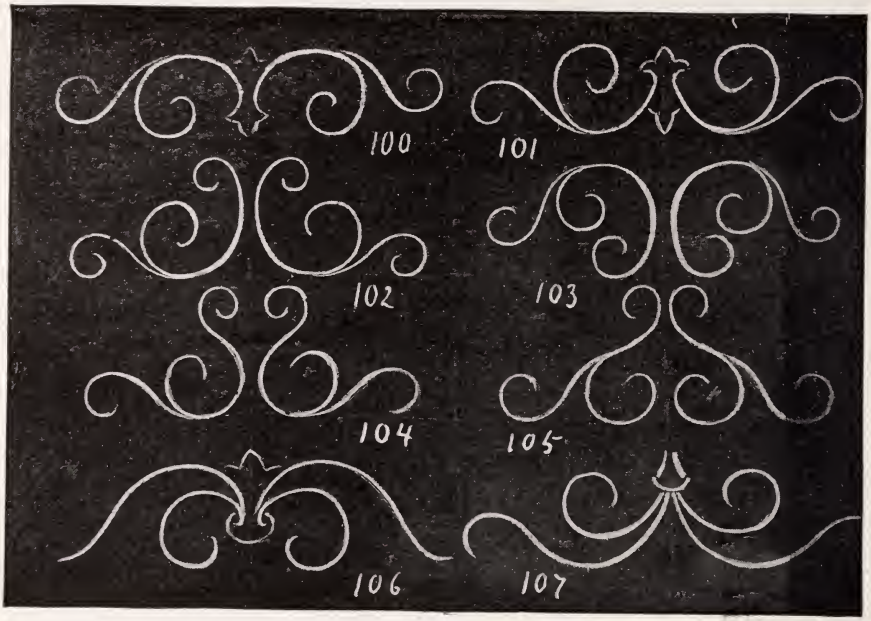
The Scroll.— *The double curve* (Fig. 95) is considered the most beautiful of lines, and the combination of the single and double curves (Fig. 96) is the most beautiful combination of lines. This union of the single and double curves is, perhaps, the most common combination to be found in decoration. There is scarcely a piece of decorative design that does not contain it in some form, and often the whole piece is made of it.

The elements of *the scroll* (Fig. 97) are the single and double curves combined. To draw these lines with ease and freedom requires a great deal of practice and much persistent effort. These scrolls are foundational in character and are the basis of so much, that they should be practised until they can be made with freedom and precision — until they have become largely automatic.

Fig. 97 represents the scroll in its most elementary form. Fig. 98 is the same as Fig. 97, but with branches curving *outward* from the main stem. These branches form combinations of the single and double curve. Fig. 99 is the same as Fig. 97, but the branches curve *inward* toward the main stem. The branching in Figs. 98 and 99 are opposite in direction.

Figs. 100–107 represent the most common forms of the scroll.

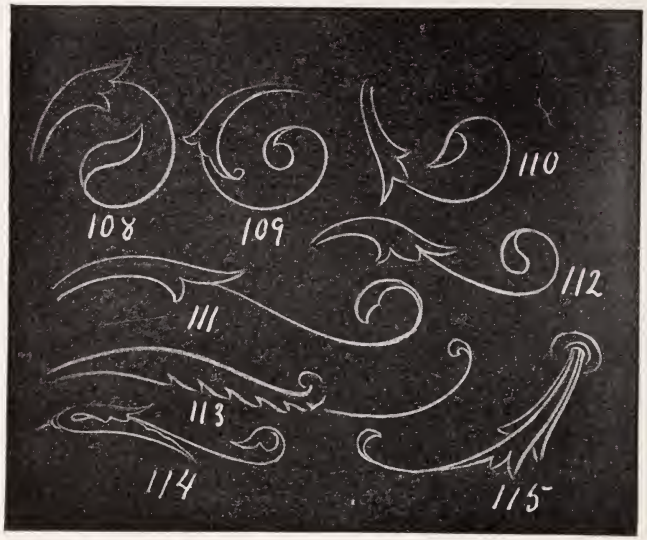
Figs. 108–115 represent some simple branches or *crockets* and *scroll endings* that can be used with the scrolls while learning them. They will add variety and interest to the scrolls.

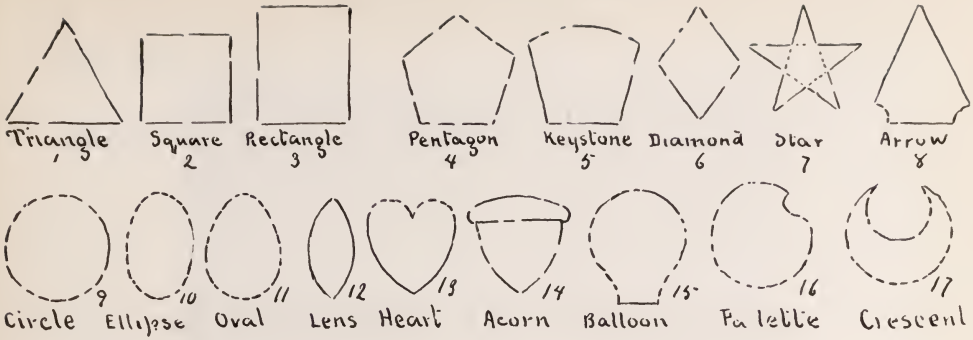


DRILL EXERCISES.

1. Draw scroll 97.
2. Draw scroll 97 extending to the left.
3. Draw scroll 97 running vertically.
4. Draw scroll 98.
5. Draw scroll 98 extending to the left.
6. Draw scroll 98 doubled. The same as scroll 100.
7. Draw scroll 99.
8. Draw scroll 99 extending to the left.
9. Draw scroll 99 doubled.
10. Draw scroll 100.
11. Draw scroll 100 and add crocket and ending 108 to it.
12. Draw scroll 101.
13. Draw scroll 101 and to it add crocket and ending 109.
14. Draw scroll 102.
15. Draw scroll 102 and add crocket and ending 109.
16. Draw scroll 103.
17. Draw scroll 103 and add crocket and ending 111.
18. Draw scroll 104.
19. Draw scroll 104 and add crocket and ending 110.
20. Draw scroll 105.
21. Draw scroll 105 and add crocket and ending 111.
22. Draw scroll 106.
23. Add to scroll 100 branching similar to Fig. 98.
24. Add to scroll 101 branching similar to Fig. 98.
25. Add to scroll 100 branching similar to Fig. 99.
26. Add to scroll 101 branching similar to Fig. 99.
27. Add to scroll 107 branching similar to Fig. 99.
28. Double scroll 108.
29. Double scroll 109.
30. Double scroll 110.

31. Double scroll 111.
32. Double scroll 112.
33. Double scroll 113.
34. Double scroll 114.
35. Double scroll 115.





CHAPTER VIII.

Form.

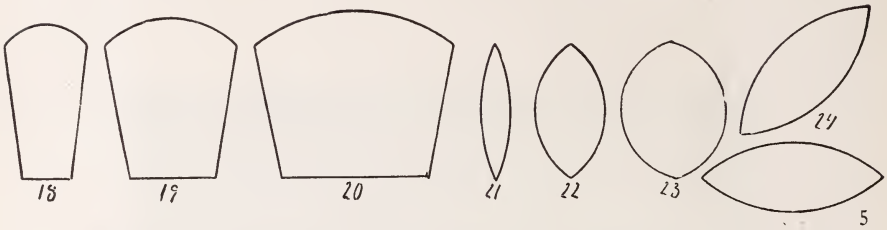
Beauty of Form depends on a pleasing proportion of the parts of which it is composed, or if the object is composed of only one part, like a rectangle or keystone, then the beauty is in the pleasing relation of its dimensions. Beautiful lines alone cannot make a beautiful form, but beautiful lines combined with a pleasing proportion can. Beautiful forms are not produced by measurements, but by cultivated perception or feeling. This "*feeling*" *is the mainspring of expression in both form and color.* The cultivation is acquired by persistent and intelligent effort.

Use of Form in designing is to suggest a basis on which the mind may build. For example, in designing a pitcher, the shape of the bowl would be based on some form — say an oval for the central form, as in Fig. 11, to which the handle, nose and standard are to be added.

Figs. 1–17 represent some of the most serviceable geometrical and conventional forms. These forms are to give or suggest to the mind something tangible with which to work. They are servants of the mind, and as such may be used as wholes, or as parts;

can be added to, taken from or used in any way the mind may devise.

These forms must be well learned before they can be thoroughly used. The best way to learn forms is to use them.



Modifying Forms.— Forms may be modified (1) by changing the size. The square or circle may be made larger or smaller. (2) By changing the width. The keystone, Fig. 19, is of medium width. It may be made narrow, as in Fig. 18, or wide, as in Fig. 20. (3) By changing the position. The lens may be narrow, medium, or wide, as in Figs. 21, 22, 23; or it may be changed in position to the oblique, or horizontal, as in Figs. 24 and 25.

The heart (Fig. 13) may be drawn *any size*. It may be drawn *narrow*, *medium* or *broad*. It may be drawn with the point *down*, *up*, to the *right*, *left*, or pointing *obliquely*. In like manner nearly all forms may be changed.

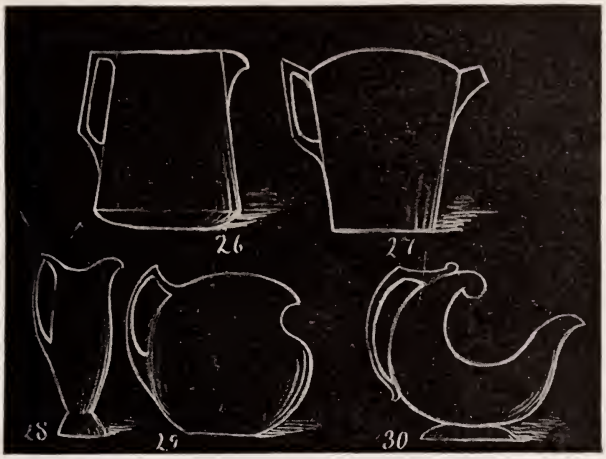
How to Design.—For example we are to design a pitcher. *What is a pitcher for?* It is to hold a liquid. Then it must possess:

A *bowl* to contain the liquid.

A *base* on which to rest, so the pitcher will not tip over.

A *spout* to conveniently pour the liquid.

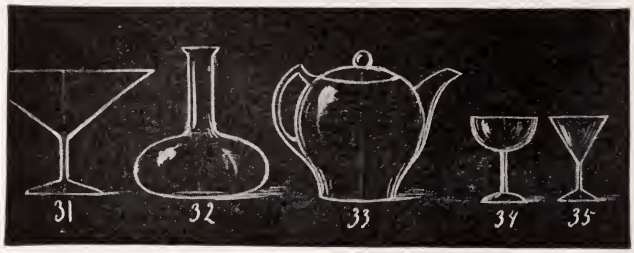
A *handle* with which to hold the pitcher.



Then our task is to construct a vessel composed of a *bowl*, *standard*, *spout*, and *handle*, *associated together to form a pleasing whole*. The bowl being the largest and most important part will naturally receive the first attention. We look over the list of forms and decide on, say the keystone (Fig. 5), and to this form attach a spout and handle, as in Figs. 26 or 27. The keystone being broad does not need a special base or standard. The handle and spout may be modified to harmonize with the bowl by changing the line to inward, outward or double curves. The bowl of Fig. 28 is lens shaped. The top of the lens has been removed and added as a base. The bowl of Fig. 29 is based on the palette in which the nose of the palette is utilized for the spout of the pitcher. The bowl of Fig. 30 is a crescent to which a handle has been added, the point bent over for the spout and a base added. The bowl, being largest and of the most importance, should in general be drawn first. The handle, spout and standard should harmonize with the bowl. These

may be changed by changing the lines from straight to outward, inward or double curves.

Beauty, *harmony* and *adaptability* are the three ends that should be sought in this work. *Is it pleasing? Is it adapted to the purpose for which it is designed?* are questions that must be answered in the affirmative.



To Design Any Object.

1. Find out its use.
2. Determine its parts.
3. Determine its size and form.
4. Associate the parts together harmoniously.
5. If desirable, decorate the object.

For example, we wish to design a teapot (Fig. 33). *What is its use?* To hold a hot liquid. *What parts are necessary?* A *bowl* to hold the liquid; a *cover* to keep it from cooling rapidly; a *standard* on which to rest; a *spout* through which to pour the liquid; and a *handle* with which to hold the pot in the hand. *What shall be the size and shape of the teapot?* We will say the size is to be 6 x 4 inches and the bowl balloon shaped. Then the task is to associate all of the above together forming a harmonious and practical utensil.

DRILL EXERCISES.

1. Draw a broad, medium and narrow triangle.
2. Draw a narrow, medium and broad diamond.
3. Draw an arrow form in three widths.
4. Represent an ellipse in three widths and the longer axis horizontal.
5. Represent the heart form as narrow and broad.
6. Modify the acorn in three ways.
7. Change the crescent to slender, medium and thick by changing the size of the inner circle.
8. Design a pitcher with a triangular shaped bowl.
9. Design a pitcher with a diamond shaped bowl.
10. Design a pitcher with an elliptical shaped bowl.
11. Design a pitcher with an oval bowl.
12. Design a pitcher based on the acorn.
13. Design a teapot from the diamond, Fig. 6.
14. Design a teapot from the arrow, Fig. 8.
15. Design a sugar bowl from the pentagon, Fig. 4.
16. Design a vase from the acorn.
17. Design a fruit dish from the arrow. Fig. 31 is based on a triangle.
18. Design a wine glass from the oval, Fig. 11.
19. Design a goblet based on the ellipse.
20. Design a fruit dish based on the crescent.
21. Design a vase with a triangular bowl.
22. Design a vase with a lens shaped bowl.

Units.— A unit in decorative design is one of the parts or forms used in making up a design.

Sources of Units.— The sources of units are:

Geometrical forms, such as the triangle, square, rectangle or oblong, diamond, pentagon, circle and ellipse.

Plant forms, such as the branch, stem, leaf, bud, flower, fruit and root of any kind of tree, shrub or plant.

Animate forms, such as the head, body, legs, tail or product of any kind of animal, bird, insect, fish or reptile.

Natural forms, such as water, snow, ice, icicles, waves, running water, smoke, clouds, wind, shells and minerals.

Artificial forms, such as ribbons, flags, streamers, banners, ropes, chains — in fact any object made by man.

It will be seen from the above that it is quite impossible to give even a superficial list of units that may be used.

Modification of the Unit.— Most units may be modified in the following manner:

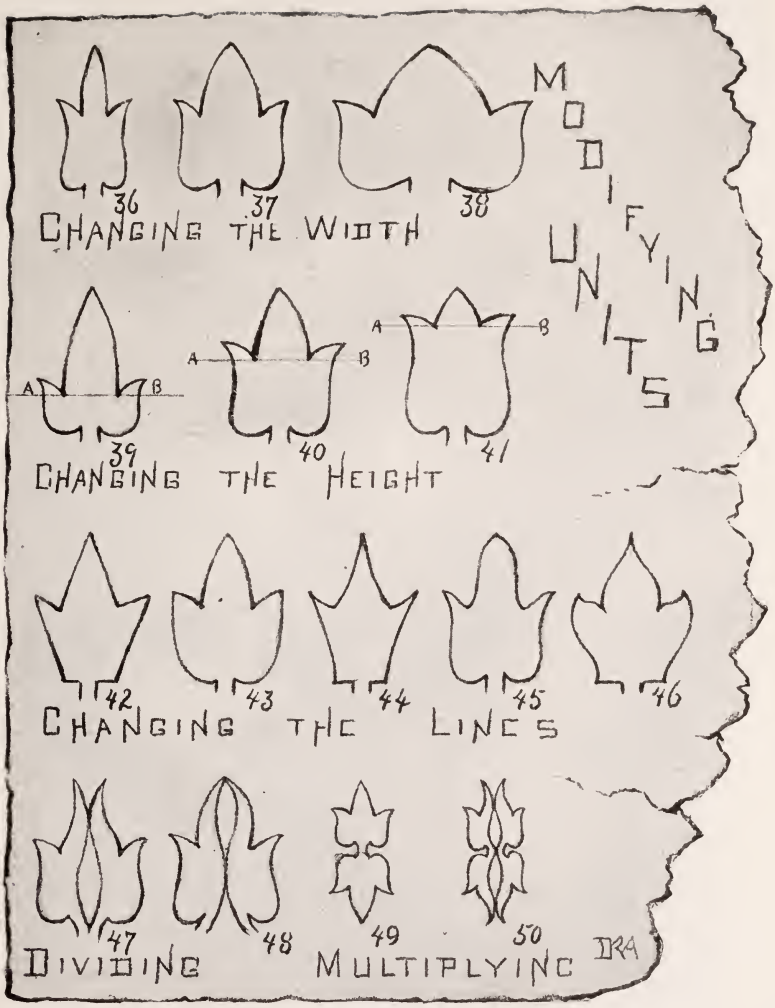
By changing the width to narrow, medium and broad, as in Figs. 36, 37 and 38.

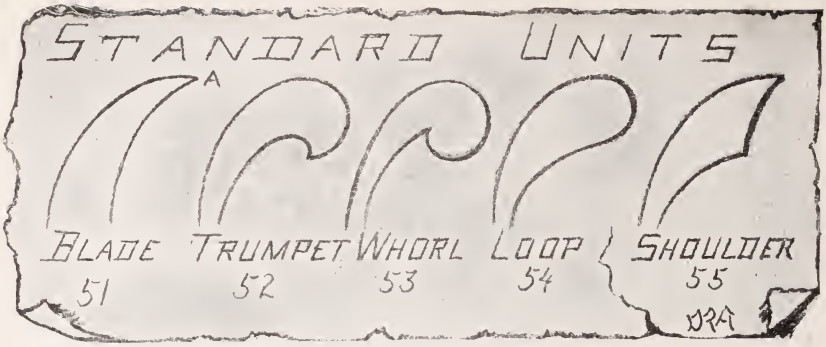
By changing the position of the shorter axis, A B, making it low, medium or high, as in Figs. 39, 40 and 41.

By changing the lines from straight, as in Fig. 42, to outward curves, as in Fig. 43, to inward curves, as in Fig. 44, or double curves, as in Figs. 45 and 46.

By dividing or multiplying the unit, as in Figs. 47, 48, 49 and 50.

By changing the position of the longer axis from vertical to oblique or horizontal, as in Figs. 23, 24 and 25.


MODIFYING UNITS
36
37
38
CHANGING THE WIDTH
A
B
39
40
41
CHANGING THE HEIGHT
42
43
44
45
46
CHANGING THE LINES
47
48
49
50
DIVIDING
MULTIPLYING
DRA



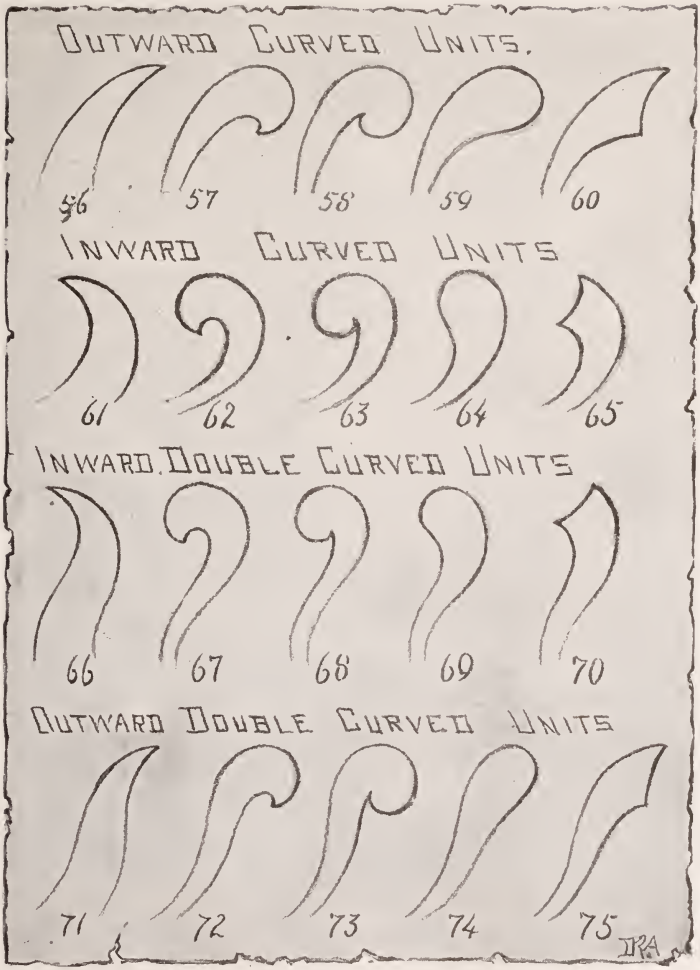
Standard Units.—There are certain elements, common to all decoration, that have had their origin in the universal mind principle, and have been handed down to us from the past. They represent the essence of that which has been proven good in decorative design. These elements have, as near as possible, been reduced to their most simple form in the five standard units, Figs. 51–55. These units include about all the elements used in historic ornament and modern decoration.

These standard units are very similar and have elements that are common to all. Carry the point A of the *blade* around farther and the *trumpet* is formed, carry it still farther and the *whorl* is formed. Eliminate the point entirely and the *loop* is formed, and add to the *blade* another point and the *shoulder* is formed.

The names of the standard units are given from a real or fancied resemblance to the objects after which they are named.

Range of the Standard Units.—The combinations of these standard units are practically unlimited; their elements enter into every form of decorative design. These units are of so much importance and so far reaching in their range that they should be fully memorized. We must know them as we know the letters of the alphabet, or as a carpenter knows his tools.

When the top part of the standard units curve outward they are called *outward curved*, as in Figs. 56–60 and 76–80.



When the top part of the standard units curve inward they are called *inward curved*, as in Figs. 61–65 and 81–85.

When the standard units are double curved they are called *inward double curved*, as in Figs. 66–70 and 86–90, or *outward double curved*, as in Figs. 71–75 and 91–95, according as the top curves inward or outward.

Fig. 56 would be called an *outward curved blade;* Fig. 61, an *inward curved blade;* Fig. 66, an *inward double curved blade;* and Fig. 71, an *outward double curved blade.* In like manner all the standard units are named.

Figs. 76–80 represent the outward curved standard units *doubled.*

Figs. 81–85 represent the inward curved standard units *doubled.*

Figs. 86–90 represent the inward double curved standard units *doubled.*

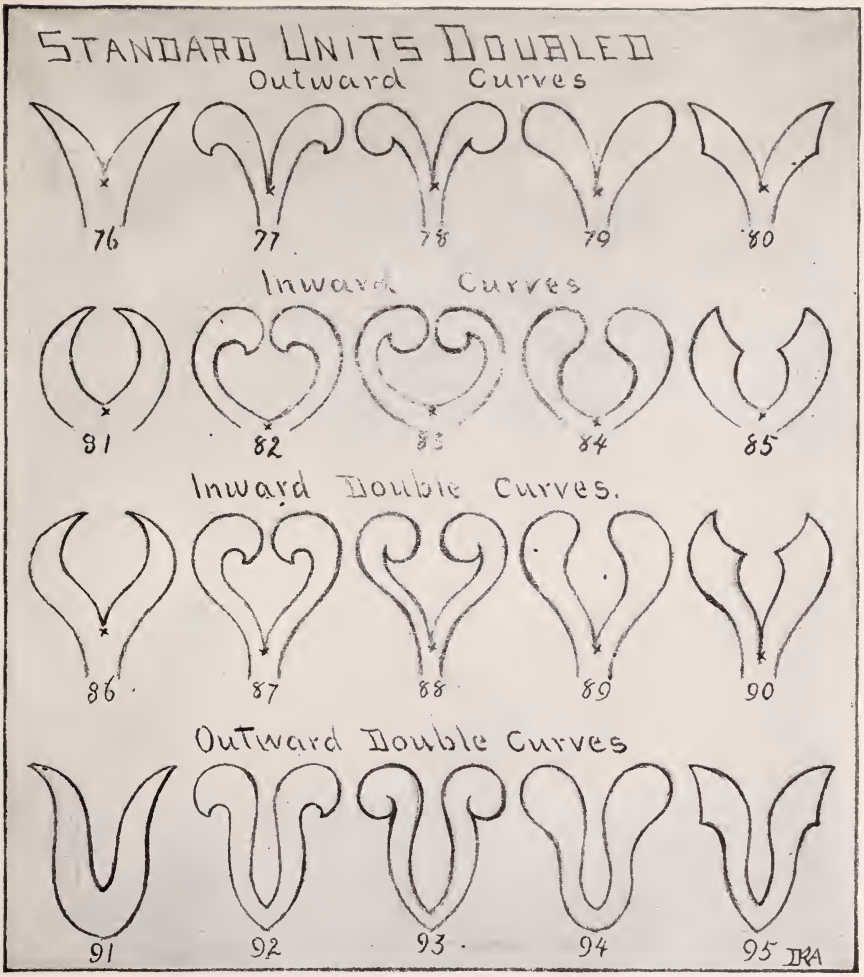
Figs. 91–95 represent the outward double curved standard units *doubled.*

Wing Units are formed by combining two standards. Fig. 96 is formed by combining the blade with itself. Fig. 97, the blade with the trumpet; Fig. 98, the blade with the whorl; Fig. 99, the blade with the loop, and Fig. 100, the blade with the shoulder.

Figs. 101–105 are the same as the above except that the main line is a double curve, thus making a more graceful unit. Figs. 106 and 107 are two very beautiful units; the first is formed by changing line A, Fig. 101, to a double curve, and the second by changing line B of the same unit to a double curve.

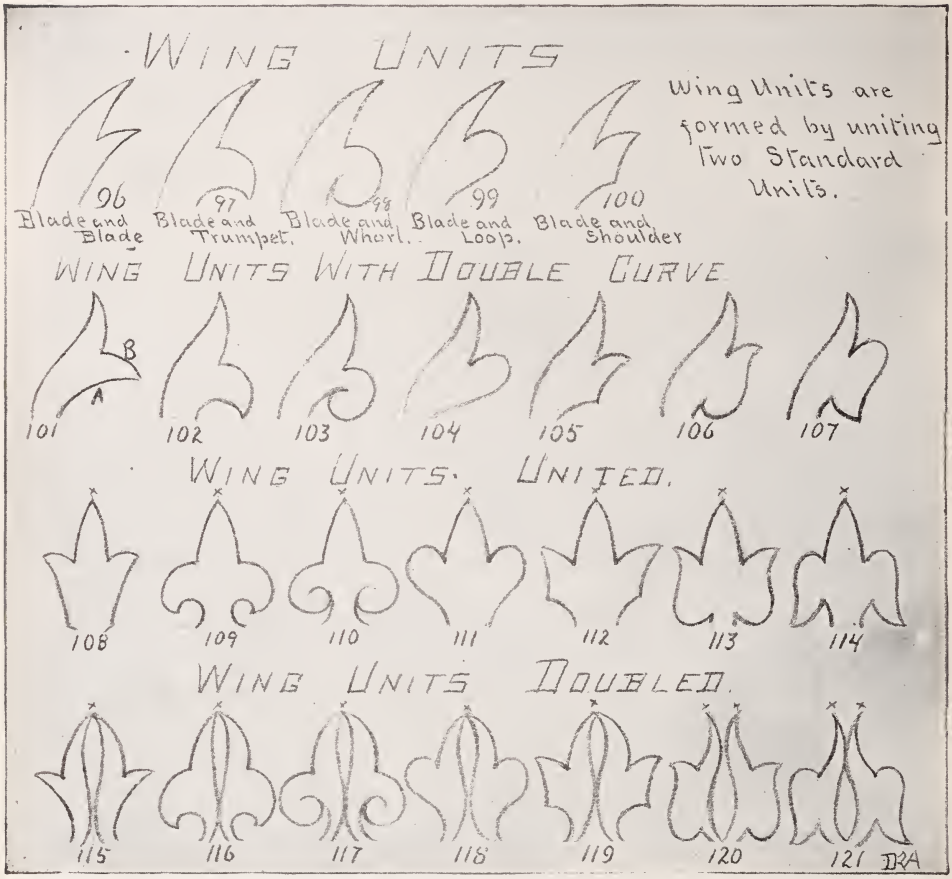
Figs. 108–114 are formed by combining two like wing units, forming a single unit, and Figs. 115–121 are formed by simply doubling two like units. Each vertical row in the illustration on page 144 is a modification of the same wing unit.

Figs. 122–127 show to what an extent units may be modified. They are principally modifications of wing units, 101 and

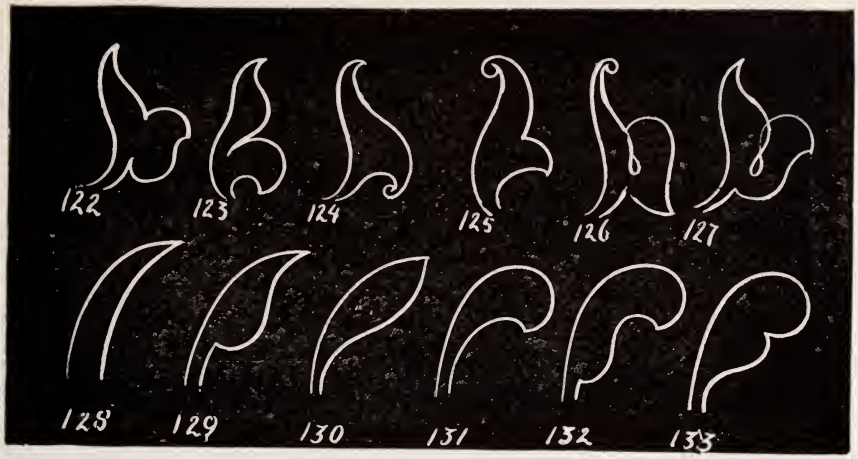


102. These units, Figs. 36–133, are not an end in themselves, but are to represent regular channels of thought along which the mind may travel in working out a design or pattern. The greatest

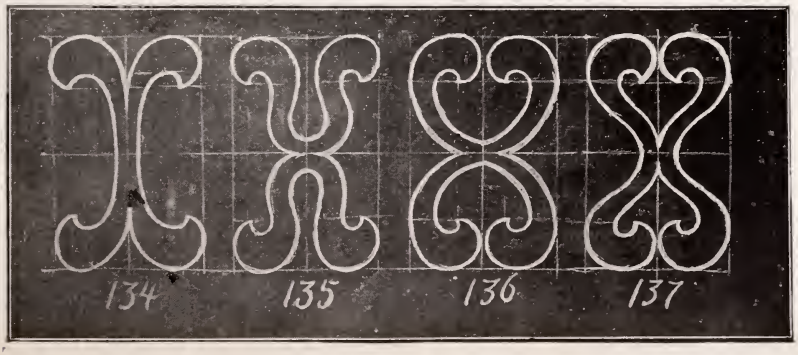
liberty may be taken with the units in adapting them to a decorative purpose; they may be added to, subtracted from, multiplied, divided, or modified in any way the mind may devise. They are



simply a means to an end, tools to work with, decorative words to express decorative thought, figures of design to work out examples of ornamentation. They are servants of the mind.



Very often we see units that seem entirely different in form from those with which we are familiar, such as the standards, and are apt to think they are entirely new, when they may be the same elements a little differently arranged. For example, Fig. 128 is the blade, change the inside line to a double curve, and Figs. 129 and 130 are formed. Fig. 131 is the trumpet, change the inside line to a double curve, and Figs. 132 and 133 are the result, thus forming new units based on the old.



Figs. 134, 135, 136 and 137 represent the outward curved, outward double curved, inward curved and inward double curved trumpet quadrupled. In like manner the remaining standard units may be quadrupled.

The Anthemion — Anthemion means to spread out like the fingers from the palm of the hand or the leaves from a palm tree. Figs. 138–152 are anthemion units.

Figs. 138–148 represent some very serviceable combinations for two-handed drawing. In these figures the small x shows the point of beginning when drawing these figures. The first row contains one unit on a side, the second row, two, and Fig. 148, three.

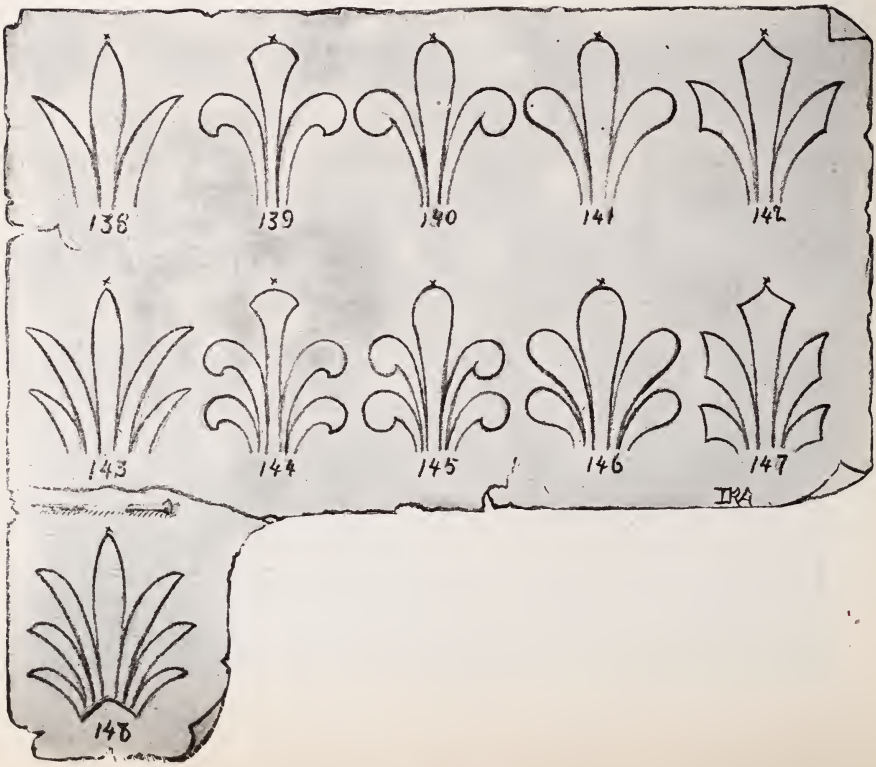
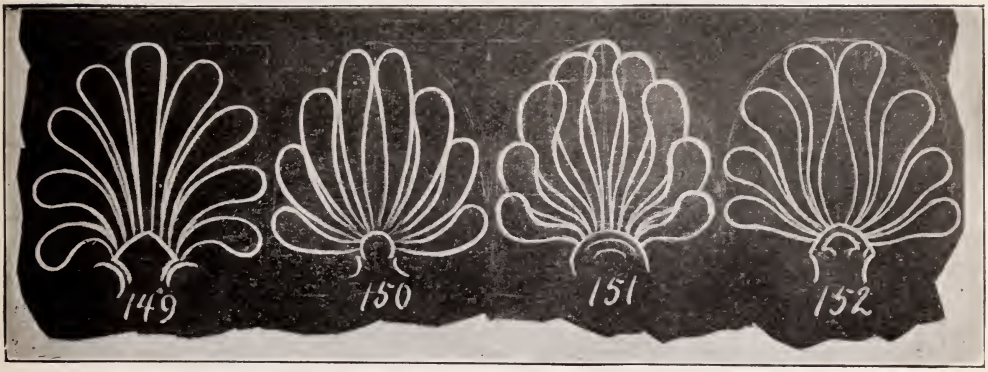


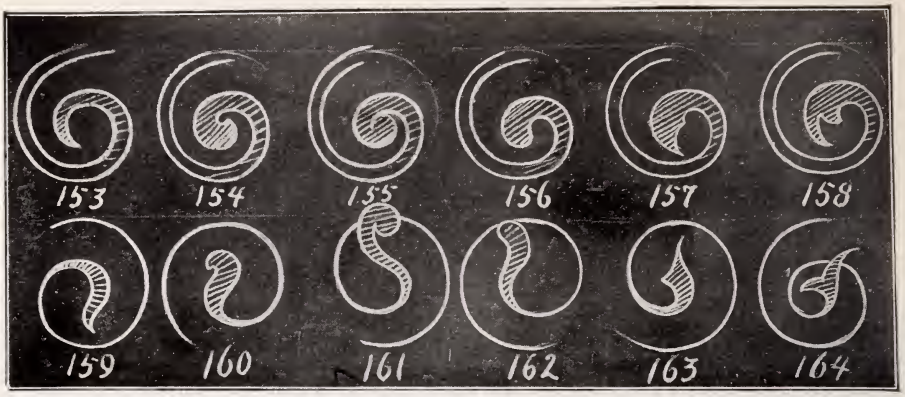
Fig. 149 represents the central feature of the Greek anthemion, one of the most perfect and beautiful of ornamental figures. Fig. 149 is the outward curved loop; Fig. 150 is the inward curved loop; Fig. 151, the inward double curved loop, and Fig. 152, the outward double curved loop. The other standard units may be used in the same manner, especially the blade, trumpet, and shoulder. Unit 130 lends itself very nicely to the forming of the anthemion.



Scroll Endings. — The standard units may be used as the terminations of scrolls, and as such are called *scroll endings*.

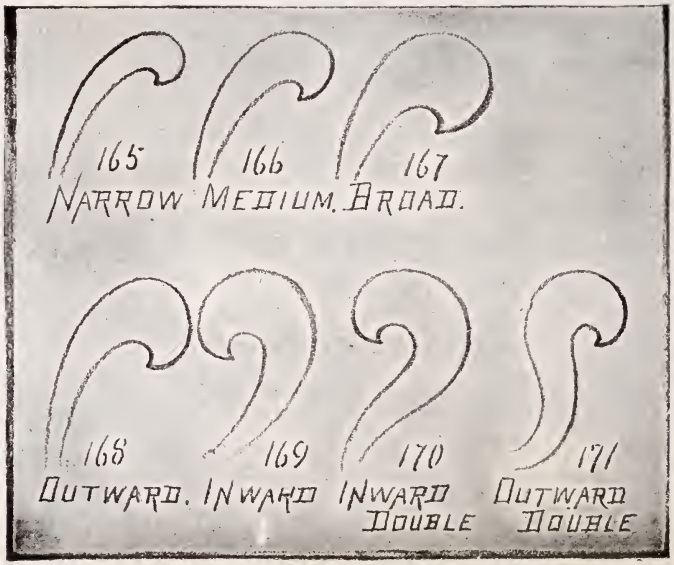
Figs. 153–158 represent double line scroll endings, and Figs. 159 and 164 single line scroll endings. Figs. 158 and 164 are wing units. The first row of endings represent the single curve, and the second row the double curve.

Learning the Standard Units. — The standard units should be learned so thoroughly that they can be drawn from memory with ease and facility. The drawing of them should, in part, become automatic.



In the learning of these units the pupil very rapidly develops freedom, speed and skill in the use of his hands.

The following is a good plan to follow in teaching these units to the class:



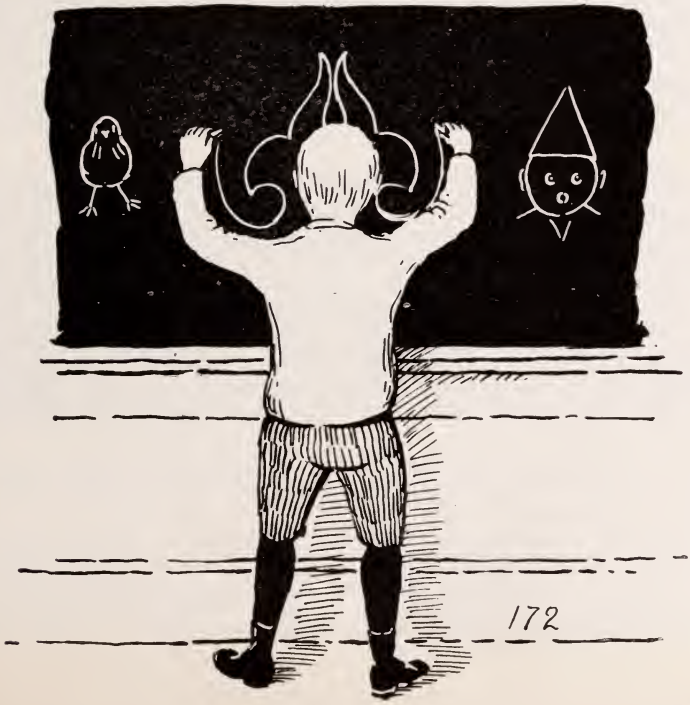
1. Teach the pupils to draw a unit, say the trumpet, Fig. 165.

2. Teach the pupils to represent the unit in three widths — narrow, medium and broad, Figs. 165, 166 and 167.

3. Teach the pupils to represent the unit in outward curve, Fig. 168, inward curve, Fig. 169, inward double curve, Fig. 170, and outward double curve, Fig. 171.

Each one of the standard units may be taught in the same or a similar way.

Ambidextrous Drawing. — Symmetrical units are best taught on the blackboard through ambidextrous, or two-handed, drawing. Forms similar to Figs. 36–50, 76–95, 108–121, 138–



148 are drawn with two hands on the blackboard with great facility. For example, Figs. 76–80 can be drawn by a class in less than two minutes after the standard units have been learned.

The aim in ambidextrous drawing is as follows:

To co-ordinate the two hands so they will work together freely and harmoniously.

To develop skill, freedom and speed in both hands working together.

The aim is not to teach the left hand to do the work of the right, this is practically impossible; but to teach each hand to do its part — to do that which each can do to the best advantage. The painter who can use either hand can work with less effort than if confined to the use of one. The carpenter who can, with either hand, push the plane, drive a nail, work the gauge and use the saw, finds his powers greatly enhanced, and the amount of work that can be done with the same amount of energy much increased.

Two-handed drawing is *not* a system of drawing, but an exercise for a specific purpose, and limited in scope to large, free movements of a symmetrical character. In the class-room its usefulness is confined mostly to drawing on the blackboard, though in reality there is no limit to its scope. All symmetrical objects are readily drawn with both hands.

Can the ambidextrous use of the hands be taught to pupils? Yes, with comparative ease.

Where? In the drawing class at the blackboard.

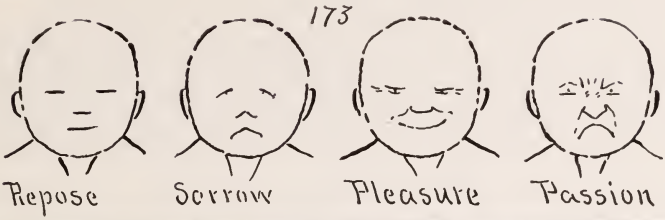
How? By following an orderly course, such as is given below.

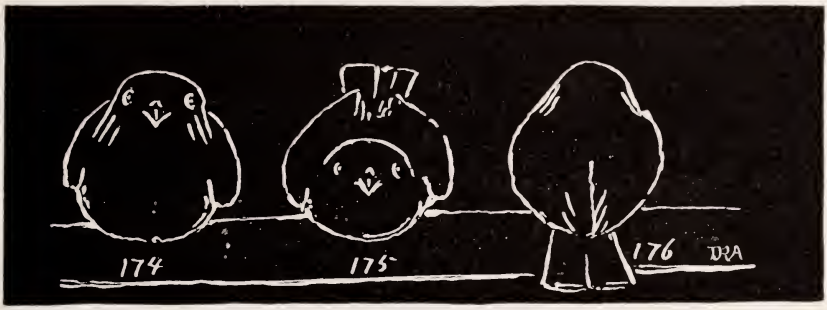
How much time will it take? Less than five minutes per day.

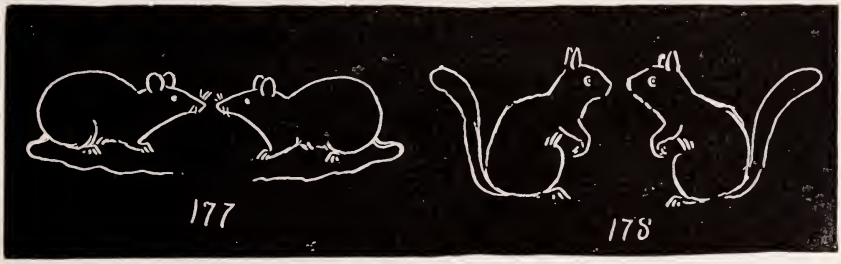
Do pupils like this work? Very much indeed, and as they gain skill, confidence, and facility, their pleasure grows with each acquisition of power.

How is an ambidextrous class conducted? (1) The class is divided into as many divisions as can be accommodated at the blackboard, allowing about thirty inches in width for each pupil.

(2) Each pupil is provided with two pieces of crayon and an eraser.







(3) The work for each week is placed at the top of the blackboard where it can be plainly seen by all. A director is appointed for each division. He gives three commands: *look*, *draw*, *erase*. At the command "Look," all the pupils look at the first figure. At the command "Draw," all draw the first figure. At the command

"Erase," all pupils erase their work ready for the next figure. In this way five figures can be easily drawn in five minutes after the foundational units are learned.

Chalk Dust.—Chalk dust in the room is caused (1) by quick erasing, (2) by the upward stroke of the eraser. The remedy is *to erase slowly downward.* There is no excuse for chalk dust in the room if the teacher cares to stop it.

Perfecting Exercises are for the purpose of raising the standard of excellence, correcting mannerisms and perfecting the unit or design in the mind of the pupil. For example, all may be able to draw the *trumpet*, but very imperfectly. Then a perfecting exercise would have for its object the perfecting of this unit: learning how to draw it more perfectly, making it more beautiful, and raising the ideal.

The manner of conducting a perfecting lesson is by comparison. The leader places on the blackboard the unit, or element, to be perfected, say the trumpet, as perfectly as he can. The pupils make a similar one, copying it again and again, receiving such help and suggestions as can be given.

The x in the two-handed figures, such as 76–90, 108–121, 138–148, show where to begin in the drawing of the exercise.

All symmetrical objects are adapted to two-handed drawing. Drawings similar to Figs. 172–178 are good. In the double figures, 177 and 178, the one on the left is drawn with the left hand, and the one on the right with the right hand. It is well to use one of these symmetrical figures each week in with the following Twenty Weeks' Course, whenever time will allow; but it is not well to pass the five-minute limit.

See Two-Handed Drawing, Book I., for further illustrations and details of the work.

TWENTY WEEKS' COURSE IN AMBIDEXTROUS DRAWING.

The following is an orderly and progressive course in two-handed drawing arranged in groups of what can be done by an ordinary class in five minutes. Each group is for one week's work five minutes per day. By this plan each group is drawn five times per week.

First Week.

Learn the standard units, Figs. 51, 52, 53, 54 and 55. Use one hand in learning the units, and learn them thoroughly.

Second Week.

Figs. 76, 77, 78, 79 and 80.

Third Week.

Figs. 138, 139, 140, 141 and 142.

Fourth Week.

Figs. 143, 144, 145, 146 and 147.

Fifth Week.

Fig. 148 and the other standard units used in the same manner.

Sixth Week.

Figs. 81, 82, 83, 84 and 85.

Seventh Week.

Figs. 86, 87, 88, 89 and 90.

Eighth Week.

Figs. 91, 92, 93, 94 and 95.

Ninth Week.

Learn the wing units, Figs. 96–100 and 101–107. Use one hand in learning these units.

Tenth Week.

Figs. 108, 109, 110, 111, 112, 113 and 114.

ELEVENTH WEEK.

Figs. 115, 116, 117, 118, 119, 120 and 121.

TWELFTH WEEK.

Figs. 36, 37, 38, 39, 40 and 41.

THIRTEENTH WEEK.

Use Fig. 112 in the twelfth week combinations.

FOURTEENTH WEEK.

Use Fig. 109 in the twelfth week combinations.

FIFTEENTH WEEK.

Figs. 42, 43, 44, 45 and 46.

SIXTEENTH WEEK.

Figs. 134, 135, 136 and 137.

SEVENTEENTH WEEK.

Double Figs. 122–127 after the manner of Fig. 108.

EIGHTEENTH WEEK.

Double Figs. 122–127 after the manner of Fig. 115.

NINETEENTH WEEK.

Double Figs. 129, 130, 132 and 133 after the manner of Fig. 148.

TWENTIETH WEEK.

Figs. 100, 101, 102, 103, 106 and 107, Chap. VI.

Application of the Standard Units. — Decoration is usually applied in three general forms, *as centers*, *as bands*, *as flat patterns*.

Centers are units arranged around a common point, or center. In shape they are usually geometrical, taking the form of a triangle, square rectangle, diamond, pentagon, circle, or ellipse. Figs. 185–191. Centers form centerpieces for rugs, ceilings, tiles, rosettes, panels, doilies, etc.

Bands and *Borders*. Repeat units side by side, running in

one direction, and a band or border is formed. Figs. 198–203. Bands and borders are used to surround centers and flat patterns to inclose space. In Fig. 208 a black border surrounds the center.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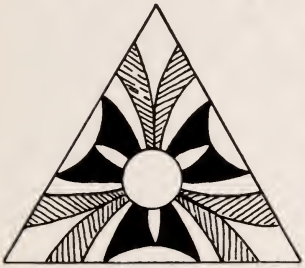
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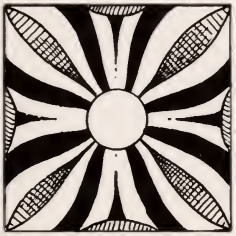
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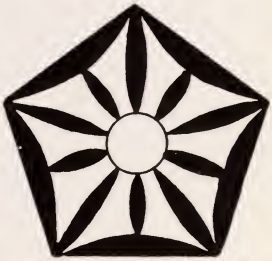
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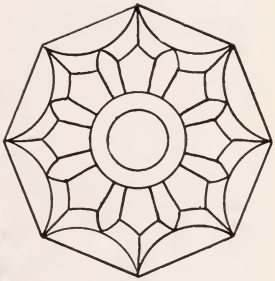
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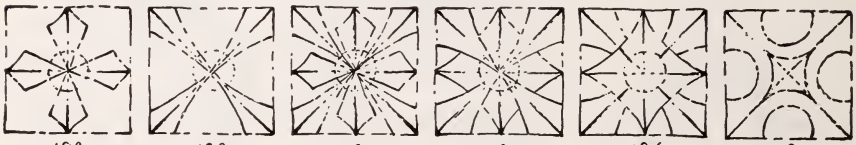
Flat Pattern is a term applied to a surface covered by an arrangement of units. Figs. 204–206. Flat pattern is used to cover the body of wall paper, carpets, curtains, rugs, dress patterns, etc.

Free Patterns are irregular in design, that is not repeated according to a geometrical plan or rule. A design representing the wind scattering autumn leaves would necessarily be a free pattern.

In Figs. 185–212 the same unit is used, *the shoulder*, so as to show more plainly the application.

Figs. 185–191 represent the most common forms of centers. In Fig. 185 the center is in shape triangular, in 186 square, and in 188 diamond, in 189 hexagonal, in 190 a rectangular panel in which only half is represented, and in 191 octagonal. It is, perhaps, easier to think of the hexagon as a double triangle, and the octagon as a double square.



192 193 194 195 196 197

Figs. 192–197 show some of the most simple arrangements of a unit around a center. The center is a square, and the unit used is the shoulder.

Figs. 198–203 represent simple bands or borders. Each one shows a different arrangement of the shoulder.

Figs. 204, 205 and 206 are examples of flat pattern. In Fig. 204, the unit is repeated regularly over the entire surface. In Figs. 205 and 206 the unit is doubled and repeated more irregularly.

Figs. 207–212 are six centers alike in form and the arrangements of the units, but differing in the manner of finishing. The unit used is the shoulder. In Fig. 207 the units and border are white, but in Fig. 208 they are black, and in Fig. 209 they are gray. In Figs. 210, 211 and 212 a combination of white, black and gray are used. These six centers are useful in showing or suggesting similar arrangements in other designs.

Thus far only one unit has been used in the designs—*the shoulder*. But in like manner all of the standard units may be used, as well as units derived from all other sources.

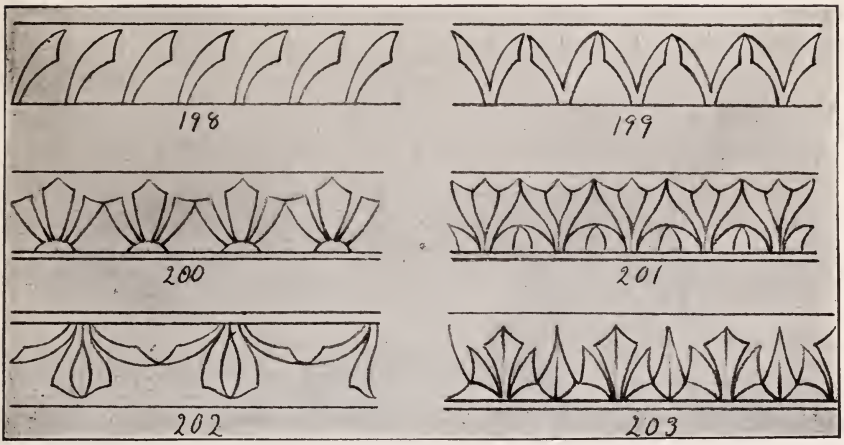
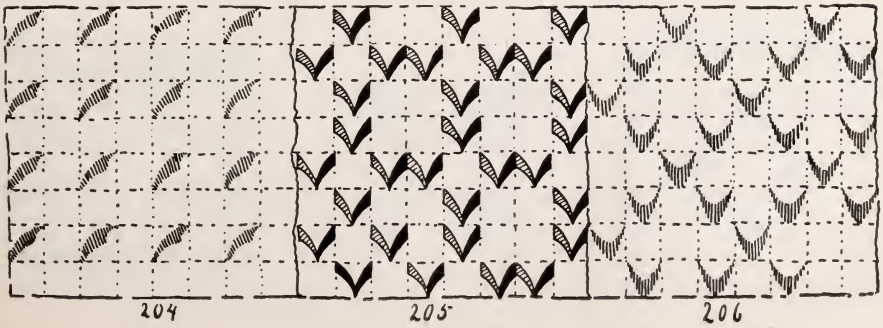


Fig. 213 is a conventionalized maple leaf, and in Figs. 214–217 this leaf as a unit is arranged in the form of centers based on the triangle and square. Fig. 216 is based on the square, merely being inclosed by a circle. Fig. 217 is best studied as being based on a double triangle rather than a hexagon.

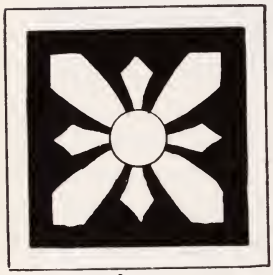


Method of Work.— *Use only the unaided hand in all of this work.* Do not use a ruler or compass at all. The training that comes from the use of the unaided hand is in every way superior to that derived from instruments, and in the end the quality of the work is higher and better. The use of instruments should follow, not precede, the use of the hand.

Give much attention to the *laying out* of the work and the use of construction lines. Use the blackboard constantly. It is the best place for drill work.

DRILL EXERCISES.

1. Design a triangular center, using the blade as a unit.
2. Design a triangular center, using the trumpet as a unit.
3. Design a triangular center, using the whorl as a unit.



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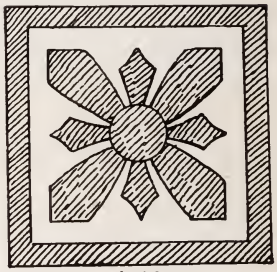

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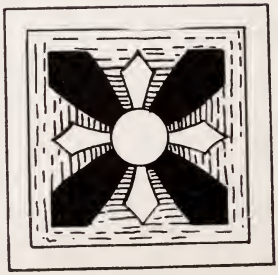

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4. Design a triangular center, using the loop as a unit.
5. Design a triangular center, using the shoulder as a unit.
6. Design a triangular center, using a wing unit.
7. Design a square center, using the blade as a unit.
8. Design a square center, using the trumpet as a unit.
9. Design a square center, using the whorl as a unit.
10. Design a square center, using the loop as a unit.
11. Design a square center, using the shoulder as a unit.
12. Design a square center, using Fig. 129 as a unit.
13. Design a square center, using a wing unit.
14. Design a pentagonal center, using the trumpet as a unit.
15. Design a pentagonal center, using a shoulder as a unit.
16. Design a hexagonal center, using a whorl as a unit.

NOTE.— Figs. 207–212 may be used as models in finishing the designs. Any design may be inclosed by a circle similar to Fig. 216.


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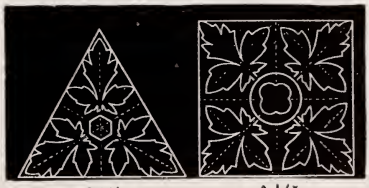
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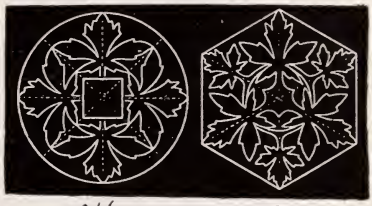
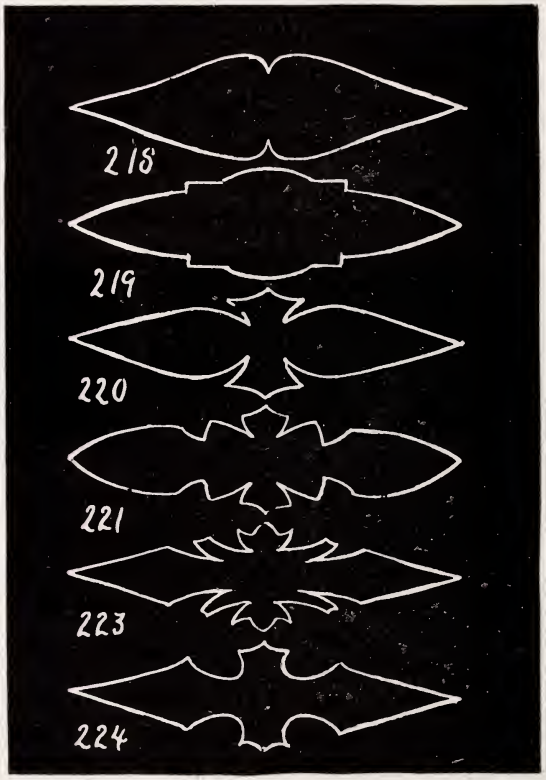

216 217

17. Design a diamond-shaped center, using a blade as a unit.
18. Design a diamond-shaped center, using a trumpet as a unit.
19. Design a diamond-shaped center, using the whorl as a unit.
20. Design a diamond-shaped center, using a loop as a unit.

NOTE.— Designs 218–224 may be drawn narrow, medium, or broad.

21. Place a design in 218, using the blade as a unit.
22. Place a design in 219, using the shoulder as a unit.
23 Place a design in 220, using the whorl as a unit.
24. Place a design in 221, using the loop as a unit.

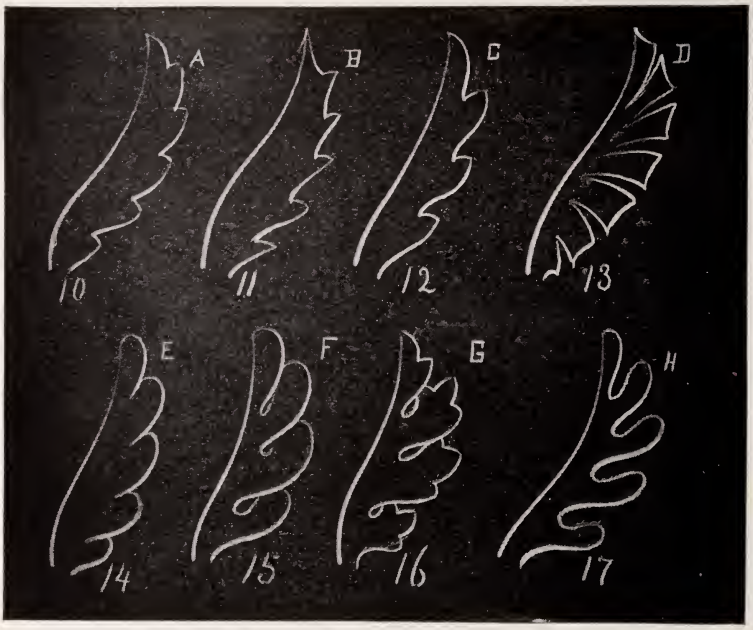
25. Place a design in 223, using the shoulder as a unit.
26. Place a design in 224, using a wing unit as a unit.
27. Design a border, using a blade as a unit.
28. Design a border, using a trumpet as a unit.
29. Design a border, using a whorl as a unit.
30. Design a border, using a loop as a unit.
31. Design a border, using a shoulder as a unit.



CHAPTER IX.

Foliation in design is to decorate with leaves. It is a general term applied to a wide range of decoration, a good example of which is seen in the Corinthian capital.

The principle of foliation is found in the combinations of the single and double curves, as shown in Fig. 1, and the various forms are found in the eight leaf forms, Figs. 2–9.



The letter above and to the right of each drawing indicates the principle that has been used. For example, A in Figs. 1, 2, 10, 18 and 27 indicates that the *outward curve* has been used in each. In Fig. 2, and those marked A, the *outward curve* is the predominating line. In Fig. 3, and those marked B, the *inward curve* is the predominating line. In Fig. 4, and those marked C, the *inward* double curve is the predominating line.

The square-lobed figure, and those marked D, are based on the *shoulder*.

Figs. 6, 7 and 9, and those marked E F H, are round-lobed and have for their basis the *loop*.

Fig. 8, and those marked G, have for their basis the *wing* units.

Figs. 10–17 are the same as Figs. 2–9, except that they

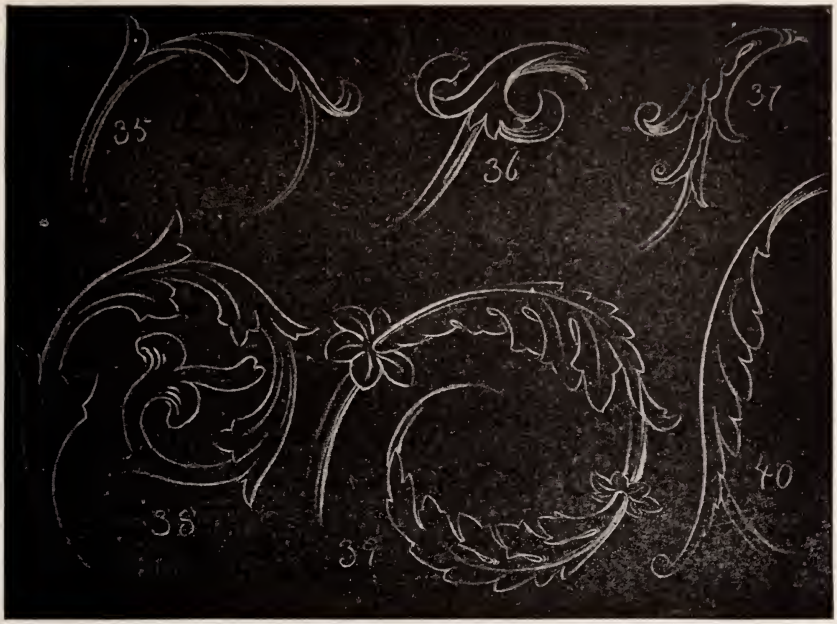
represent the half leaf. The half leaf is better adapted to the scroll; in Figs. 18–25 it is shown fitted to various scrolls.

Figs. 26–34 represent rosettes. These rosettes follow the general plan outlined in Figs. 2–9. They may be used as endings, as in Fig. 22, or as the base of leaf forms, as in Figs. 39, 57, 59 and 60.

Figs. 35 to 52 represent examples of foliation taken from various sources. All of them represent the same elements as are found in the standard units.

These bits of leaf work can be used in connection with various kinds of scroll work, and for suggestions in the application of units.

Figs. 53–60 represent various forms of leaf decoration illustrating some of the most simple forms and combinations: Figs. 61–67 show the application of these principles to various animal forms.



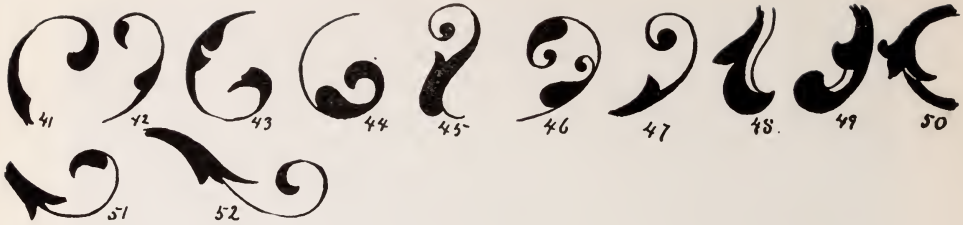
DRILL EXERCISES.

OUTWARD CURVE.

1. Draw Fig. 2.
2. Draw Fig. 10.
3. Draw Fig. 10, branching to both left and right.
4. Draw Fig. 18.
5. Draw Fig. 26.
6. Draw Fig. 27.
7. Draw Fig. 40.

INWARD CURVE.

8. Draw Fig. 3.
9. Draw Fig. 11.



10. Draw Fig. 19.
11. Draw Fig. 28.

DOUBLE CURVE.

12. Draw Fig. 4.
13. Draw Fig. 12.
14. Draw Fig. 20.
15. Draw Fig. 29.

16. Draw Fig. 38.
17. Combine Fig. 29 with Fig. 40.
18. Draw Fig. 5. Fig. 13. Fig. 25. Fig. 33.
19. Draw Fig. 6. Fig. 14. Fig. 21. Fig. 30.
20. Draw Fig. 7. Fig. 15. Fig. 22. Fig. 31.
21. Draw Fig. 8. Fig. 16. Fig. 24. Fig 32. Fig. 39. Fig. 40.
22. Draw Fig. 9. Fig. 17. Fig. 23. Fig. 34.
23. Combine 34 and 37.
24. Combine 29 and 35.

25. Place 35 in the form of 74.
26. Place 37 in the form of 80.
27. Place 41 in the form of 79.
28. Add 42 to 76.
29. Add 43 to 76.
30. Add 44 and 49 to 79.

31. Add 45 to 76.
32. Add 46 to 78.
33. Add 47 to 80.
34. Add 48 to 74.
35. Add 50 to 81.
36. Add 51 to 80.
37. Add 52 to 76.

38. Add a simple leaf form, similar to Fig. 58. To 68. To 69. To 70. To 71. To 72.

39. Draw Fig. 57. Fig. 59. Fig. 60.

40. Draw Fig. 61. Fig. 62. Fig. 63. Fig. 64. Fig. 65. Fig. 66. Fig. 67.

41. Combine Figs. 61, 77 and 43.

42. Combine Figs. 63, 78 and 50.

43. Combine Figs. 65, 74 and 41.

THE IDEA.

In decorative design the object decorated is the idea; as, for example, a door knob, a key, or a rug. The idea is and should be primary, and the decoration secondary. The decoration is to beautify the idea, and as such is subordinate to it. The idea may exist without the decoration, but the decoration has no legitimate existence without the idea.

Aim of Decoration.— The end and aim of decoration is *to please*, to make the idea more beautiful, more pleasing. If the decorative design does not please, it is a failure — the end has not been obtained.

There are many, many laws governing decorative design, laws of magnitude, laws of relation, laws of form, laws of position, laws of direction, all aiming to express harmony, rhythm, unity, fullness and richness in form. But all of these laws may be summed up in the question: "*Does your design please you?*" The arranging of the decorative elements is based on your taste and judgment; and this taste and judgment is developed through your understanding of the elements of design and skill in arranging them in a pleasing manner.

Decorating the Idea.— The steps necessary in the decoration have in part been given before. They are:

(1) Know the idea to be decorated.

(2) Know the units or elements with which the idea is to be decorated.

(3) Associate the decorative elements together in such a manner as to make the idea more pleasing and beautiful.

Forms of Decoration may in general be divided into:

Centers, borders, bands, flat patterns, endings, supports, trophies, emblems, symbols, the study of which is based on elements already given.

The lists of objects suitable for decoration include everything from a pin head to a tower, from a common finger ring to the frieze of a temple. All objects may be decorated: vessels, utensils, furniture, toilet articles, jewelry — anything that has form or occupies space; but it rests with you how and in what manner the work shall be done.

CHAPTER X.

Constructive Drawing.

Constructive drawing is the language of making — the language of modern industry. Every manufactured thing, and all the mechanism of manufacture of this teeming industrial age, has first to be expressed on paper in the language of form. All the millions of busy hands in the industrial world are directed by the drawing, and without it the revolving wheels of industry would cease. There is not a steamer crosses the ocean, not a vessel sails the seas, not a bridge spans a river, not a railroad crosses the continent, not a temple points toward heaven, without the aid of this industrial art called drawing. This style of drawing is called *constructive* or *mechanical drawing*, and the drawings themselves are called *working drawings*.

A working drawing then is a drawing to show workmen how to construct an object. It aims to give the *size*, *structure* and *material* of the object, but not its ordinary *appearance*.

Four Methods of Constructive Drawing.— There are four ways of representing a constructive drawing. They are:

1. By Isometric drawing.
2. By Cabinet drawing.
3. By Orthographic projection.
4. By a Sectional drawing.

Fig. 1 represents a perspective or picture drawing of a common brick, which is 8″ long, 4″ wide, and 2″ thick.

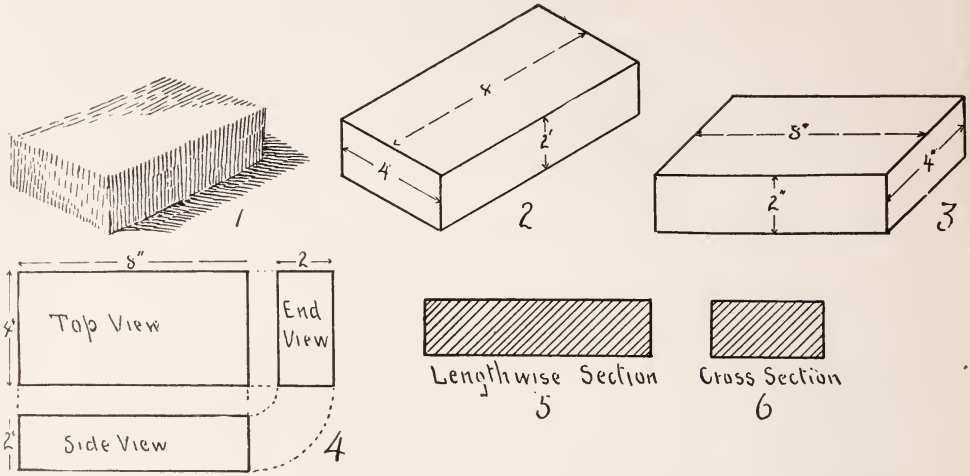


Fig. 2 represents an isometric drawing of this brick. This drawing differs from the perspective drawing in the lines of the faces not converging, but being perfectly parallel. All of the lines of isometric drawing slant 30° from the horizontal, and the measurements are exactly as they measure on the drawing in the direction of the 30° lines.

Fig. 3 represents a cabinet drawing of the brick. This kind of drawing varies from isometric drawing in that the receding lines may be *any angle*, and the front and back faces are in *vertical planes*. The measurements are likewise exactly as they measure on the drawing.

Fig. 4 represents an orthographic projection of the brick in which the *top view*, the *side view* and the *end view* of the brick are shown separately. Each face is represented as it actually appears looking straight at it when the face is directly in front of the eye. The side view is often called the *front view*.

Figs. 5 and 6 represent sectional drawings of the brick. Fig. 5 is the *longitudinal* or *lengthwise* section, and Fig. 6 is the *transverse* or *cross* section.

Sectional drawings show the construction of objects on the inside as they appear when cut in two parts.

Materials.— The minimum of materials necessary for constructive drawing are :

A pair of compasses with pencil attachment.

A T square with a 9″ to 12″ blade.

A 45° and a 30°–60° triangle.

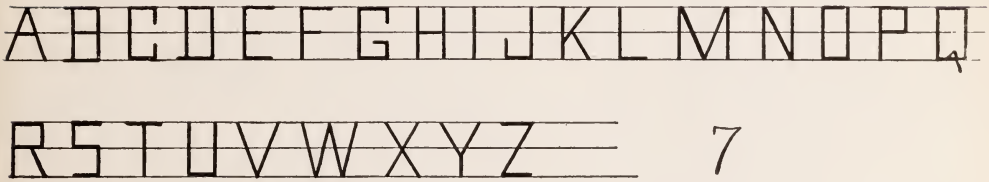
A hard pencil, H or No. 3.

A common foot rule.

A pad of paper 6″ x 9″ or 9″ x 12″. The pad should be made with a stiff back and with perfectly straight edges and square corners so that it can be used in place of a drawing board.

If ink is used, then to the above should be added a bottle of drawing ink, a ruling pen and a pen attachment for the compasses.

A piece of old linen or cotton cloth is serviceable to keep the instruments clean.



Lettering.— A simple form of letters and figures is indispensable in constructive drawing, and is also very serviceable in the general work of the school-room.

Both teacher and pupil should acquire some neat and serviceable form of lettering.

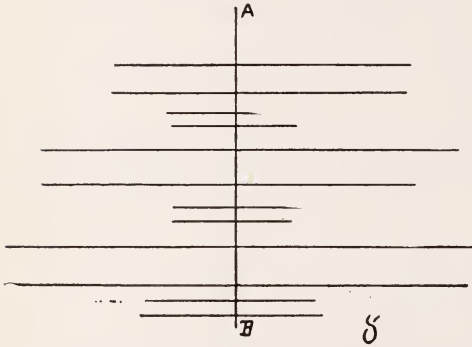
Below are given two forms of letters, which are perhaps as simple as lettering can be made.

Fig. 7 represents the *straight line letters*, so called because each letter is made with straight lines.

All the letters may be made of the same width except I M and W. I is merely a straight line, and M and W are double the width of the other letters.

In lettering, the guide lines may be made with the T square or straight edge, but *all lettering and spacing should, from the very beginning, be done with the unaided hand and eye.* By depending on the free hand the work may not be as neat at first, but in the end it will not only be neater, but far more rapid, and a very desirable power of judgment will be acquired that will have a wide range of use in other lines of work.

The chief beauty of printing lies in keeping the main or vertical lines parallel and the spacing of the letters equal. So important is this that these steps should be done separately. The four



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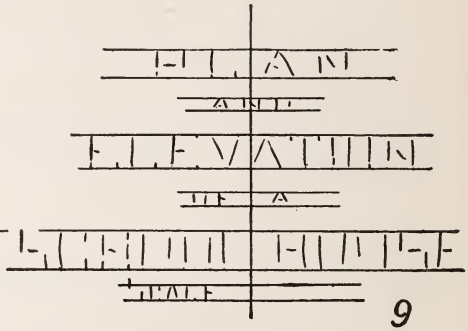

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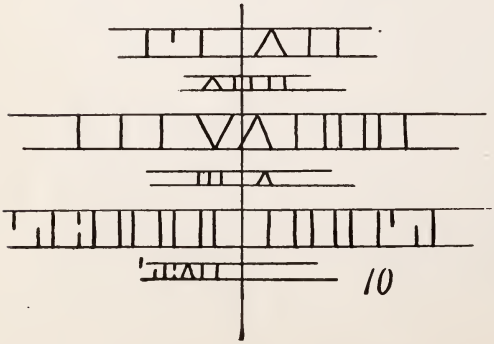

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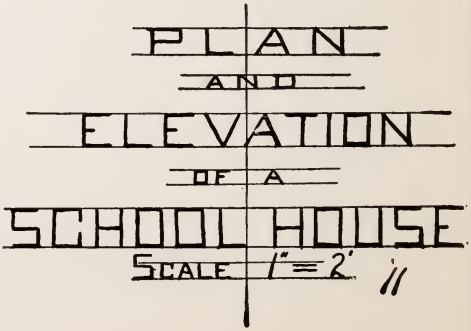

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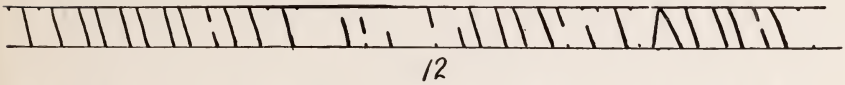
steps are: (1) The line spacing, Fig. 8. (2) The letter spacing, Fig. 9. (3) The drawing of the main lines of the letters, Fig. 10. (4) Finishing the letters, Fig. 11.

When the printing is symmetrical, as in Figs. 8–11, then a *median line*, as A B, Fig. 8, is drawn, and half of the letters and spaces placed on each side of it. This is done by counting the letters in each line, and working from the middle letter right and left from the median line. For example, in Fig. 11, the line *school-house* contains eleven letters, and counting the space between the words as one letter, there are twelve letters in all, which will make six letters on each side of the median line.



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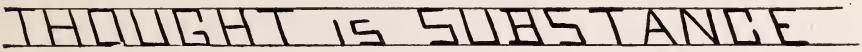

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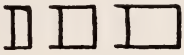

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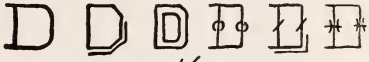

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Steps 2 and 3 may be combined after a little practice, and the spacing and the main lines made at the same time, as in Fig. 12, and then finished, as in Fig. 13.

The straight line letters may be made the basis of all styles of capital letters. They may slant *to the left*, *to the right*, *or remain vertical*, as in Fig. 14.

They may vary in width, be *narrow*, *medium* or *wide*, as in Fig. 15.

They may be *round*, *angular*, *blocked* or *decorated*, as in Fig. 16.

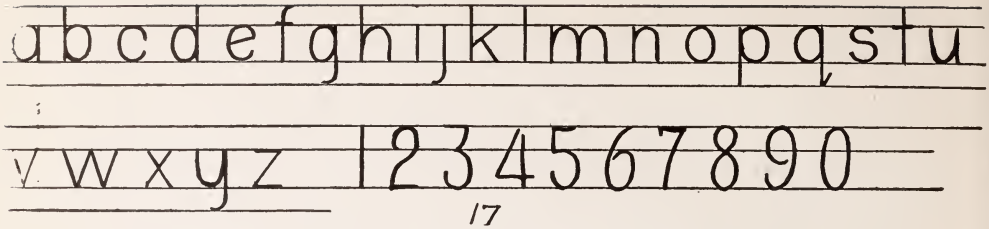
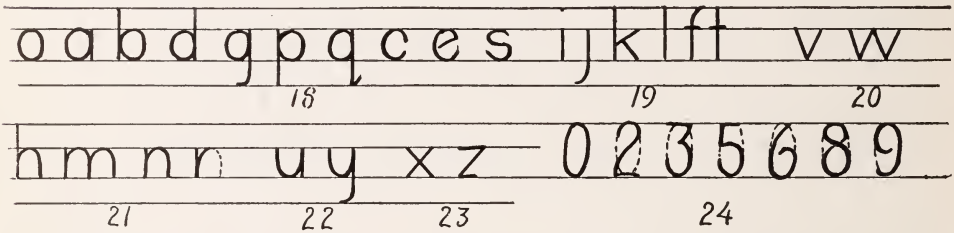


Fig. 17 represents a simple form of small letters which is very serviceable where considerable printing is to be done. Printing with small letters is more rapid than with the capitals. This alphabet, as well as the figures, where they are curved in part, is based on the letter O.



In Figs. 18–23 the letters that are similar in construction are grouped together.

Letters a, b, d, g, p and q are formed by the addition of a vertical line tangent to the letter o, and c, e and s are merely modifications of o. Letters i, j, k, l, f and t are straight lines with slight additions to distinguish them apart. w is a double v. h, m, n, and r are alike in construction ; u and y are also similar. x and z are in a class by themselves, being unlike any other letter, but easy to understand.

Drill Exercises in Printing.— *In printing, words should be given prominence in proportion to their importance*, as shown in Fig. 11. Unimportant words should occupy a subordinated place both in size and position.

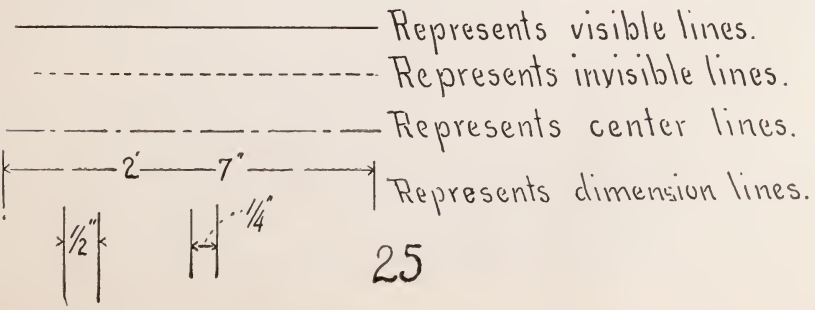
Print the following readings in straight line letters:

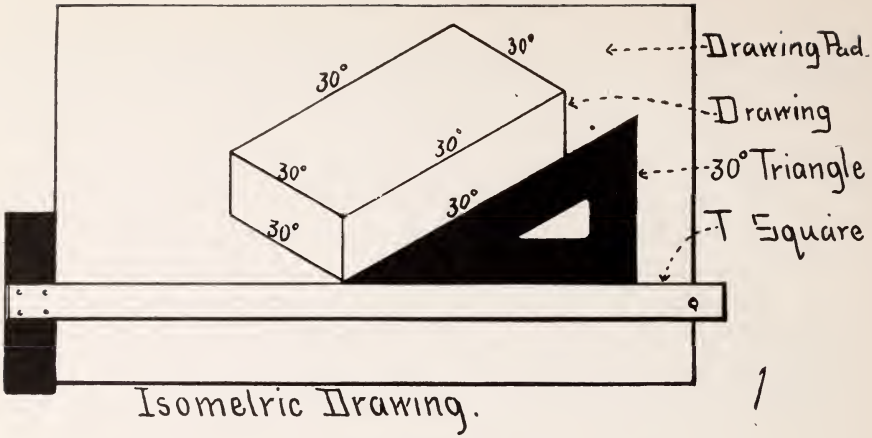
1. Post-office.
2. Reading-room.
3. Principal's office. Hours from 8 to 10 A. M.
4. Map of the State of Oregon.
5. Chamber of Commerce, Denver, Colorado.
6. Second floor plan, Markham School, Oakland, Cal.
7. Section drawing of a Globe valve. Exact size.

Print the following readings in small letters, using the same size letters for all words.

8. Giving is receiving.
9. To do is more than to know.
10. We alone can limit ourselves.
11. Substitute a love thought in place of a hate thought.
12. Skill is the expression of power.
13. Nothing can be truly great that is not right.
14. The more cheerfulness we spend, the more remains.
15. You cannot do or act above your thought.
16. Neatness, accuracy and speed are the big words in Constructive Drawing.

This sign ' above a figure indicates feet and this sign " inches. 2'— 6" would read 2 feet and 6 inches.





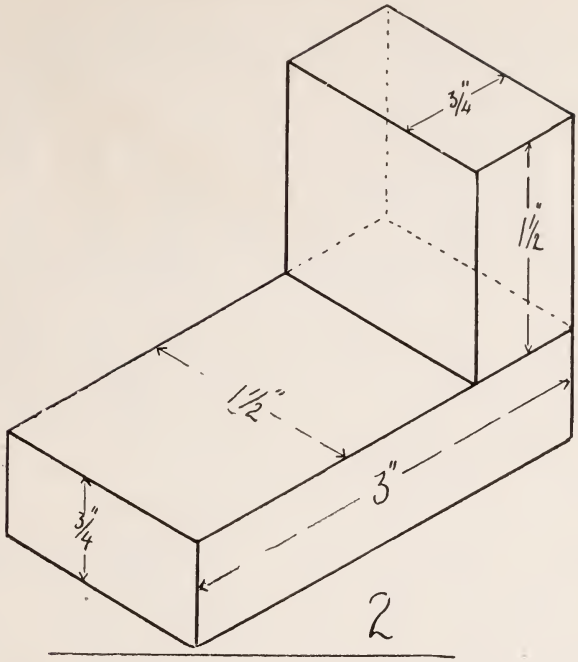
CHAPTER XI.

Isometric and Cabinet Drawing.

The advantage of Isometric and Cabinet drawing is that they combine much of the intelligibleness of the picture, and the exactness of the projection. They also possess the advantage of being more readily understood by those unacquainted with drawings of plans and elevations.

Isometric Drawing.—In isometric drawing the T square and the 30° triangle are used together, as in Fig. 1. All right angles are made with 30° lines, or 30° lines and vertical lines. (The vertical lines are in reality 30° lines that slant directly away.) The lines are made 30° from the horizontal edge of the T square. All measurements in isometric drawing are made on the 30° or vertical lines. All other measurements are not true.

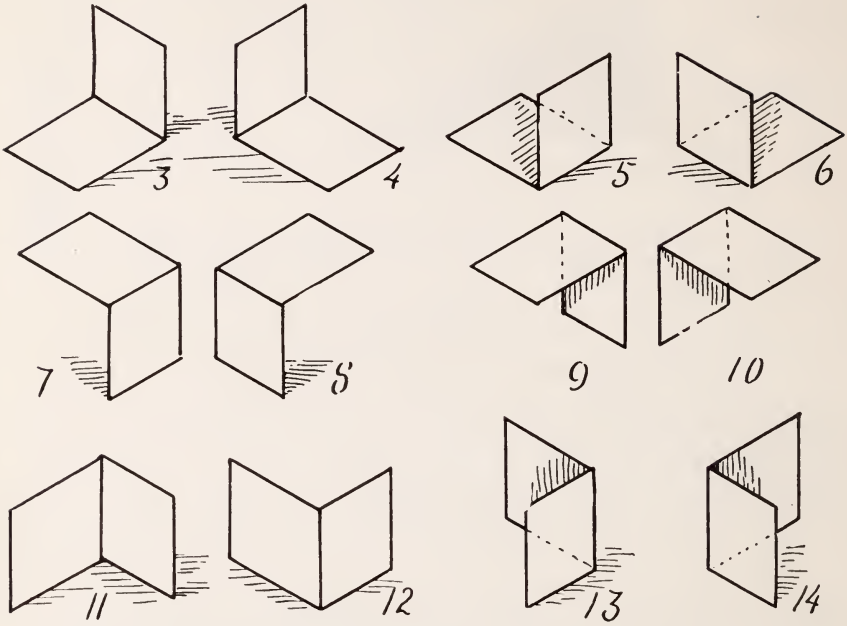
For the purpose of learning isometric drawing, have several models made like Fig. 2. Give these models to the pupils and let them make isometric drawings of them until they understand the process. Let them do as many of the following exercises as is necessary to gain this understanding.



DRILL EXERCISES.

1. Make an isometric drawing, exact size of the model, in the position of Fig. 3 (see Fig. 2).
2. Draw the model in the position of Fig. 4.
3. Draw the model in the position of Fig. 5.
4. Draw the model in the position of Fig. 6.
5. Draw the model in the position of Fig. 7.
6. Draw the model in the position of Fig. 8.
7. Draw the model in the position of Fig. 9.
8. Draw the model in the position of Fig. 10.
9. Draw the model in the position of Fig. 11.
10. Draw the model in the position of Fig. 12.

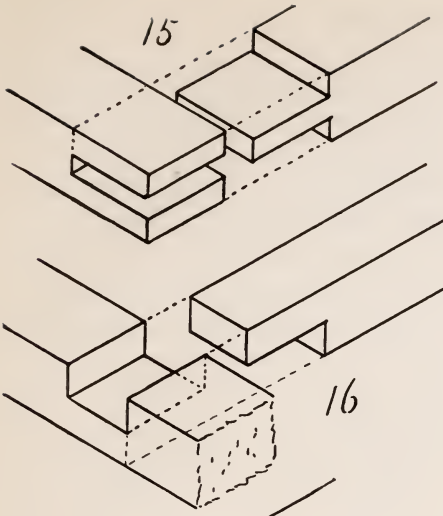
11. Draw the model in the position of Fig. 13.
12. Draw the model in the position of Fig. 14.

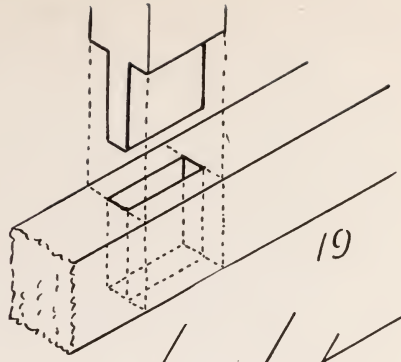


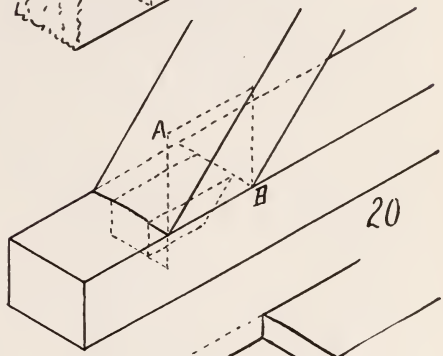
Joints.— After the pupils have learned the process of isometric drawing, take up some other form of work as an application of the process. The various kinds of joints are excellent for this purpose, and may be made by any carpenter or cabinet maker.

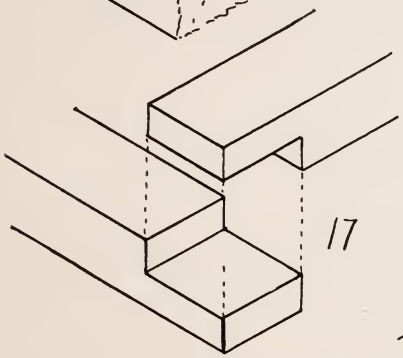
Have a set of joints made out of stock 1″x $1\frac{1}{2}$″ and about 6″ long. If preferred, a variety of sizes may be made.

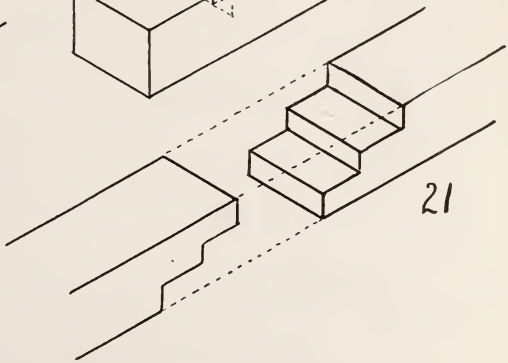
Figs. 15–21 represent some of the most common joints, and also different ways of representing them in isometric drawing. Each joint may be represented in a variety of ways. For example, Fig. 16 could be represented in the same manner as Figs. 17, 18 and 19, as well as several other ways.

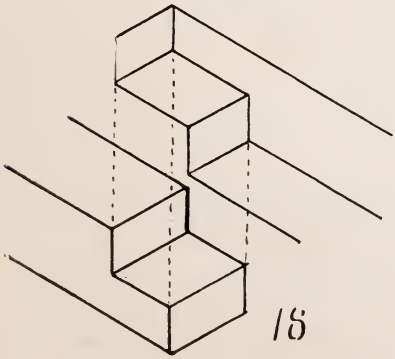








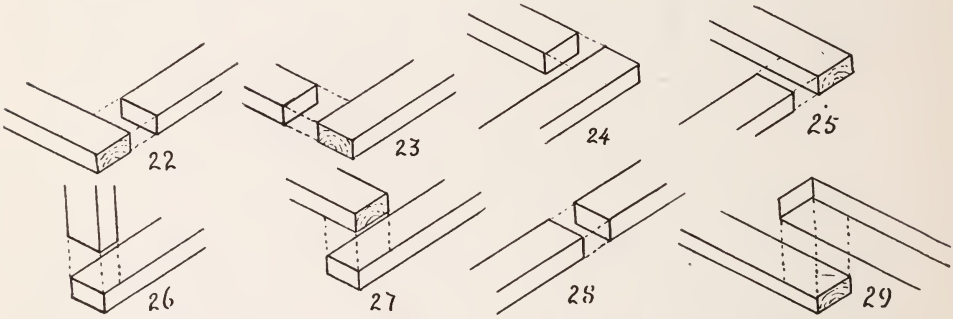




15 Open Mortise and Tenon Joint.
16 Halved T Joint.
17 and 18 Halved Joint
19 Mortise and Tenon Joint.
20 Brace Joint.
21 Scarf Joint.

All the joints are made with 30° and vertical lines, except Fig. 20, the brace joint. The brace is at an angle of 45° from the main stick. In isometric drawing, measurements can be made on 30° and vertical lines only. The lines of the brace are found by drawing a diagonal through the square A B. A 45° line may also be represented by the 60° triangle.

The joints are to be placed in the hands of the pupils to be drawn exact size in any position that to them seems best to represent the joint.



Figs. 22–29 represent the various ways in which joints may be drawn. Each joint may be drawn in most of the above positions.

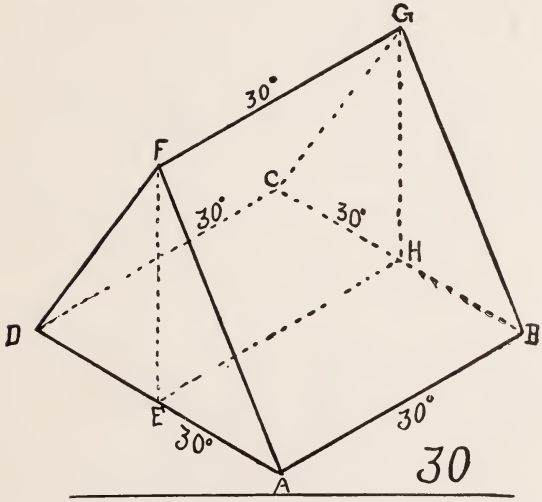
Drill Exercises.— *Draw the joints, exact size, in the following positions. Use the real joint for a model.*

1. Draw the open mortise and tenon joint.
2. Draw the open mortise and tenon joint in the position of Fig. 23.
3. Draw the open mortise and tenon joint in the position of Fig. 26.

Arrange the joint before you in the position it is to be drawn.

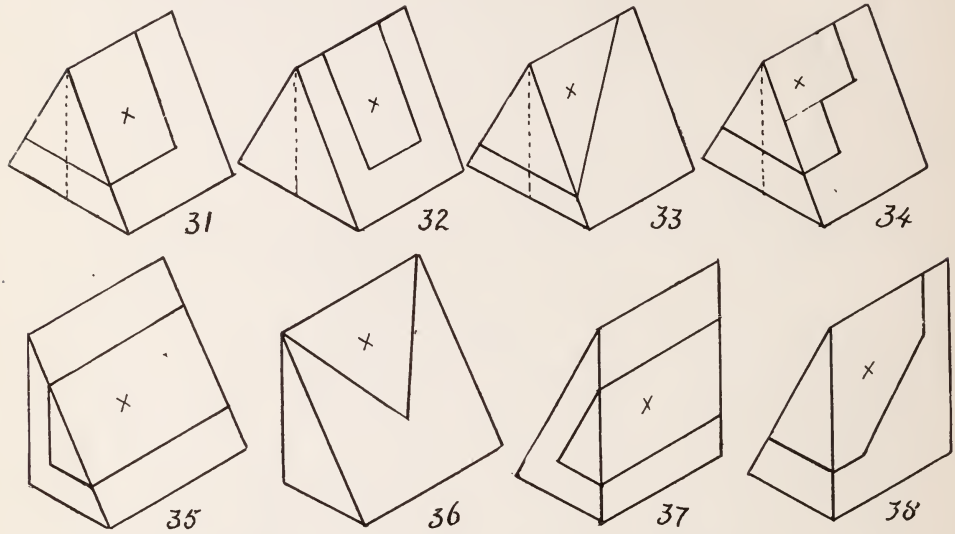
4. Draw the halved T joint.
5. Draw the halved T joint in the position of Fig. 23.

6. Draw the halved T joint in the position of Fig. 27.
7. Draw the halved joint.
8. Draw the halved joint in the position of Fig. 24.
9. Draw the halved joint in the position of Fig. 25.
10. Draw the halved joint in the position of Fig. 26.
11. Draw the halved joint in the position of Fig. 29.
12. Draw the halved joint in the position of Fig. 28.
13. Draw the halved joint in the position of Fig. 18.
14. Draw the mortise and tenon joint.
15. Draw the mortise and tenon joint in the position of Fig. 25.
16. Draw the brace joint.
17. Draw the scarf joint.



The Triangular Prism.—In isometric drawing, measurements can be made only on 30° and vertical lines. On all other lines the measurements will not be true. For example, in Fig. 30 lines F A and F D are in reality equal, but in the figure they do not measure the same.

The triangular prism is drawn as follows: (1) Draw the the base A B C D, Fig. 30. (2) Bisect A D as at E. (3) From E draw a vertical line as high as the apex F is to be. (4) Draw the lines E H, H G, and F G, also the lines F D and F A, G C and G B.



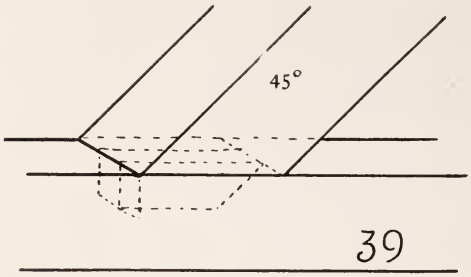
Figs. 31–34 are triangular prisms similar to Fig. 30, and are drawn in the same manner.

Figs. 35–38 are triangular prisms similar to one half of Fig. 30, and are drawn in the same manner.

In each of the above triangular prisms, the part marked X is to be removed from the prisms and *all lines, both seen and unseen, are to be represented.*

DRILL EXERCISES.

1. Draw Fig. 31, and remove the part marked X. Show all lines, both seen and unseen, in the finished drawing.
2. Draw Fig. 32, and remove the part marked X.
3. Draw Fig. 33, and remove the part marked X.
4. Draw Fig. 34, and remove the part marked X.
5. Draw Fig. 35, and remove X.
6. Draw Fig. 36, and remove X.
7. Draw Fig. 37, and remove X.
8. Draw Fig. 38, and remove X.



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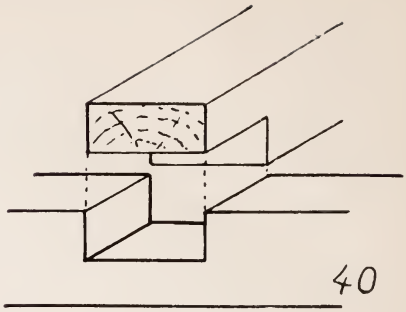

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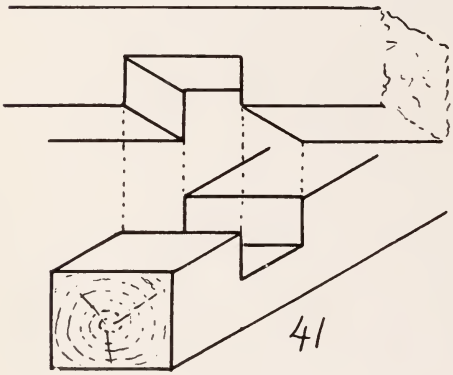

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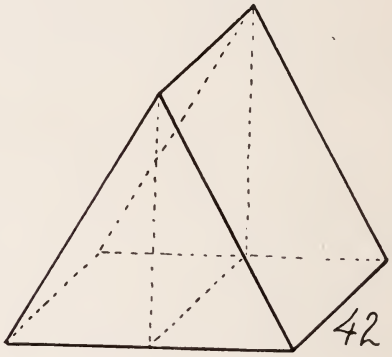


42

CABINET DRAWING.

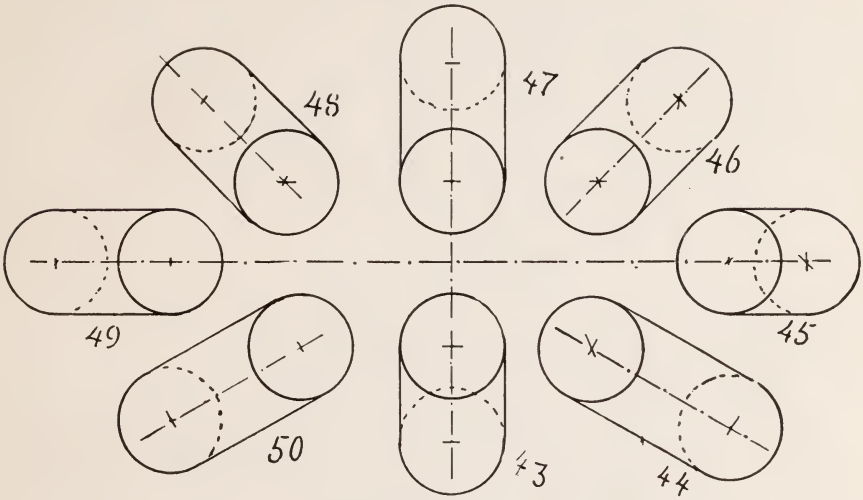
Cabinet and isometric drawing are very similar; their chief points of difference are:

(1) In cabinet drawing all measurements in the vertical planes are true as well as those along the main receding lines, while in isometric drawing only those measurements on vertical and 30° lines are true. For example, the oblique lines of Fig. 39 are true 45° lines, and all the lines in Fig. 42 are lines of true measurement.

(2) Circular and curved lines can be represented in true measurement on the vertical planes of cabinet drawing, while in isometric drawing it is impossible. See Figs. 51–55.

(3) The receding lines of cabinet drawing may be extended in any direction or angle, while isometric drawing is confined to 30°.

In Fig. 41 the receding lines are 30°, but in Fig. 42 they are 45°. In Fig. 43 the receding lines are vertical, in Figs. 45 and

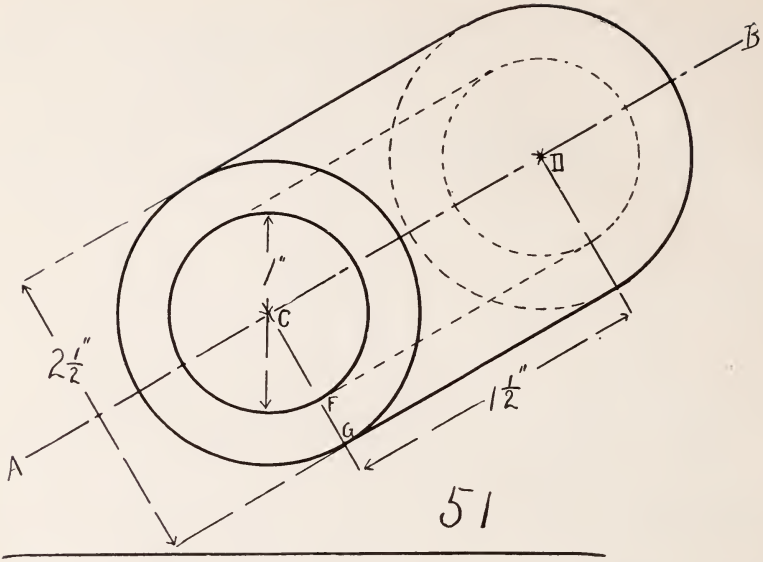


49 they are horizontal, in Figs. 46 and 48 they are 45°, and 30° in Figs. 44 and 50.

Isometric drawings can easily be made in cabinet drawing. Fig. 39 represents the *brace joint*, Fig. 40 the *halved T joint*, Fig. 41 a *cross lap joint*, and Fig. 42 a *triangular prism*; all of which were represented in isometric drawing.

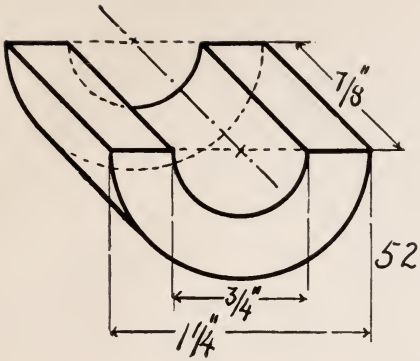
Figs. 43–50 represent cylinders drawn in cabinet drawing to show the wide range of angle that may be used in this kind of work.

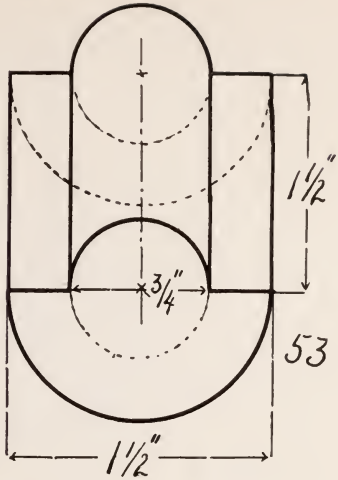
True measurements may be made on the vertical faces and in the direction of the receding lines of any of these figures.



A Drill Model.—Use for a drill model a cylinder with a round hole through it, similar to Fig. 51. These models may be made by sawing the ends from spools, but a better plan is to have made on a lathe as many models as necessary. Have a number of the models cut in two parts, similar to Fig. 52.

The cylinder, Fig. 51, is drawn as follows: (1) Draw the center line A B any angle you wish; 45° is the usual angle. *All measurements are made on or from this line.* (2) Measure on the center line the length of the cylinder, as C D. (3) With C and D as centers, and radii equal to C F and C G, draw circles at both ends of the cylinder. (4) Draw the connecting lines tangent to the circles.





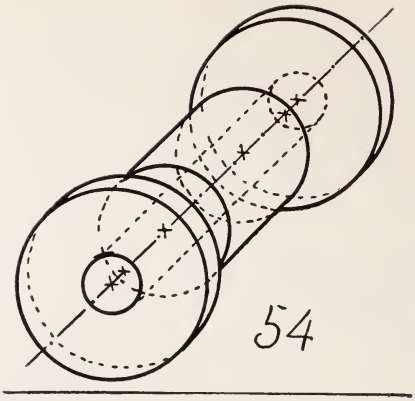
DRILL EXERCISES.

In the following exercises represent all lines, both seen and unseen, and draw the cylinder represented by Fig. 51, exact size.

1. Draw the cylinder in the position of Fig. 46.
2. Draw the cylinder in the position of Fig. 48.
3. Draw the cylinder in the position of Fig. 45.
4. Draw the cylinder in the position of Fig. 49.
5. Draw the cylinder in the position of Fig. 47.
6. Draw the cylinder in the position of Fig. 43.
7. Draw the cylinder in the position of Fig. 44.
8. Draw the cylinder in the position of Fig. 50.

Fig. 52 is one half of Fig. 51, and Fig. 53 is the same with a round core added.

9. Draw Fig. 52.
10. Draw Fig. 52 in the position of Fig. 48.
11. Draw Fig. 52 in the position of Fig. 53.
12. Draw Fig. 53.
13. Draw Fig. 53 in the position of Fig. 52.
14. Draw Fig. 53 in the position of Fig. 45.



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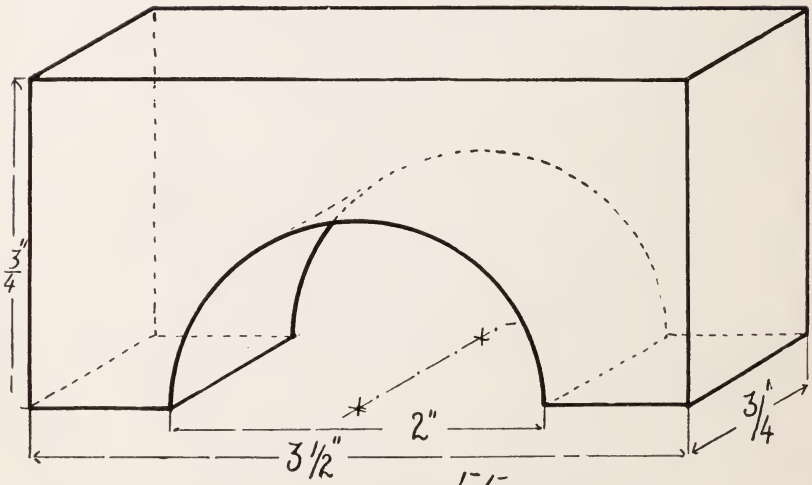

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A common spool is an excellent model for cabinet drawing. Make all measurements on the center line A B, and the drawing will be found less complicated than it appears. Procure a common spool and draw it exact size, as follows:

15. Draw the spool in the position of Fig. 54.
16. Draw the spool in the position of Fig. 48.
17. Draw the spool in the position of Fig. 47.
18. Draw the spool in the position of Fig. 45.

The Arch.— Fig. 55 is a very serviceable model for cabinet drawing. Make the models according to the dimensions given in figure on opposite page, and let the pupils draw them exact size.

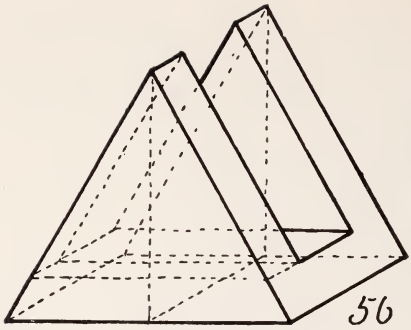
19. Draw the arch in the position of Fig. 55.
20. Draw the arch, at an angle of 60°, in the position of Fig. 48.
21. Draw the arch in the position of Fig. 47.
22. Draw Fig. 55 inverted.
23. Draw Fig. 55 inverted, and in the position of Fig. 48.

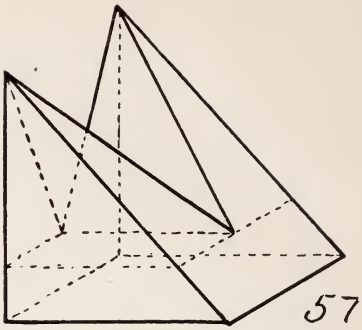
Draw the following joints in cabinet drawing.

24. The open mortise and tenon joint.
25. The halved T joint.
26. The halved joint.
27. The mortise and tenon joint.
28. The brace joint.
29. The cross lap joint.

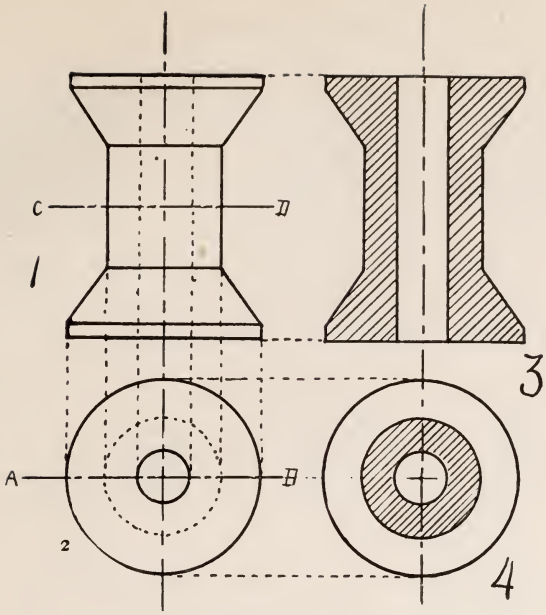
Figs. 56 and 57 are Figs. 32 and 36 drawn in cabinet drawing, and the part marked X removed. In like manner draw the following triangular prisms in cabinet drawing, and remove the part marked X.

30. Draw Fig. 31 in cabinet drawing, and remove X.
31. Draw Fig. 32 in cabinet drawing, and remove X.
32. Draw Fig. 33 in cabinet drawing, and remove X.





33. Draw Fig. 34 in cabinet drawing, and remove X.
34. Draw Fig. 35 in cabinet drawing, and remove X.
35. Draw Fig. 36 in cabinet drawing, and remove X.
36. Draw Fig. 37 in cabinet drawing, and remove X.
37. Draw Fig. 38 in cabinet drawing, and remove X.



CHAPTER XI.

Orthographic Projection.

A Projection shows one face only of the object represented, therefore there should be as many projections shown in the drawing as there are different faces on the object.

Fig. 1 represents the *side* or *front view*, or *projection*, of a common spool. The two dotted lines running through it represent the round opening in the spool. The dot and dash line is the *center line* from which measurements are made.

Fig. 2 is the *end view*, or *projection*, of the spool. The dotted circle represents the barrel of the spool, and the round ring the circular opening marked by the dotted line in Fig. 1.

Figs. 3 and 4 represent *sectional drawings* of the spool.

Fig. 3 is a *lengthwise* section, representing the spool cut through on the line A B, Fig. 2.

Fig. 4 is a *cross section*, representing the spool cut through on the line C D. The parts actually cut are shaded to distinguish them from parts that are not cut.

Sectional drawings are to represent the inside of objects. In botany, sections of seeds, buds and flowers are thus shown. In geography, sectional drawings are used to represent the inside of a hill, spring, river, or valley, and such drawings give the idea far more clearly than it is possible with words.

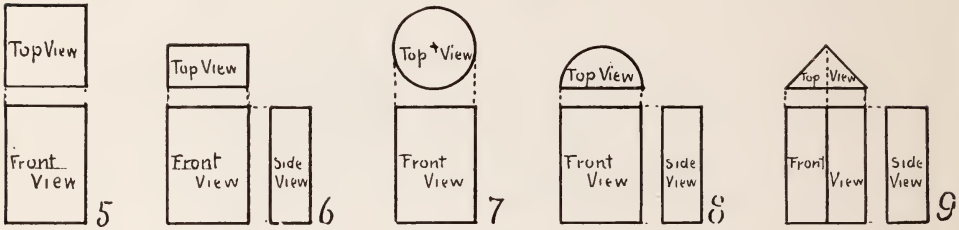


Fig. 5 represents a top view and a side view of a *square prism*; a side view is unnecessary because it is exactly like the front view.

Fig. 6 represents the top, front and side views of a *rectangular prism*. Three views are necessary because there are three different faces.

Fig. 7 represents the top and front view of a *cylinder*.

Fig. 8 represents the top, front and side views of a *half cylinder*.

Fig. 9 represents the top, front and side views of a *triangular prism*.

Each view in the above drawings is a projection. There should be as many views, or projections, as there are different faces or different facts of form to be shown.

Often the projection and sections are combined together in the same drawing, as in the rolling pin, Fig. 10.

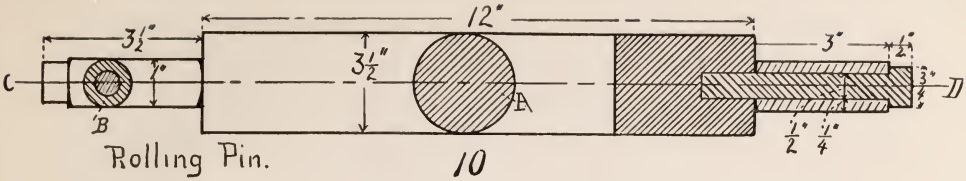
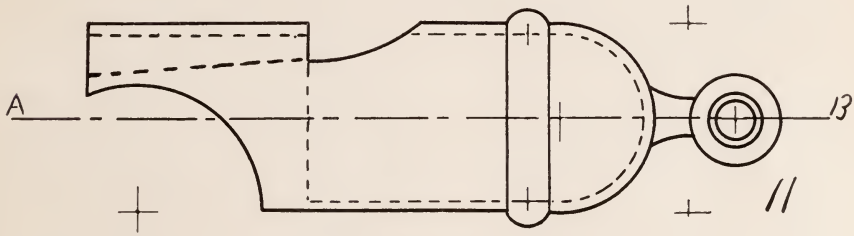
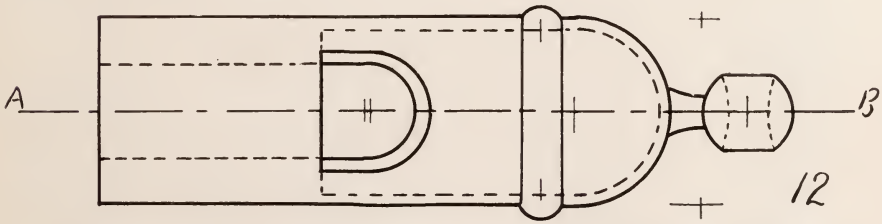


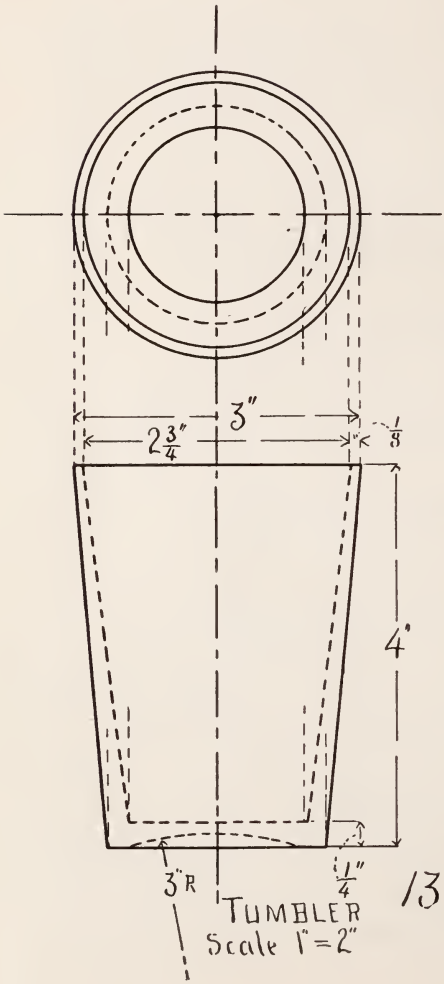
Fig. 10 represents the side view of a rolling pin. Three fourths of the rolling pin is represented in projection, and one fourth in half section, cut lengthwise. A is a cross section of the barrel of the rolling pin, and B is a cross section of the handle. Observe in each separate piece of the sections that the shade lines are drawn in different directions. This is to show the parts more distinctly, so they can be recognized easily and quickly.





Often the inside of an object is represented on the projection by means of dotted lines, as in Figs. 11 and 12. The crosses mark the centers for the curved lines. A B is the center line, from and on which measurements are made.

Drawing to a Scale.— It is not practical or possible to draw all objects the exact size. Drawings are usually made smaller than the object they represent, but they should always have the same proportion as the object. Maps are many times smaller than the country they represent, yet if the scale of the drawing is known, it is easy to tell how far it is from place to place. If the map is drawn so that each inch on its surface represents fifty miles of the country, then we know that if two places are an inch apart that the distance between them is in reality fifty miles.



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The most common scales used in constructive drawing are 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$ the size of the object. These scales are written, exact size, $6'' = 1'$, $3'' = 1'$, $1\frac{1}{2}'' = 1'$, and $\frac{3}{4}'' = 1'$.

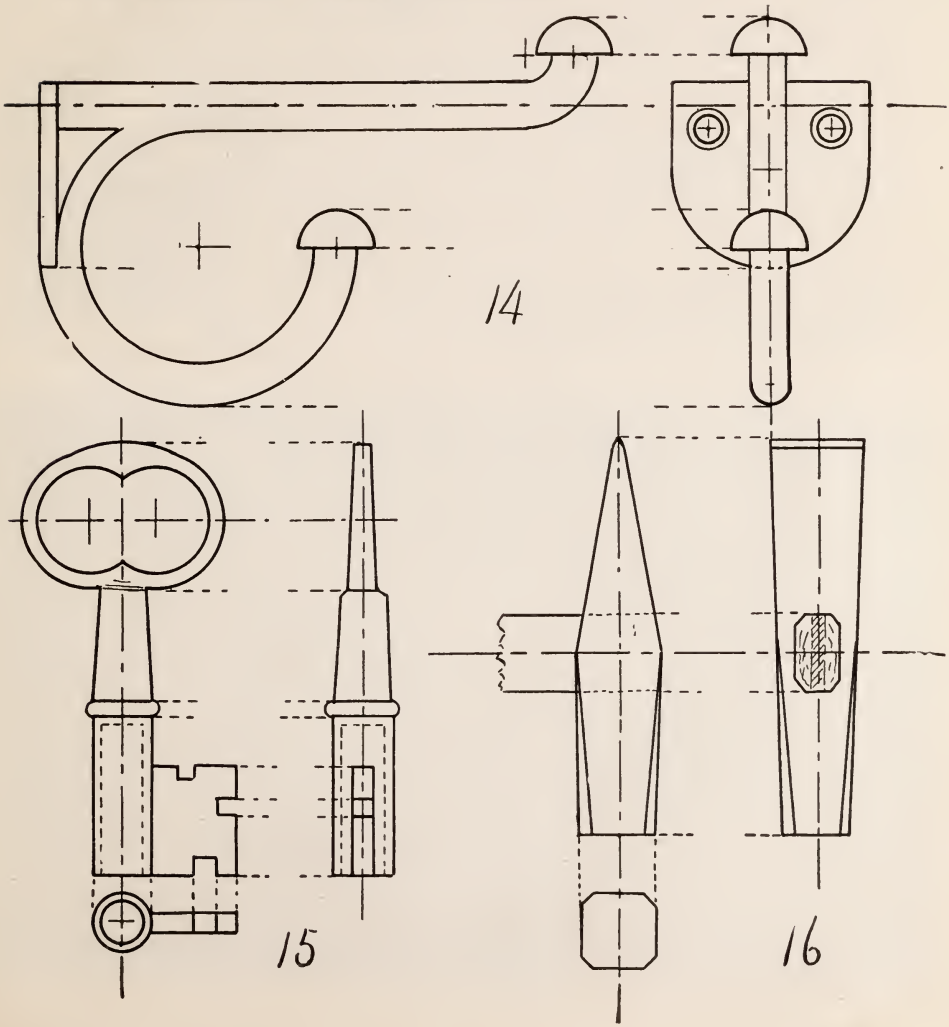
Pupils should at first be required to draw their work exact size.

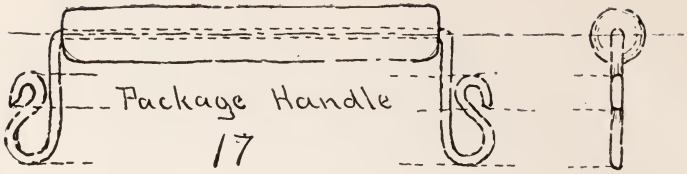
The tumbler, Fig. 13, is drawn to a scale of one half the size of the real tumbler. That is, for every inch on the real tumbler only one half of an inch is represented in the drawing.

The real tumbler is 3″ in diameter, and 4″ high, but the drawing is only $1\frac{1}{2}''$ in diameter,

and 2″ high. The scale is marked 1″ = 2″, and reads 1″ on the drawing is equal to 2″ on the real tumbler.

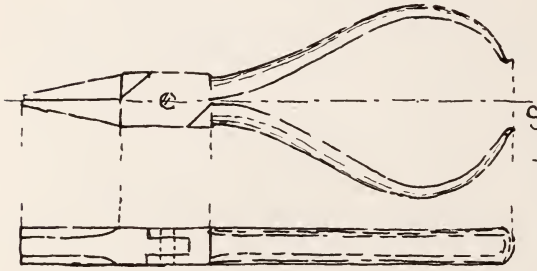
3″ R means that the curved dotted line that marks the bottom of the tumbler has a radius of 3 inches.



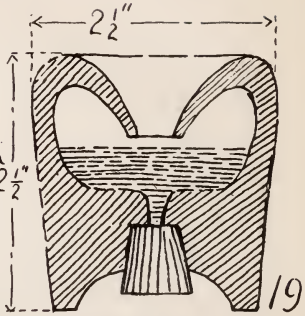


Package Handle

17

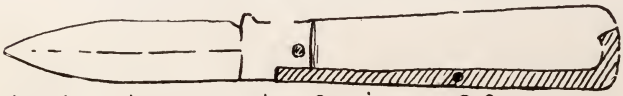


Pinchers. 18

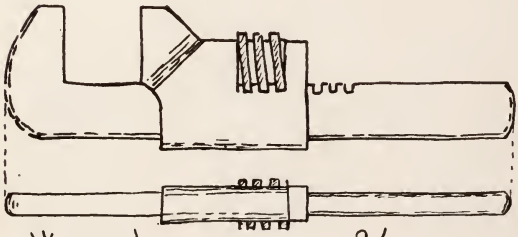


Section of an Ink bottle

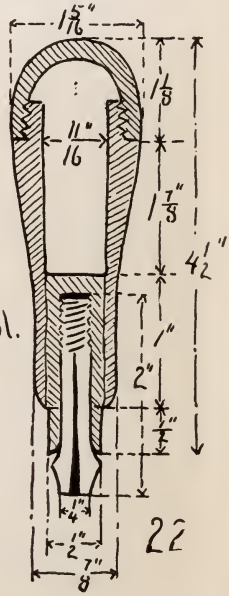
19



Knife showing the Spring 20



Wrench. 21



Section of a Brad Awl.

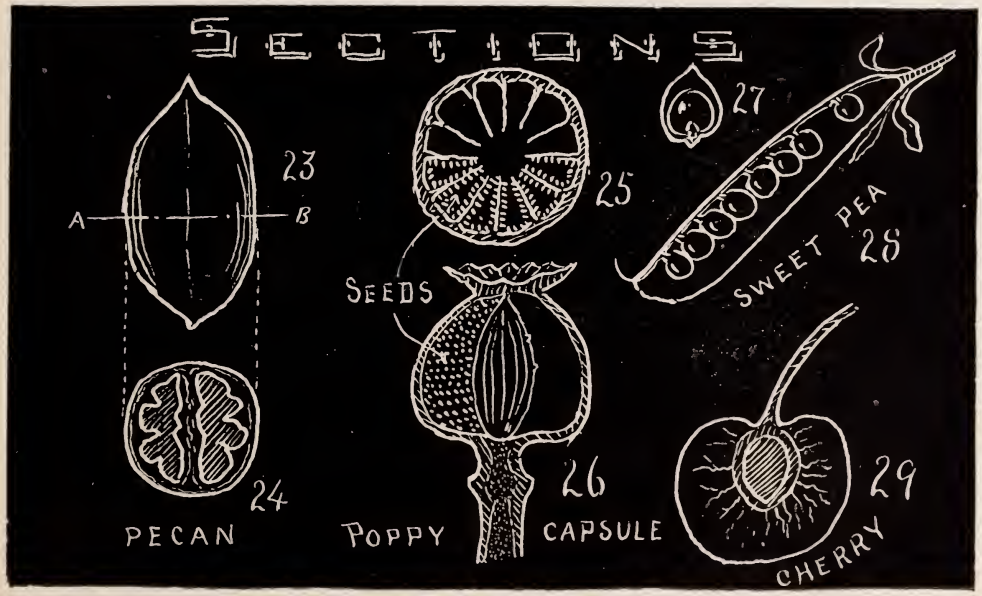
22

The real measurements are put in the drawing, not the measurements of the drawing itself.

Fig. 14 represents two views of a clothes hook. The drawing is one half the size of the real hook.

Fig. 15 represents, exact size, three views of a key, and Fig. 16 represents three views of a riveting hammer, drawn one half size.

Mechanical Sketching.— The ability to sketch an idea in projection or section, without the aid of instruments, is perhaps one of the most desirable attainments for the mechanic or tradesman. To represent an idea easily, quickly, and with some degree of accuracy, is more to be desired than the slower and more laborious drawing made with instruments. Facility is sometimes more than accuracy.



The aim in this work is to give the idea by means of the drawing, and show the accuracy by the figures indicating the measurements. For example, Fig. 22 is a sketch of a brad-awl handle. The sketch gives the idea of the different parts — their relation, position, and, in a rough manner, their proportion, and the figures give the size. Finished drawings may be made from these sketches. It is usual among draughtsmen to make a preliminary off-hand sketch containing data for the finished drawing. Such a sketch is full of suggestions, facts, and points to aid the memory.

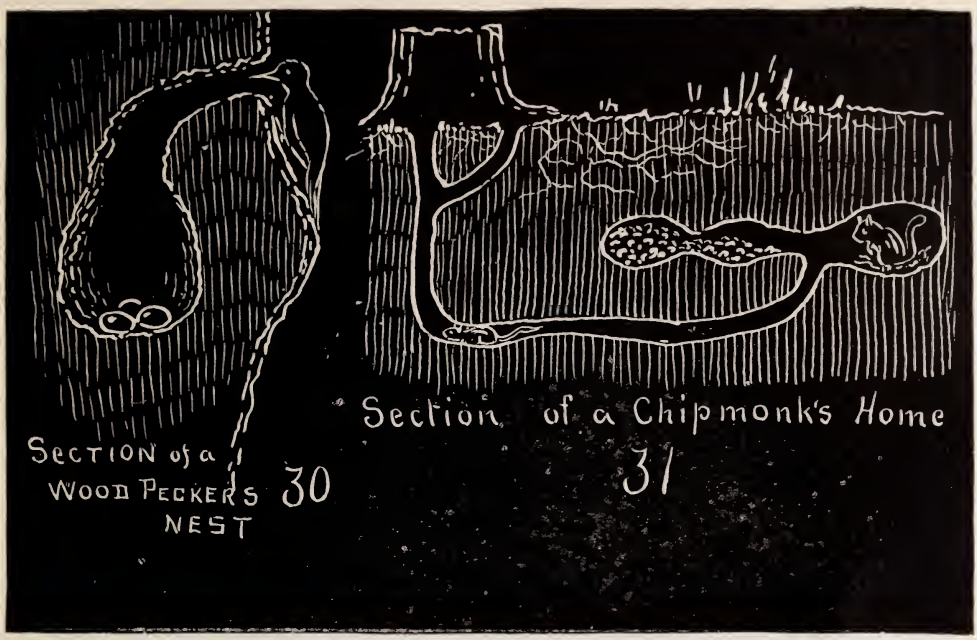
Sections.— There is no kind of drawing that tells so many facts about an object as a sectional drawing, and there is no kind of drawing that so satisfies the curiosity to see the inside and know how things are made.

By sectional drawings we can show how a spring is formed; show the bed of a lake or river, the formation of a valley, how the bud grows, and the seed is formed. We can show where the squirrel lives, where the turtles and frogs stay in winter, as well as to tell all about the inside of a house, a valve, or a steam engine.

A lengthwise or *longitudinal section* is a section cut in the direction of the longer axis. Figs. 19, 22, 26, 28 and 29 are examples.

A cross or *transverse section* is a section cut at right angles to the lengthwise section. A section cut through A B, Fig. 23, would be a cross section. Figs. 24, 25 and 27 are examples of cross sections.

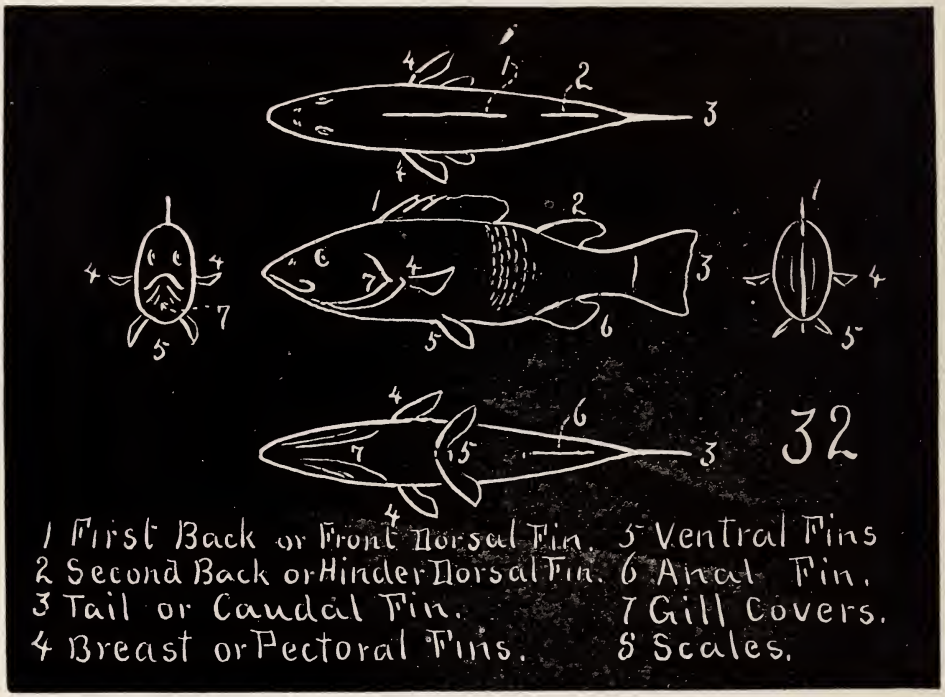
Vertical section and *horizontal section* are terms often used in place of lengthwise and cross sections. Fig. 25 is a horizontal section of a poppy capsule, and Fig. 26 is a vertical section. Figs. 30 and 31 are vertical sections of nests.



Figs. 30 and 31 represent a vertical section of a woodpecker's nest and a chipmunk's burrow. The source of such drawings must, to a certain extent, be conceptive in character, but the conception should never be based on the imagination alone, but on *description*, *a museum model* or *original research*. The drawing of the woodpecker's nest is based on original research, the chipmunk's burrow on description, and Fig. 29 on knowledge gained by observation.

Constructive drawing is not necessarily confined to building and making. It may also include natural objects, such as buds, flowers, fruits, animals, birds, reptiles and insects. Fig. 32 represents the side, top, bottom, front and back views of a fish. Fig. 33 is the side front and top views of a bug.

A map is a plan of a part of the earth's surface. It varies in size from a great continent to a child's playground or flower bed. Fig. 34 is the plan of the author's home in Oakland, Cal., and represents a plot of ground 50 x 150 feet.



TERMS USED IN CONSTRUCTIVE DRAWING.

Pupils are to find these terms in the dictionary and draw figures to illustrate the meaning of each:

Angles, right angle, acute angle, obtuse angle.

Altitude, base, apex, vertex, longer axis, shorter axis.

Bisect, trisect, quadrisect.

Curves, reverse or double curve, spiral curve, regular curve, irregular curve.

Lines, vertical line, horizontal line, oblique line, curved line, straight line, angular line.

Inscribe, circumscribe, longitudinal, transverse, perimeter, perpendicular.

Concentric, eccentric.

Circle, circumference, diameter, radius, semicircle, arc, chord, segment, sector, tangent, degree, quadrant.

Trefoil, quartrefoil, cinquefoil.

Core, frustum, truncated.

Circle, semicircle, sphere, hemisphere, ellipse, ellipsoid, oval, ovoid.

Polygons, equilateral, equiangular, triangular, square, rectangular, pentagonal, hexagonal, octagonal.

Prism, plinth.

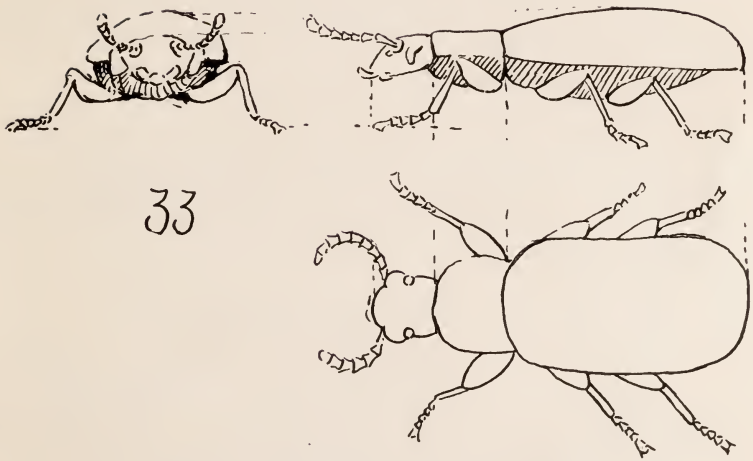
Objects suitable to use in constructive drawing from which projection and sectional drawings can be made:

teapot	drawer-pull
cup and saucer	lock-bolt
funnel	clamp
oil can	bracket
frying pan	pulley
sad-iron	caster
pail	faucet
lamp	valve
candle	wrench
vase	hammer
tumbler	hatchet
clothes-pin	axe
nail	brad-awl
table	tack

chair
chest
stand
cupboard
bird-house
dog-house
tent
shed
dumb-bell
skate
trunk
desk
wash-tub
wash-bench
book
jar
jug
cart
wheelbarrow
top
ball-club
scoop
sprinkler
mallet
saw
hyacinth bulb
lily bulb
crocus bulb
onion
pumpkin
squash
ear of corn

rope
chain
hosepipe
croquet lawn
base-ball diamond
tennis court
school-yard
house-yard
rolling-pin
umbrella
pencil
rubber
shoe
slipper
hat
cap
gate
knife
spoon
fork
melon
cherry
plum
orange
strawberry
walnut
acorn
butternut
hickory nut
filbert
almond
pecan

pea-pod	grasshopper
apple	butterfly
pear	moth
peach	beetle
trout	dragon fly
sunfish	spider
perch	bird's tail
catfish	bird's foot
bass	bird's bill
cocoanut	bird's wing



33

DRILL EXERCISES.

1. Represent the top and side views of a cylinder. Of a square prism.

2. Represent the top and two side views of a rectangular prism. Of a triangular prism.

3. Represent the side, end, and top views of block 2 in Chap. X.

4. Represent two views of an open mortise and tenon joint. Of a halved T joint. Of a halved joint. Of a brace joint.

5. Represent the side, top and end views of block 55 in Chap. XXII.

6. Represent three views of a key, exact size.

7. Represent three views of a hammer. Hatchet. Axe.

8. Represent two views of your lead pencil. Pen and pen-holder.

9. Represent two views of a funnel.

10. Represent three views of a caster. Drawer-pull.

11. Represent two views of a knife. Clothes-hook.

Represent the following objects by means of an off-hand sketch, similar to Figs. 17–22:

12. Represent two views of a frying pan.

13. Represent three views of a sad-iron.

14. Represent three views of a tack.

15. Represent three views of a table, or bench.

16. Represent two views of a dumb-bell.

17. Represent two views of a bicycle wrench.

18. Represent two views of a chair. Mark the measurements on it as in Fig. 22.

19. Represent two views of your hat or cap.

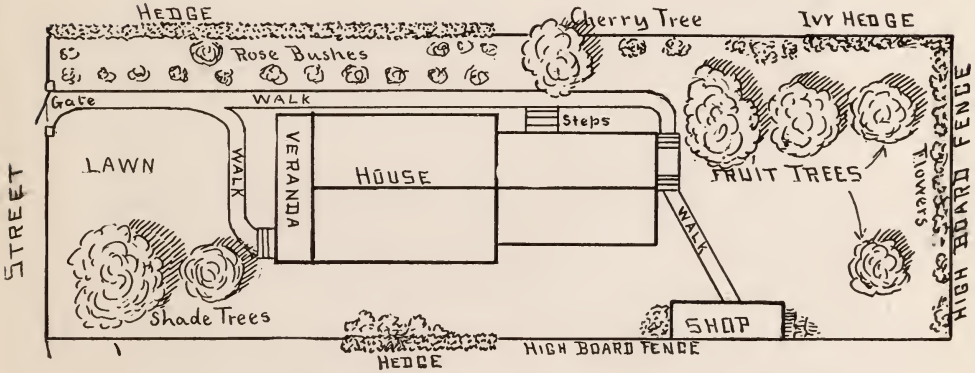
20. Represent two views of a moth, butterfly or grasshopper.

21. Represent five views of a fish.

22. Represent the side and top views of a beetle.
23. Draw the plan of a croquet lawn. Base-ball diamond.
24. Draw the plan of your front or back-yard.
25. Draw the plan of the school-yard.
26. Draw the plan of the coal-shed.
27. Draw the plan of the room you sleep in.
28. Draw the plan of the school-room.

Represent the following objects by means of a sectional drawing:

29. Make a sectional drawing of a walnut, hickory, or butternut.
30 Make a sectional drawing of a filbert, almond, or pecan.
31. Make a vertical section of an apple. A cross section.
32. Make a sectional drawing of an onion or carrot.
33. Make a sectional drawing of an ear of corn.
34. Make a sectional drawing of a pumpkin or squash.
35. Make a sectional drawing of a melon or cucumber.



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