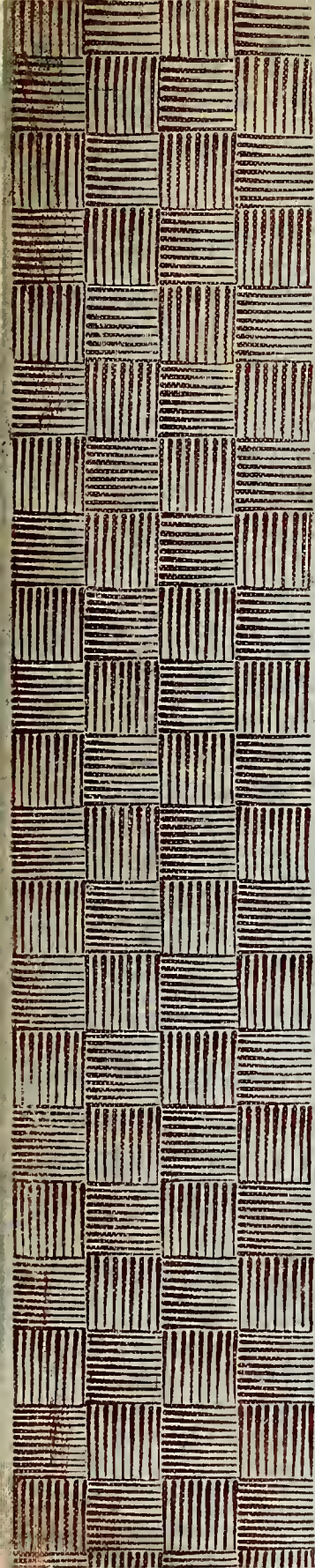
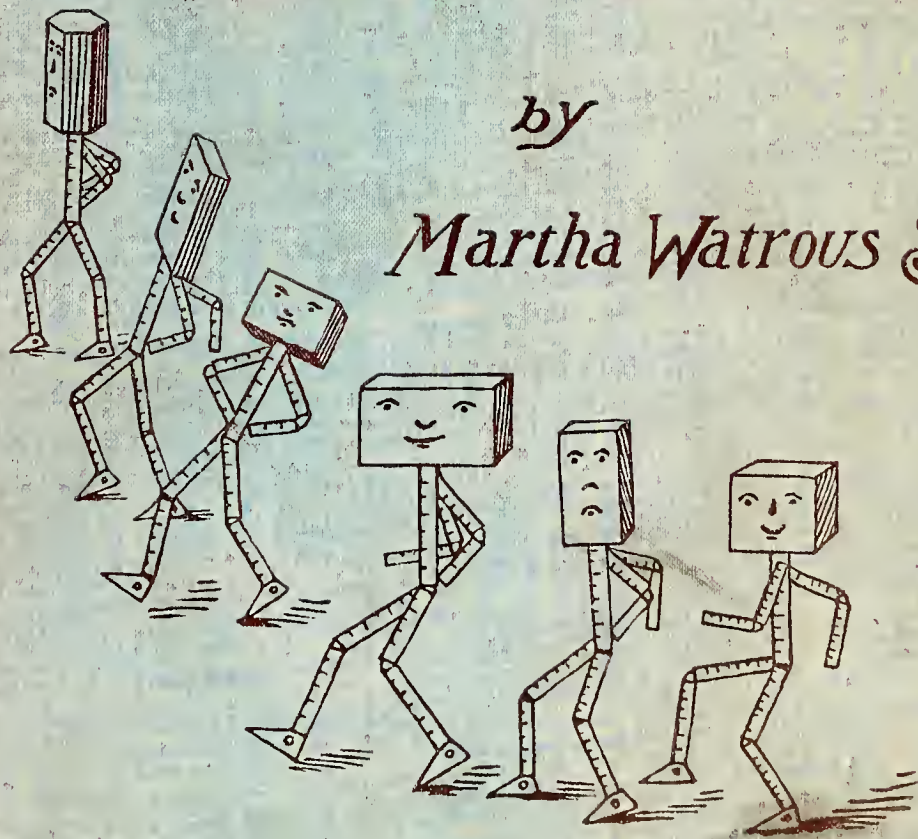


A SCHOOL
WITHOUT
BOOKS

by

Martha Watrous Stearns



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A

SCHOOL WITHOUT BOOKS

— OR —

EDUCATIONAL HANDIWORK

FOR

Home and Schoolroom.

BY MARTHA WATROUS [↙] STEARNS.

MAR

1897

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PREFACE.

THE value of manual occupation for children has long been recognized. Yet on introducing manual work into communities where it has never before been taught, many pupils are apt to consider it a degradation of school work proper, and maintain an injured air when asked to work a visible, material problem, by making a box; as though their dignity was injured by descending to the handling of "base matter." But give them the same thing in abstract numbers, and they feel that they have something worthy of their thought. They would doubtless be surprised to be told that such sentiments are the relics of paganism and bigotry: yet to prove it so, we have only to study the education of the past. During the reign of paganism the masses were kept in ignorance; education was reserved for the few—the patrician class. All pagan religions were simply the most popular systems of philosophy, the prominent feature in them all being the exaltation of the spiritual, which they were pleased to conceive as immaterial, and the consequent degradation of the material. In Kingsley's "Hypatia" the central thought of pagan philosophy is expressed when she says of the soul: "It is but a little time, a few days longer in this prison-house of our degradation, and each thing shall return to its own fountain,—the blood drop to the abysmal heart, and the water to the river, and the river to the shining sea, and the dewdrop which fell from heaven shall return to heaven again, shaking off the dust grains which held it down, thawed from the earth-frost which chained it here to herb and sward, upward and upward ever, through stars and suns, through gods and parents of gods, purer and purer through successive lives till it enters 'The Nothing' which is 'The All,' and finds its home at last!" Poor dewdrop! it excites one's sympathy to think of its weary wanderings to find the joys of nothingness!

The prevailing sentiment could but debase and relegate to the attention of servants, everything that pertained to the care and sustenance of these "prison-houses of our degradation." Such religious sentiment naturally stamped the education of the day, leaving all manual occupations to the attention of the unlearned, as pertaining to base material, and giving an education to the upper classes which dealt almost wholly with the abstract, cultivating the imagination; poetry, art, rhetoric, higher mathematics, and philosophy being the sum of the required knowledge of the day. The natural sciences were below par in

the educational market. It was more poetical to think of the forests and streams as peopled with dryads and satyrs, and the very animals as inhabited by the gods, than to make a scientific study of them.

The ecclesiastical era that followed did no more for education; it changed only the name of the same system. During the Dark Ages we hear of demon sprites, and ghosts of the dead, and various good and bad fairies in possession of nature, instead of the dryads and satyrs of paganism, and in place of the soul's transmigration into nothing. Such theology created the Dark Ages, and anathematized its Galileos of science as it did its heretics of theology, and fed the minds of the people, as it did their souls, on the dry bones of formalism. As a result of its teaching, we have hymns that are but parallels of pagan philosophy; as,—

“In ever-changing orbit, our life doth quickly flee;
And gently doth absorb it, eternity's wide sea.”

And—

“Oh when shall our spirits exchange, these cells of corruptible clay?”

Also—

“Beyond the sowing and the reaping, Beyond the ever and the never,
I shall be soon!”

How much more soul-satisfying are the ringing words of Paul: “What? know ye not that your body is the temple of the Holy Ghost?” and, “Ye are the temple of the living God,” than the pagan's thought of our “prison-house of degradation,” or the theologian's “cells of corruptible clay.” And again Paul says: “This we commanded you, that if any would not work, neither should he eat.”

The Christian's Divinity could, even after his resurrection, stoop to prepare such necessities with his own hands for some hungry, breakfastless fishermen! Isaiah gives us no uncertain sound as to the future home of God's people—he locates it in the “new earth,” and says of them, “They shall build houses, and inhabit them; and they shall plant vineyards, and eat the fruit of them.”

A place evidently not beyond “sowing and reaping,” and of much more substantial material than the poor, little, wandering dewdrop found in “The Nothing” which is “The All,” and of more definite terra firma, than the theologian's “beyond the ever and the never.”

Thanks be to God! the true Christian religion is a tangible religion, built on the “Rock Christ Jesus,” and it gives to those who will take it, material comfort in this world, and the promise of material joys in a future material home. Such religion elevates the handiwork of God, and points us to science as one of God's true teachers, because it opens our eyes to the wonders of his work, in which he has expressed his character.

True education will ever lead us to God through the things he has made. “For the invisible things of him from the creation of the world are clearly seen, being understood by the *things that are made.*”

M. W. S.

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SAMPLES OF WEAVING. METHOD OF STARTING A BASKET. TRIANGULAR CORNERED BASKET PARTLY WOVEN.

INTRODUCTION.

A SYSTEM of manual education can only approach perfection as it is based on the teachings of the only perfect Teacher. One of the greatest lessons ever taught, he gave from the mountainside, his text—the things he saw; the birds above him, the lilies at his feet, by which he taught things not seen—the new education—is not newer than the old, old story, which was the Word made flesh, so materialized that earth's children could grasp its fulness. In that mountainside lesson the Father's love and care over his greater children was made objective to them in the loving care they could *see* expressed for his lesser children—the birds and flowers. So he still makes objective his thoughts for us. His careful love for his children's needs has implanted in the nature of all what might be called the instinctive arts, the two great useful arts, building and weaving. From these, all the useful arts of the present are but outgrowths or elaborated accessories. The types of these arts he has shown us in the mineral and vegetable worlds.

In a collection of the various systems of crystals, we can see every combination of architecture from a Greek temple to a Chinese pagoda. In combining their outlined forms, we can see every piece of furniture from the throne of Solomon to the fifteen-dollar bedroom set of the Yankee "furniture man." We cannot go away from the fundamental forms, whether we build a temple or a table, a throne or a three-legged stool! So in a variety of leaves are demonstrated the principles of weaving; we see the ribs and veins held together

by a fine network representing the warp and woof. It matters not whether it is the coarse willow basket of a German peasant or the rich silk of a society belle, the principles of weaving are the same in both. Again, these two arts, building and weaving, are made objective to us either singly or in combination, in the work of our lesser brothers and sisters; no point lace was ever woven with greater care than our little eight-legged brother of the garden, traces his lace work from bush to bush. No silk manufactory has ever produced softer, more beautiful texture than the cocoons of the silkworm, which art has been unable to substitute in the manufacture of silk. Nor could the finest basket-workers in Europe compete with the feather-dressed nest-makers who have wrought such marvels in their woven architectural puzzles.

The art of building has been demonstrated geometrically in mud, sticks, stones, paper, and wax, by workers who have never served any apprenticeship, except in Nature's workroom. In their structures, we catch glimpses of the principal types of architecture. The beaver's dome-shaped settlements have an air of the Byzantine about them, the pointed and arched structures of the white ant suggest the Gothic, while the white hexagonal columns of the honeycomb remind one of the Grecian style.

Both men and animals express their development by their building instincts. The history of every epoch can be read without words, in its works. Lowest in the scale of progress are the burrowing animals, such as the mole, tortoise, and rabbit, that construct their dwellings by excavation; then the burrowing insects,—the spider, beetle, and ant; the burrowing birds, which construct their homes in the sand and clay; and finally, burrowing men, like some of the tribes in the interior of Africa and the former cliff-dwellers of Colorado. Opposed to these are the animals who construct aerial

homes in the bushes and trees. Our first thought would suggest the birds as having a monopoly of this accomplishment, but the harvest-mice weave as creditable nests as the birds, and hang them from the bushes.

The greater proportion of insects live in the trees and bushes and low plants, and there are not wanting men who also construct tree dwellings, like some natives of South America, and certain portions of Africa. The more civilized method of building on the ground, instead of above or below it, is illustrated by the beaver, white ant, turret-spider, ground-birds, and water-fowl, as well as by man. As we look at the wonders of architecture of the present, and realize that they are but the outgrowth of those first rudimentary forms seen in nature; and as we see the exquisite works of the loom produced now, and realize that they, too, are simply an elaboration of nature's methods, we cannot fail to see the value of these arts as an educational medium.

Thus far there has been little practical form-making and form-weaving accomplished outside of the kindergarten. The children have outgrown it, it is supposed, as they have outgrown their short petticoats; but if there ever was a place where Froebel's "law of activity" should be recognized, it is in the primary grades, till they are old enough to attempt the wood sloyd. The use of pasteboard and straw as more difficult material to handle than the paper of the paper-folding and paper-weaving of the kindergarten, contains the desired means for calling into play the children's increased ability; for as the true spiritual education consists in a series of overcomings, so the true material education lies in presenting a series of interesting obstacles, the overcoming of which shall produce the desired development.

Thus far the tendency has been to make these obstacles wholly intellectual, confined within the covers of a text-book, and the over-

coming has been a matter of compulsion rather than of interest. Success depends on keeping up the correct balance between obstacle and interest. Such has been the thought in the preparation of these models. In their construction the attention is first called to the one true source of all designs, nature, a habit which if formed in this way will be applied in all their future work. The working-form is shown them, first in the crystals themselves, as it impresses the natural thought of the form more deeply, and makes them feel that they are copying nature's thought, rather than human thought. The idea given is not that they are to make a box like the box their teacher has made, but as she copied the geometrical *form* of the *crystal*, in a box, so they are to copy the crystal form in a box. They are charmed with its beauty; then follow a series of questions, the answering of which describes the form geometrically and mineralogically. They are anxious to copy it at once, and the making of it necessitates the practise of whatever knowledge of numbers they have acquired, besides giving them practical work in mechanical drawing, and hand skill in the manipulation of materials.

They have already become accustomed to the geometrical forms in the gifts of their kindergarten. They now learn to make as well as to use them, and learn their origin, which is quite a surprise to the majority, their thought being that somehow nature has copied man's work, as one boy put it when an unusually perfect crystal form was shown him, "Did that grow wild?" What a pity that a child could confuse nature's wonders with man's art! The completed course of these models gives a familiarity with the common systems of crystals, an elementary knowledge of geometrical drawing and crystallography, practical number work, and hand training, besides unconsciously teaching the spiritual truth, that the victory of achievement lies in overcoming.

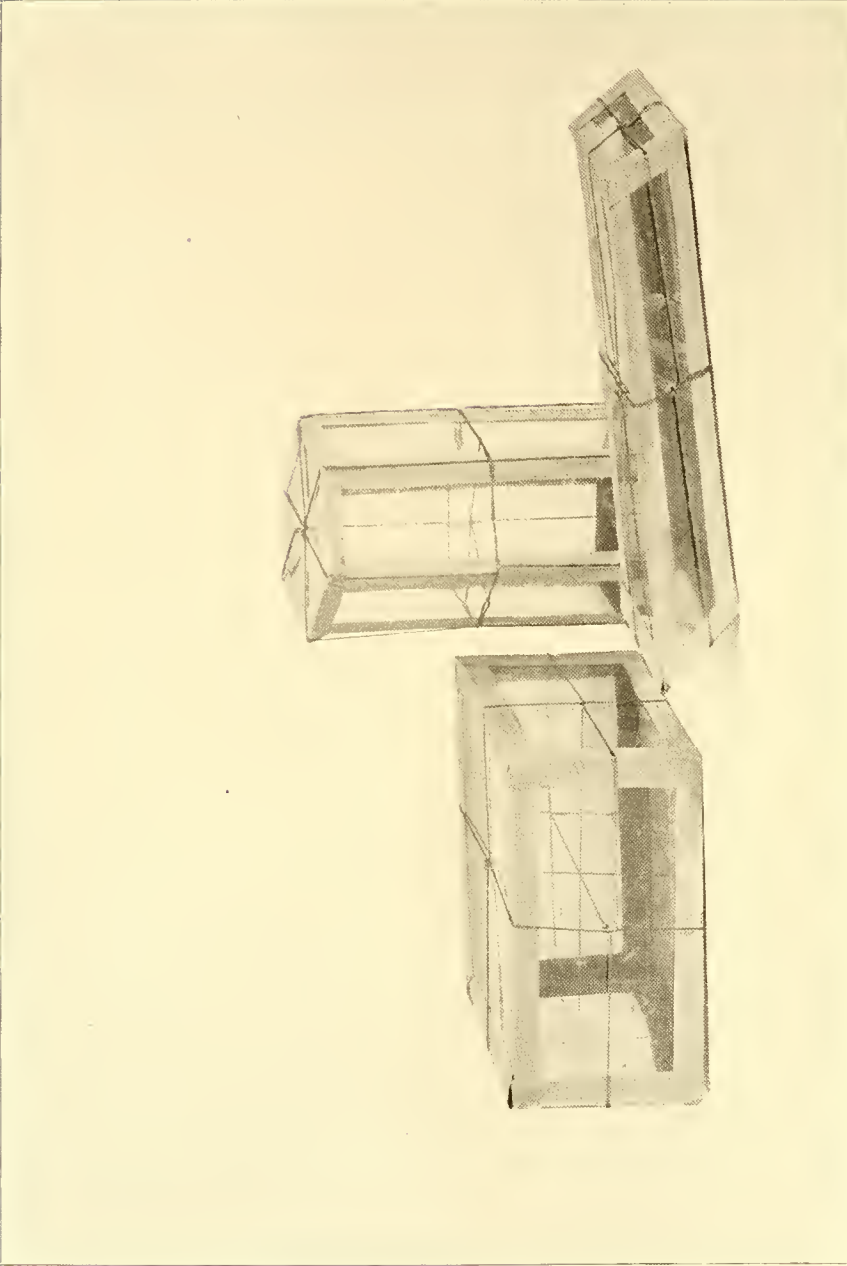
Weaving, as representing all textile art, is combined with the pasteboard form-work, as its opposite. The pasteboard models have been developed in unyielding material, and the natural difficulties attending its manipulation have been overcome. Now, in yielding material, the same form is developed with a different use, and a reverse of difficulties are met to overcome; the pasteboard was comparatively inflexible, the straw material is flexible, thus the education from handling both, represents the means, as opposed to the extremes.

The neatness and care which this work requires, offer many opportunities to show nature's way of working. Thus, a little girl asks, "Must I make this box just as nice on the inside as on the outside?" "Here is a flower," replies the teacher; "this is our model; pull it to pieces, and see if you find any wrong side." So the child is made to realize that nature has no concealed defects, no wrong sides to be covered up, and a lesson of truthfulness is inefaceably made on the heart of the child, to be worked out in her character as in her basket. Again, manual work affords the teacher opportunities given in no other work, of cultivating refined tastes in her pupils, many of whom come from grades of society whose only ambition is to eat, drink, sleep, and labor therefor. The schoolroom has long been looked to by various remodelers of society, as a field for action, and a true teacher will see in it a world full of possibilities; for a school system extending over so large an area as the United States of America, gathers in its schoolroom, types of its own as varied as though produced by other nations, besides a generous conglomerate dropped into Uncle Sam's collection plate, by every civilized nation on the face of the earth. Out of all this raw and diverse material, the teacher is to amalgamate a schoolroom republic, plant a crop for the benefit of society, and develop the individual child for his individual life. The teacher that is to do all this, must be a

compound of all the virtues, well stocked with brains, and a good deal of a diplomat besides.

As a matter of fact, she is more often a *machine*, employed by *machines* to manufacture *machines*; not always willingly, perhaps, but because there is no opportunity to be anything else. Some form of educational handiwork presents this opportunity. It is the sesame by which she can find her way to the hearts, and get at the real life of the children, and through which she can exert a wonderful power in their lives. It offers to her a thread by which she can tug at least one end of the labor and capital tangle; for every day that she makes labor and capital meet in the individual as thought, supplemented by execution, she places the two on a par in the estimation of her pupils, and so lessens the probability of their separation into classes in after life, for what meets in the individual will meet in the classes. Many school boards, however, as well as individual families, are so economical that they think the usual manual training outfits, "won't pay just for children." The visible returns for the outlay are not as great as the visible deficit in the school purse, therefore they decide to economize their dollars by taking them out of the brains of the rising generation, which must continue to rise in the good old way, borrowing its brains from books, and then serving its destiny in educational automatism. Thus many teachers are thrown on their own resources if they wish to educate anything but the heads of their pupils. For them, as well as many families who feel the necessity of handiwork for the children, which can be provided without great expense, these informal lessons have been prepared; not as unvarying forms, but as suggesting ways of helping the children to an all-round education of the head, heart, and hand; and of developing in them that insight which —

"Finds tongues in trees, books in the running brooks, sermons in stones, and good in everything."—*Shakespeare*.



MICA WORKING FORMS.

A SCHOOL WITHOUT BOOKS.

I.

SUGGESTIONS REGARDING THE APPLICATION OF THE WORK.

WHENEVER possible, a good collection of natural crystals should be consulted for subject-matter. When access to these cannot be obtained, one can sometimes find excellent substitute specimens at the druggist's. The large, square, white, pyramidal crystal in the illustration on page 26, is crystalized alum obtained from a druggist. The crystalized sugar used as the suggestive form for the writing tablet, was the terminal crystal of a rock-candy string. Crystals of *halite*, or common salt, would take the place of the iron pyrites when these could not be procured, as they very often occur in perfect cubes.

It is intended that the teacher should make the forms used as working-subjects, in mica, as illustrated in plates on pages 16 and 38, and that after showing to the class the crystal-subject, the structure be made plain by the glass models. Then the class should model the form in wax or soap like the illustration on page 44. This should be done by cutting the model out of the wax, the thought being that the form should be so perfectly seen in their minds, that

they are to see it as a perfect thing in the wax before they touch a finger to it, and then simply take their knives to cut away the superfluous wax. They next regard the form in reference to its plane faces, which they draw on paper. This makes the working-drawing, which, put on cardboard and cut and folded together, produces the form in pasteboard.

For children without previous kindergarten training, this would be too difficult. For them the form should be first modeled in clay; then to obtain an idea of its plane faces, the form can be laid with cardboard or wooden tablets, and instead of drawing the form on pasteboard to reproduce, the patterns accompanying this book may be laid on, and the form traced.

When they can make them well in this manner, they can remake them in the way first suggested, changing the proportions somewhat, or developing in different material so the task will not prove irksome.

The materials and instruments needed are, first, a good drawing-board, accurate ruler, graduated to the sixteenth of an inch, a book-binder's knife, well-sharpened scissors, compasses, an accurate square; also a can of Denison's liquid glue and a jar of "parlor paste," unless the home-made paste is more easily procured, in which case it should be carefully strained before using, that it may be free from lumps. Strips of old muslin should be at hand for cutting bindings with which to glue the models together before covering with paper, as it makes them much stronger.

The foundation for the boxes and heavier models, should be of light-weight "tar-board," as that does not warp as readily as the strawboard in common use for such purposes. If not obtainable, a thick white cardboard makes a good foundation but is more expensive. Tinted cardboards of three-ply thickness should be used for the linings of the boxes. For the coverings, the leatherettes and

embossed papers are more suitable for the heavier models, and the lighter weight coverings known as box papers, for the less substantial models.

The weaving material may be either split palm-leaf, straw hat braid, the sweet grasses, or the thinly shaved, dyed woods, used by the Indians, and obtainable by sending to their reservations in northern Maine or Michigan. The other materials can be found at any hat factory, and the pasteboards and papers can usually be procured at any good printer's or bookbinder's.

Always provide good tools and good materials for the children, for they are the price that must be paid for good work.

II.

HOW IT HAPPENED TO BE.

IT was an odd advertisement that caught Miss Lovechild's eye as she scanned a Western paper — "Cranny Crag Cottage, 8000 feet altitude, 500 miles of views, hot springs and cold springs, a first-class, quiet, Rocky Mountain retreat for first-class, quiet people. Others need not apply!"

"I wonder if I am first-class and quiet," she said, smiling, "and what proof I shall have to present of the same to satisfy my landlady of the Cranny Crag; a *landlord* could never have originated that 'ad.' I am positive that is just where I want to go for a three months' rest — 'a tired-out Eastern school-teacher who wants rest,' I'll tell her; that ought to be sufficient, I am sure." And it was, with the added fact that she winced not at the "first-class, quiet" prices, incidently thrown in as a part of the bargain.

If society could be mineralogically classified, Miss Lovechild would have put the guests of the Cranny Crag in the order known as conglomerate, as she studied with curiosity her presumably "first-class," quiet, fellow boarders. There was a decidedly quiet, consumptive-appearing, New England clergyman, wife, and child, who had "come for his health," the landlady said. She had an original method of taking on an explanatory appendix to her introductions, as she set her guests afloat on each other's acquaintance. Then there was the "mining man" who was not quiet in any acceptance of the term with which Miss Lovechild was familiar. "He's come



for his health, too, if he don't look it," announced the gracious Mrs. Hostess, smiling on her plethoric guest. "That's a fact," he laughed, "if you mean my pecuniary health, for I've got some old mining interests here that needed looking up." And there was an Eastern manufacturer who was likewise looking the ground over with an eye to his "pecuniary health," and a Chicago "commercial man," also. The New York "business man" was there, too, and the Southern "do-nothing-in-particular" man; the uneducated man with money, trying to polish himself up with travel, and the educated man without money, enjoying his brains!

All had come, bringing some of their "heirs apparent," with the intent of enjoying *themselves*. These "heirs" soon appeared to be an epitome of everything that children should not be at a "first-class, quiet, Rocky Mountain retreat." They monopolized the most desirable seats on the veranda, the cosiest nooks in the garden, and the most comfortable hammocks at the most desirable times, and everybody began to wonder what there was about this younger portion of the conglomerate that had impressed Mrs. Hostess, as being sufficiently quiet to admit them to such a very "quiet, first-class" retreat; but Mrs. Hostess was very positive that they *were* quiet children when she admitted them; they merely illustrated the exhilarating effects of the delightful altitude! She was obliged soon, however, to awake to the realization of the situation, for it became evident that if somebody did not do something soon, her "conglomerate" would resolve itself into its original parts, and the Cranny Crag would be a very "quiet, first-class" cottage, minus its guests!

"I say, Miss Lovechild!" ejaculated Mrs. Hostess in despair, "you're a schoolmarm; can't you think of some way to keep those young ones still?"

“That’s my business nine months of the year, I admit,” Miss Lovechild said, smiling, “and I came up here to be away from it for three months.”

Poor Mrs. Hostess looked so discouraged that Miss Lovechild remorsefully added, “I will consider the question, however.”

“You’d be doin’ real good mission’ry work if you could do something toward hushin’ them up. They cut up worse than any heathen I ever heard of, and I don’t believe but the rest of the folks would feel so grateful to you, they would pan out a good collection for your time.”

“If I do anything for missionary work, however,” laughed Miss Lovechild, “it will have to be gratis, and I don’t care about anything else. My only object in coming here was to rest, but I will try to interest the children in doing something, if their friends will provide money for the materials.”

So it was that at the following dinner, everybody was electrified with the announcement, “A summer school for children will be opened in the picturesque, old log cabin on the cliff, a short distance from the house—for everybody who wishes to come, nobody else invited,” Miss Lovechild stated, laughing, and she was immediately overwhelmed with the gratitude of all the fond papas and mamas, and more particularly of the people who were *not* papas and mamas. The children were ready for anything new, so were delighted at the idea of such a novel school, and could scarcely wait for the next morning to come. The papas and mamas assured Miss Lovechild, in private, that they had never known *their* children to be so noisy before, and were quite sure that all they needed was a little occupation. With this, Miss Lovechild agreed perfectly, and wondered they had not discovered it before.



[26]

SUGGESTIVE MINERAL FORMS.

III.

PINE LOG UNIVERSITY.

MISS LOVECHILD had not long to wait at the old cabin the next day, till her prospective school appeared, coming up the trail from the Cranny Crag.

First were the twins, Tod and Tad Westerly, the "mining man's" eldest. Could it have been so, any one would have said that Tod was the older. That being impossible, Tod was denominated as the "primary" member of the two, and Tad, as "secondary," was of no importance except as Tod's "supplement." Then came Guy Gumption — his father was the Eastern manufacturer; with him was Frank Flashy who belonged to the "commercial man" from Chicago. Just behind was Gustave Goslawson, whose mother was Mrs. Hostess's Swedish cook; then came the girls, three of them together,—Prudence Puritan, the very apple of her father's eye, who was the New England clergyman; little Flossy Finery, the pet of the New York "business man;" and little Esther Easygo, the family pride of the man from the South. "What an educational speculation I have on my hands!" sighed Miss Lovechild, as she watched them coming. "East, West, North, and South, labor and capital; dear, dear! I shall have miniature rebellions to quell and 'strikes' to settle!"

"Here we are!" shouted Tod. "Yes, this is the place," added Tad, and the children hurried up to Miss Lovechild.

"Are we going to be corralled in here?" questioned Tod.

"That depends on how well you can help me arrange it," replied Miss Lovechild.

"O how lovely! It looks just like the pictures of the Pilgrims' cabins in the old Indian days," said Prudence.

"Wonder if the gold hunter who used to live here left any of his nuggets under the floor," laughed Frank Flashy, raising one end of an old plank.

"Humph! he'd been a goose if he had n't more sense than that; and I guess if he'd any to take away with him, there'd be a big shaft running here to-day, instead of that old prospect hole." "You ain't living in a wild-west story-book, you know," added Tad, under which high altitude logic, the young Chicagoan subsided.

"Awful knotty pine logs you've got out here," Guy remarked reflectively, as he tried to chip off a piece to whittle. "Father says your Western lumber isn't good for anything, anyhow."

"Your father knows everything, I s'pose," rejoined Tod.

"He knows enough to have one of the biggest furniture manufactories back East," replied Guy, spicily.

"O well, we don't pretend to make a point on lumber out here, do we Tad? unless it is prickly-pear and soapweed," and the boys laughed good naturedly.

"Where are we going to sit?" inquired Miss Flossy (Fussy, the children sometimes called her), eying the rough pine boards, and then her pretty outing dress, fresh from New York.

"You'd better ask Guy to import some of that fine back-east furniture of his for your special benefit," suggested Tod.

"That would be a fine idea," said the secondary member.

"What are you fussing about? 'Sit on de' flo',' as they say down South," laughed Esther Easygo. "This makes me think of the cabins at home, anyway; the floor is n't too good for me," and

she plumped herself down in the doorway, while the others seated themselves on rocks in front of the cabin.

“Well, I see you are good talkers,” said Miss Lovechild, sitting down beside them. “Now I am wondering how much you are worth.” The boys’ hands all went into their pockets, for they thought of course she wanted money to fix up with. “No, I do not want money; people with their pockets full are often worthless.”

All opened their eyes except Prudence; she understood. “No, I want you to show me right now how much you are worth to make a pleasant class-room out of this, without buying a thing, unless it is some nails. You may each give me your plan, and we will vote on the best. Come. Gustave, you have been quiet, and have not said a word yet, what do you think about things? You shall give us your plan first.”

Gus blushed to the very roots of his white hair, and said, “If you please, Miss Lovechild, I would rather let the others do the planning, and I will help them with the work.”

“Very well, Gus, just as you say. Now who is going to give me the first plan?” asked Miss Lovechild.

As she expected, Tod volunteered. “But,” put in Guy, “I don’t see how anybody can tell what is needed till you tell us what you are going to have us do.”

“Ah, I see you are worthy of your surname,” laughed Miss Lovechild. “I wondered if any one would stop to ask that. Necessity is the mother of invention. Of course you must know what I am going to do before you can suggest a way of furnishing the room. I fancied that you all had as much book-work as you cared for through the school year, so I had planned to give your hands something to do, instead of tiring your heads out with more books. We are going to work in pasteboard, paper, and straw.”

"Then you will want plenty of table room and good seats," said Guy.

"That is right. But Tod was the first volunteer for a plan; we will hear his, and then you may give us yours," replied Miss Lovechild.

"Our plan," said Tod,—he always spoke for his double,—“is cracker boxes on end for tables, and a log sawn up in foot lengths, for seats; that would be cheap and easy.”

"Yes, Mrs. Hostess has got lots of empty boxes she would let us have I know," supplemented Tad.

"Well, your plan is no good, if it is easy to fix. I would like to know how much work anybody could do balanced on a post."

"It isn't voting time yet, Guy," gently suggested Miss Lovechild; "tell us your plan."

"Well, I thought we could make use of those big cracks between the logs, and save time and work by slipping planks in them, long enough to reach across the room, for both benches and tables; they would be firm to sit on and firm to work on. We could use a single plank for a seat, and place three close together, about three logs higher, for our table. I saw some planks back of the Cranny Crag that Mrs. Hostess had for tent floors one summer. If she would let us make them the right length, they would do finely."

"Now for your plan, Frank," Miss Lovechild said.

"Well, I don't take any stock in the boys' makeshifts," he replied. "In Chicago we don't do things by halves. I vote on having some respectable camp-chairs, and folding camp-tables for each of us. We can all afford it, if we each buy our own, and then we won't be bothered hunting up boards and filling our hands and our clothing with slivers."

Miss Lovechild smiled, and said, "Well girls, what do you say?"

"I think hammocks are the nicest things to sit in; they are so comfortable," remarked Esther Easygo. "We could take our work in our laps, you know, and the hammocks could be nicely hung from the rafters."

"Lots of work you'd do," laughed Guy.

"Now Flossy, what have you to say?" asked Miss Lovechild.

"O I don't care about the seats if they are not so rough as to get splinters into my clothes. I should think they might be covered with something. I don't like the hammock plan though, it crumples one's dress so to sit in one. I was thinking how pretty and picturesque we could make the room look by trimming it with the mountain cedar; that old stone fireplace would look like a Christmas picture, festooned with evergreens." Even the children smiled, it was so like Flossy always to think of the "looks" of things.

"And what have you to propose, Prudence?" inquired Miss Lovechild.

"Nothing about the seats, only I like Guy's plan best, because the tables would be firmer to work on, and they wouldn't cost anything. I think it would be nice, too, if they could be arranged so that we could see the pretty views out of the windows while we are at work. Then I was thinking how nice it would be if the boys would saw up a boxful of logs to burn in the fireplace cool mornings or when it rained. And I thought it would be neater if we had some white sand on the floor or pine needles, and it would not be so noisy either. We could almost imagine, then, that we were living in the days of our Pilgrim fathers, if only we had a crane and some andirons for our fireplace. Oh but I never thought of the rattlesnakes!" she exclaimed. "Do you suppose that building a fire would warm them up? I have read that they live under the floors of these Western cabins."

"I wish there were some here, I always wanted the fun of killing one," said Tod; "but they don't come up as far as this. High altitude does n't agree with their health; they never leave the foot-hills, so you need n't worry, Prudence." "That's a fact," emphasized Tad. "I never saw one off the plains at the foot of the mountains. It's too cold for them up here."

"But our meeting must come to order if we are going to vote," interrupted Miss Lovechild. "Whose plan of work shall we accept? Shall we sit on camp-chairs, planks, logs, or in hammocks? Write your ballots, and I will gather them up." "Ah, Guy wins, I see. The majority say, planks; nevertheless, if Frank prefers his camp-chair and table, and Esther her hammock, there is no reason why they should not have them since there is plenty of room. We can indulge our individual tastes since they interfere with no one else. Now what shall we call ourselves?"

"Chipmunk College," suggested the primary twin. "There are lots of them around here," explained the secondary.

"Magpie Roost would not be bad either, and we chatter about as much as they do," Guy remarked.

"But roost is n't dignified enough for a place of learning," objected Frank. "Gold Ledge Institute would sound better."

"I thought we were coming here to work," Gus Goslowsou picked up courage to say. "Why would n't Working Bees' Hall, be a good name?"

"You have n't heard my name yet," said Esther Easygo, as she industriously tried to pull the point of a prickly-pear from the toe of her low walking shoe; "if it's anything at all here, I reckon it's a Prickly-pear Plantation!" Everybody laughed.

"I think I shall have to help you out with your name," said Miss Lovechild. "It strikes me that if we are anything at all,

as Esther says, we are a university, because you see we represent all the American universe—North, South, East, and West. Then I think that the knowledge we get here will be of the universal sort, too. So I propose that we call ourselves, Pine Log University, and have the name painted on a strip of cloth, and put up with ever-green festoons, and over it a picture of Liberty or Uncle Sam, with North written over his head, South below him, on the right, East, and on the left, West, to help us remember that it takes them all to make America.”

“That’s fine,” acquiesced the children. “But you haven’t told us what *you* are, Miss Lovechild.”

“O but I must keep that a secret. I am just an American.”

“Were your parents American, too?” queried Prudence, with a New Englander’s love for genealogy.

“Suppose I should say no, you would not think I knew enough to teach a little girl whose fathers were Pilgrims, would you?” Prudence blushed.

“I do not think it would make an atom of difference myself; but we must return to business. Guy, I appoint you and Gus as our carpenters, Prudence our housekeeper; Esther shall look after our luxuries, Flossy our decorations; Frank and the twins shall be our business agents if they will promise not to sink us in debt by their speculations. I shall expect our room to be in working order in two days, and you will all have your hands full. Now how would you like to walk home by the creek, near the hot springs?”

“That will be grand fun,” the University voted. So as they left the cabin, Miss Lovechild took the trail down the cliff into the canyon where a very dashing, tearing, businesslike brook rushed along. Very much in a hurry, like the rest of the Western world, it did not stop to give much attention to the detail of its surround-

ings, its only object being, as Tod put it in his Western phraseology, "to get a move on itself," and everything else that happened to be near it, Miss Lovechild thought, as its banks were washed and gullied in a most surprising manner for so small a stream. It could not claim so much as fourth cousinship to Tennyson's "brook;" for none but a well-regulated English brook could flow "on forever" in one channel, content with the pretty sentiments of life—reflecting forget-me-not banks and loitering around trout pools! No, the rough-and-tumble Western brook never stops for sentiment; its business is gold washing, and to that end it tumbles on.

"See here, children," said Miss Lovechild, "aren't you glad you are not those stones in that little whirlpool? What do you suppose would happen to you if you were? Do you dare get a few of those small stones out for us to look at, Tod?"

"That's nothing," replied Tod. "Get you all you want, but you won't find any gold in them."

"Well there are other interesting things in this world besides gold," Miss Lovechild rejoined with a smile. "Thank you, Tod," she said, as he placed a handful of dripping, water-worn stones in her hands. "Now go to the foot of that ledge of rock, and bring me a handful of the stones you find there."

"There's nothing there though, but broken rock," he replied.

"Well bring me that, then," she said. "Now," she continued, as Tod returned with a handful of rough, broken rock, "some one please tell me the difference between these stones."

"The brook stones are smooth, and the others are rough and all corners," Guy answered.

"Now throw the rough stones into the water and watch them; that little whirlpool bumps them together in a very unceremonious way, does it not? I fancy that if they could speak, they would all

be accusing each other of hurting everybody. Do you see what the trouble is?"

"Why, the water knocks them together," said Prudence.

"But it would not hurt if they had no corners," replied Miss Lovechild. "It is not easy for two round things to hurt each other. Take these round pebbles and bring two together however you will, hardly a pin's point of their surfaces touch; see? Where a family of stones have to live together, the brook very kindly rubs their corners off so they will not hurt each other. There is some hurting at first till they grow smooth; but after that, they can have a very pleasant time. And there are other things besides stones that have corners sometimes, and they do not like to have them rubbed off, either; but if they will just think how beautifully smooth they are going to be by and by, perhaps it would not hurt quite as much. You see I had a reason for bringing you to the brook," said Miss Lovechild.

"O you mean we are the stones," said Flossy; and they all laughed.

"Now we must hurry home for we have our hands full of work."

"I must go to the hardware store for some nails, before I go home," said Guy.

"I'll get them for you," said Tod, "if you'll tell me what you want; I've got to go anyway."

"Well then, here are three cents;" and Guy tossed the coppers to Tod. "That will buy enough."

"What on earth do I want of those? I ain't going to buy postage-stamps am I?"

"Well, won't they buy nails as well?" replied Guy, not very pleasantly.

"Not on this range, my tenderfoot. You don't suppose that people who have such big things as these mountains to look at all the

time, deal in pennies, do you? No sir, we never want anything less than a nickle will buy. Keep your pennies till you go home where they deal in small wares," Tod said loftily.

"Look out! somebody's losing a corner," said Miss Lovechild.

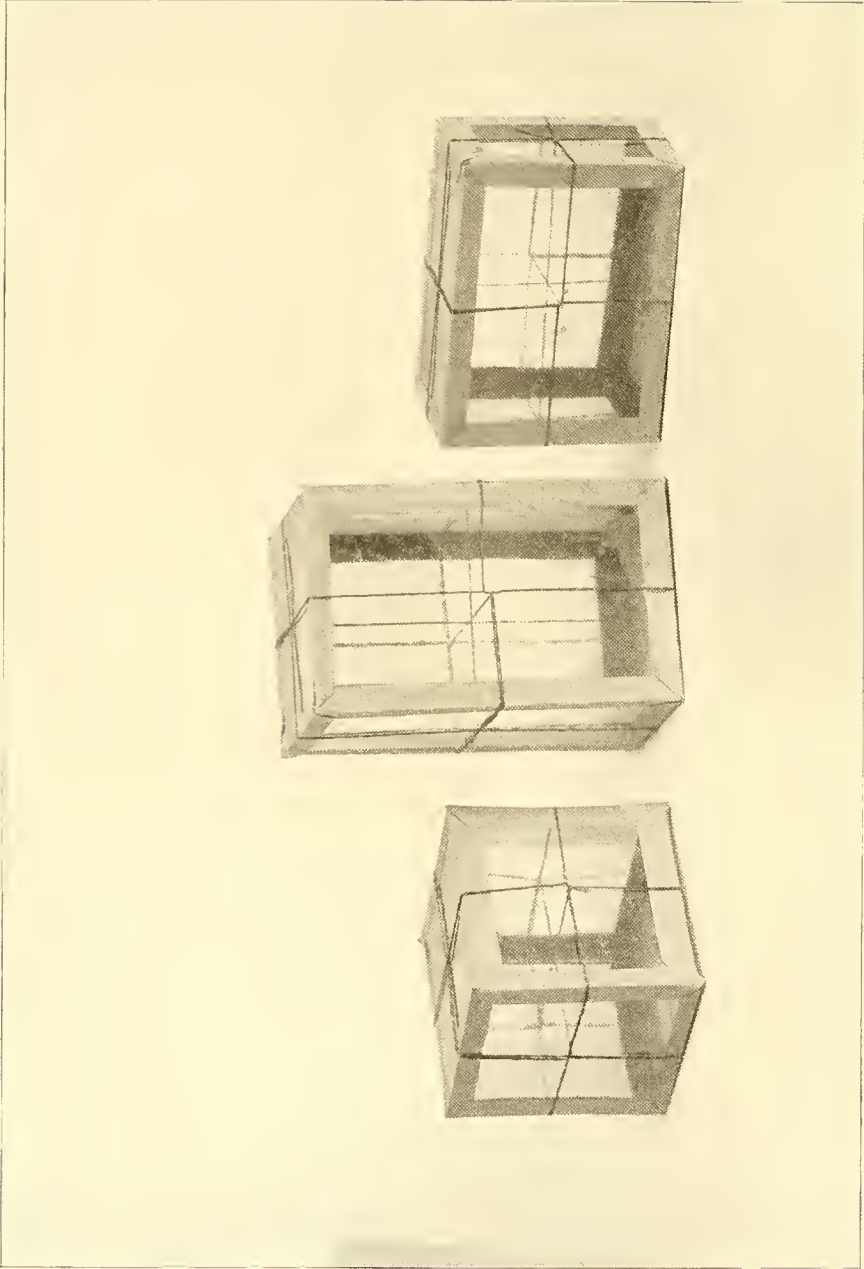
"Dear! dear!" said Guy; "I wish we could lose them all, so we would n't be bumping together so much. You think we are some very sharp-cornered stones, don't you?"

"I think you can be beautifully smooth if you won't mind a little rubbing," said Miss Lovechild pleasantly. "As the room will not be ready, instead of our school to-morrow, do you think your father would let us visit one of his mines, Tod? We will understand our work better if we can."

"O yes, father would be glad to show you down, and we would have a jolly time going down, too. How it will make the girls scream!" and Tod laughed at the prospect.

"How it *won't* make them scream," said Esther.

"O I suppose we shall have plenty of chances to chip off corners," interrupted Miss Lovechild; "but don't let us do any more chipping to-day, or we shall have no room to begin school in. Now go, and see who will have the most work done."



IV.

UNDER A MOUNTAIN.

THE father of the "double T's," as the children called Tod and Tad, was only too glad to help on the school scheme by inviting the members down his mine. So Pine Log University on foot, left the breakfast table for the shaft-house of the Twins' Claim. "Pa named it for us," said the double T's, as they climbed the trail, "as he opened it up on one of our birthdays."

"My! it sounds like an Eastern factory," exclaimed Guy. "What makes all that noise?"

The engine. My father don't run a hand bucket. This is the only one of his mines that he has n't an elevator in; but he did n't think it would pay because it is n't worked all the time. It's more fun going down in a bucket anyway, especially where the shaft is inclined as it is here. You girls will be scared I suppose; girls always are, and scream and jump, and that makes the bucket tip, and frightens them all the more."

"What are all those little holes for, up the side of the mountain, one above another?" asked Frank.

"O just prospect holes," explained the "primary T."

"They were following the float," supplemented the "secondary T."

"For instance, suppose I pick up a piece of float like this," picking up a rusty-looking piece of quartz.

"But what do you call it float for?" interrupted Frank.

"Because it is loose rock broken off of some ledge higher up; and as I was saying, when we find such a piece, we just hunt till we

find a ledge of the same kind of rock it came off of, if it's good float; and then work it a little, to see if it is any good. You see here they worked six ledges before they struck the one that carried the ore, and that's the 'Twins' Claim where we are going."

"Well, how do you know when it has got gold in it?" pursued Frank.

"Miners can almost always tell by the color, whether it is good or not; but they always take some to be assayed, before working a prospect much."

"Well, what is that?" questioned Frank.

"Why, that is having it tested chemically, to see what it's made of. You didn't suppose gold came in solid chunks, did you?"

"It does sometimes," interrupted Flossy; "because I have seen imitation nuggets in museums."

"Well, I mean regularly," explained 'Tod. "Once in a great while somebody will strike a nugget, but that is not an every-day thing; it generally comes all mixed up with lots of other things, like iron, copper, silver, and lead. That's why we have to take it to the assayers to find about what proportion of each there is, so we can tell whether the lode will pay to work. Sometimes a lot of good ore will come out, then there will not be any worth much for a long time, and then we will strike a rich vein again. When we were here once before," said 'Tod, "I remember of going to a ball game when one of the players stubbed his toe on something and fell. He picked it up and found it was a gold nugget worth three hundred dollars!"

"You don't suppose I am tender enough, as you say, to believe that, do you?" said Frank.

"Well, it's so anyhow, whether you believe it or not," rejoined the "double T's;" "but here we are," said 'Tod.

"My! I didn't think shaft-houses were such big things," exclaimed Esther all out of breath. "I should hate to walk up here every day, though!"

"Yes," said Miss Lovechild, "we would not care to do much talking and walking at once. We are glad you saved us the trouble of talking, Tod. You gave us some very useful bits of information, too."

"Why!" exclaimed Guy, as they entered the shaft-house, "it's like a store, a factory, and a blacksmith shop all combined, with a well in the middle!"

"You see everything has to be under one roof," explained Tod, "to be handy. The miners cannot go to town every day for supplies, so we have to keep groceries up here, too. Then picks have to be sharpened all the time, and other things done, that keep two or three blacksmiths busy. Then that big old engine over there, that runs the whole business, takes lots of coal. So you see it has to be a sort of 'Jack-of-all-stores.' There are the ore rooms over there, with some of the bags packed. The best ore is put in bags. Then here's a case of specimens that have been taken from this mine. But here comes father, he can tell you more than I can."

"Glad to see you all!" exclaimed Mr. Westerly. "I'll be glad to see you down now, if you're ready."

Miss Lovechild and the girls wrapped up in rubber waterproofs with rubber hoods and boots, and the boys put on their mackintoshes. Tod informed them that "they would not be worth a Yankee shilling by the time they came out. It's worse than mud down there. Put on our 'slickers;' we've got our old clothes on, and don't care."

"Your what?" queried Guy.

"O I suppose you would call them oilcloth coats."

"Here you are!" said Mr. Westerly, as the big iron bucket swung up filled with slimy ore. "Here, boys," he said to two miners, "empty it quick, we've got another kind of ore to load on now."

"O Miss Lovechild," whispered Prudence, "are we going down in that dreadful, black, wet, muddy, iron barrel? How can we ever get into it swinging over that dreadful hole? One wrong step would send us to the bottom."

"But you don't need to take the one wrong step," replied Miss Lovechild.

"O I suppose it must be all right," said Prudence, and she tried to appear very brave. Perhaps she remembered her Pilgrim fathers, and felt that she must keep up their reputation; or perhaps she caught the flash of daring in Esther's eyes, who was not afraid of anything. So it was that when Miss Lovechild asked who would be the first to go down, Prudence volunteered at once; but Mr. Westerly said Tod and Tad with Gus would better go first, as they could be guides for the others when they went down, and to this the boys, of course, readily consented.

"Come, pile in, boys," he said, as he caught the bail of the bucket, and drew it one side so that the rim was even with the floor of the shaft-house, while they tumbled in. "None of your pranks now," he said. "Here are your candles; take care that they don't go out. There, you're off," and he touched the electric bell that gave the signal for the great wheel to unwind the heavy chain, from which swung the bucket.

"Suppose one link should break!" whispered Prudence to Miss Lovechild.

"But little Puritan must not always be supposing things," said she. "Let us sing them down!"

“O yes,” said Prudence, “let us sing, ‘The old oaken bucket, the iron-bound bucket, the moss-covered bucket that hung in the well.’”

“That will be jolly,” they all acquiesced, “only there will have to be some variations.”

“I have it,” said Guy, “we will just give them the chorus of The old ore bucket, the iron-bound bucket, the mud-covered bucket that hung in the well!” And they sung with a will, till the “old ore bucket” appeared for the next load, then that load sung with the others, till they lost each others’ voices in the depth of the shaft. At last Miss Lovechild and Prudence’s turn came, after the others were all down.

“Nobody to sing to us,” said Prudence.

“Perhaps they will sing us a welcome,” replied Miss Lovechild.

“Here we are at the first level. See that long, dark hall, Prudence, with the lights on the wall; they look like very small stars in a very black night, don’t they? See that miner waiting with his ore car to load up the shaft bucket. He will have to wait still longer won’t he? There! We passed another level, you can tell by the sound of the picks and the glimmer of the lights as we pass by. It is like going down the elevator of a large hotel, and catching a glimpse of the different landings as we pass, only our elevator has muddy walls, instead of mirrors and plush upholstering.”

“How far down are we?” asked Prudence.

“About eight hundred feet I should think,” replied Miss Lovechild. “There, I can hear them singing ‘The old ore bucket.’”

“‘Twins’ Claim terminus! Change cars for lowest drift!” Tod shouted.

As the bucket grounded, Miss Lovechild and Prudence clambered out, and laughed at themselves and everybody else, as they stood there, ankle deep in water, and bespattered with sticky clay mud.

"This goes ahead of anything in the line of Boston mud that I ever saw," laughed Guy.

"And what do you think of it, Prudence? anything like this back your way?" inquired Tod.

"Not unless it's Bunker Hill Monument upside down," laughed Prudence.

"O there are two or three Bunker Hills upside down in here, and a Washington Monument to finish them off, aren't there, Miss Lovechild?" asked Tod.

"How deep is this mine?" she asked.

"One thousand two hundred and fifty feet," said Tod.

"Then we could put three Bunker Hills on top of each other, and a Washington Monument on top of them, and still be twenty-two feet from the top; or we could stand the Board of Trade in Chicago on the State House in Philadelphia, the Bartholdi Statue on top of them, then Cleopatra's Needle as a finishing touch, and still be sixteen feet from the top of the shaft!"

"Whew!" whistled Guy, "I hope there will not be an earthquake just now! My! what's that?"

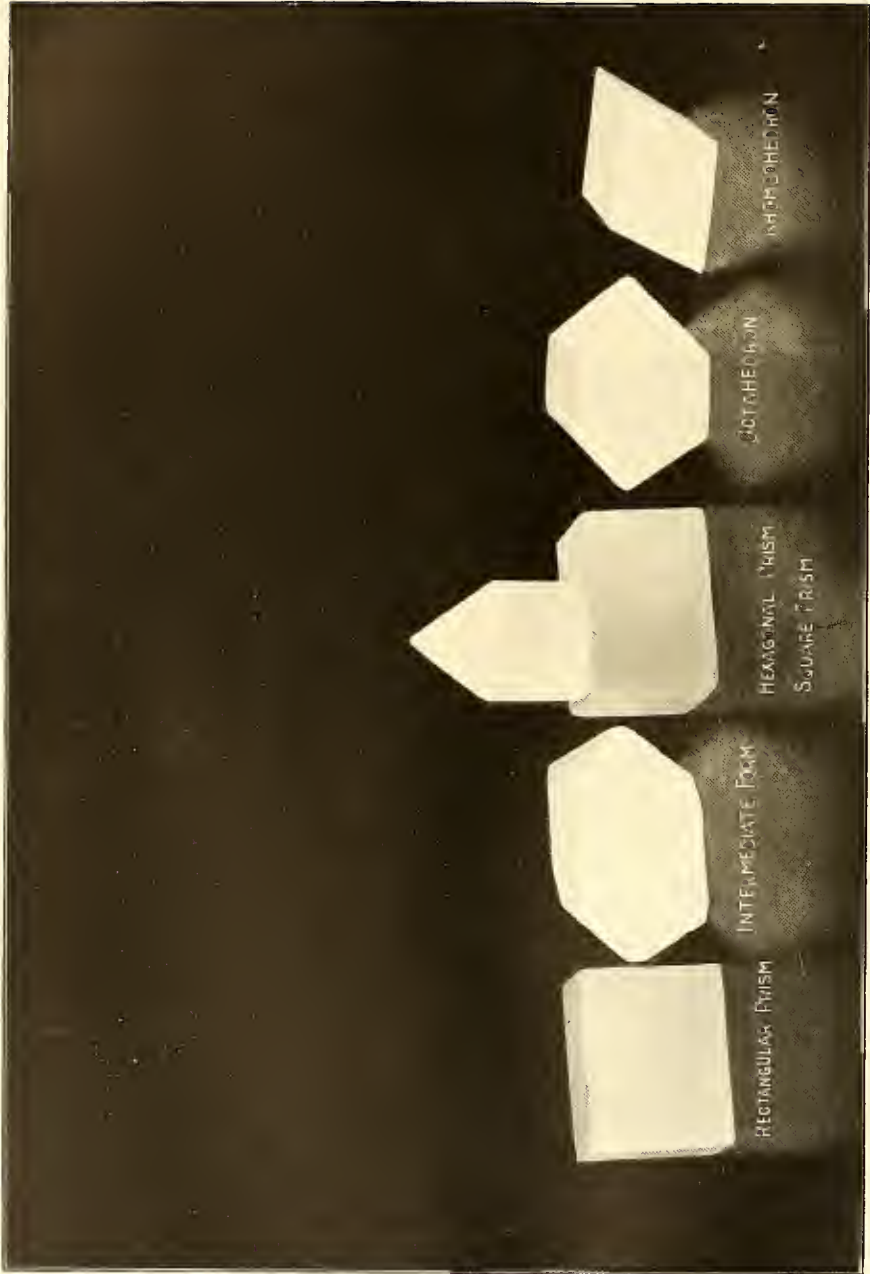
"Nothing but a blast on another level," explained Tod.

"Dear! I feel as though I was drowned in darkness down here!" exclaimed Esther.

"I feel more as if I was drowned or going to be drowned in water," returned Flossy. "It's splash, splash under our feet, and trickle, trickle above and around us. I don't see any difference between this and a well, except that this is deeper."

"And we keep *all* the water pumped out instead of a part of it," rejoined Tod, "as well as pumping into it lots of air."

"Forward march!" called Mr. Westerly. "Keep your candles well to one side, and you can catch glimpses of the ore as it runs like a ribbon through the rock."



CRYSTAL FORMS IN WAX.

“O what is that lovely white stuff overhead?” cried Flossy; “it’s like white moss, and just covers those old planks.”

“Yes, that grows in the old tunnels that have been timbered up a good while, and makes a very pretty effect. It is a kind of fungus,” explained Mr. Westerly. Suddenly a very explosive laugh from Esther made everybody look around to where she brought up the end of the procession.

“What is the matter?” every one said.

“O nothing,” replied Esther, “only I have been watching you, while you have been looking around, and we make the funniest parade I have ever seen yet.”

“In a minute you will have something still more weird and uncanny to look at than we are, if you keep your eyes open,” added Mr. Westerly. And sure enough, a few steps more brought them around a curve in the tunnel, and gave them a view of what appeared to be a group of shadows working with picks in the darkness at a heap of broken timber, loose rock, and earth.

“Why, what is the matter?”

“A cave-in!” “A cave-in!” shouted Tod; “when did it happen?”

“Last night when the night shift went on. They had been working here only a little while stouping.”

“Anybody hurt?” asked Tad.

“No, nothing to speak of; it need n’t have happened if they had been more careful, though stouping is always a little dangerous,” replied Mr. Westerly. “I thought you would all like to see a real cave-in, though, so I brought you around here. There is no danger if you don’t go too near. Now, Miss Esther, just imagine that there are some arms and legs scattered around and sticking out of that heap, here and there, and you see what often happens down here; the cost of gold is greater than many realize. Isn’t that more gruesome than our parade, as you called it?”

“O how horrible!” said Prudence. “I would n’t be a miner for all the gold in the world.”

“I would,” said Esther; “it is so exciting and interesting to be digging out gold,” — “and have some rock smash down on your head,” put in Guy.

“It does not happen very often, however, does it?” inquired Miss Lovechild.

“That depends largely on the kind of men that work for us; though sometimes, of course, a company is at fault by not keeping up repairs,” Mr. Westerly replied. “Sometimes when we have a careless set working, it happens very often; but it need not happen at all. Here is something else, however, that I brought you this way to see. They just opened up a vein of ore that is full of very pretty crystals such as I fancy you were looking for.” And Mr. Westerly handed a beautiful specimen of quartz crystals, sprinkled with cubes of iron, to Miss Lovechild.

“O how exquisite!” she exclaimed.

“Now is the time to remember, though, that all that glitters is not gold; in fact but very little of the real thing makes any show at all,” said Mr. Westerly. “Here is some that looks iridescent. Notice its play of colors, — rose, green, and peacock blue. It is worthless as far as we are concerned. We do not find many varieties in crystals down here, as one lode usually carries the same kind of combinations. I have some very fine specimens, however, in our case above, that I have taken out of other drifts. We will pass around this cave-in now,” continued Mr. Westerly, leading the way, “and there you can see how the men drill and get ready to blast. See those two men there at the end of the cave? They are the strongest we have in the mine. Drilling is hard work; it takes muscle to swing those heavy hammers.”

"Why do they have so many different lengths of drills?" Guy queried of Tod.

"Doesn't your Yankee gumption teach you that?" returned Tod. "They have to drill first with a short one, and keep changing as the hole grows deeper."

"I don't understand how they can see well enough to strike straight," said Frank, "with only those candles to work by."

"Their eyes become used to the darkness after a time," Tod replied.

"Ugh! what awful work," said Prudence, "to spend one's days in the dark, hammering away at rock. They look like Vulcan in his workshop, don't they, Miss Lovechild? Just see their great strong arms with their muscles knotted and twisted up as they strike the blows! How large and black they stand out against the light of the candle beyond them!"

"See our underground railway," said Mr. Westerly; "here's an ore car; climb in, girls, and the boys shall give you a ride."

"What a dear little car! Just big enough for us three!" exclaimed Flossy. "Can't the boys push us back to the shaft, now?"

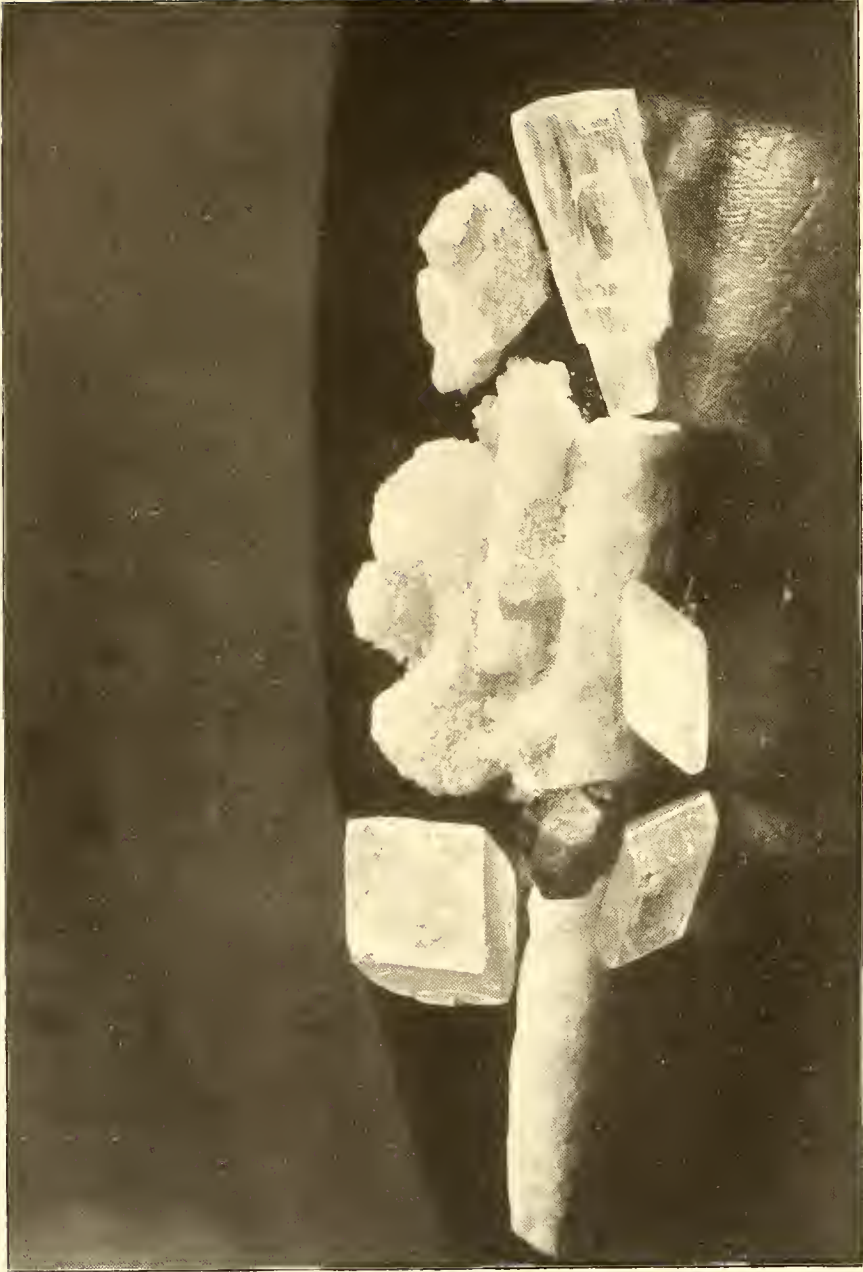
"Of course they can; a five-boy power should make quick time! Come, get hold here, and show what you are good for," said Mr. Westerly. Then with much laughing and splashing of water, their iron chariot was trundled along to the shaft, where the "patent elevator," as Tod called it, was waiting for them.

"All aboard for daylight! Who'll go up first," he shouted.

Everybody seemed so anxious for the chance, that Mr. Westerly declared that he believed they were afraid of another cave-in; but Prudence said that it was only because they were tired of holding a mountain over their heads, and that hereafter she should always be sorry for Atlas when she saw his picture, with a world on his back!

So Mr. Westerly declared that if she was as tired as that, she should go up first, with Flossy, who also looked suspiciously "trembly," and it was not long before they were all safely landed high and dry, and laughing at the revelations daylight made in their appearance. Mr. Westerly was not willing to have them go till they had seen him send the electric current that ignited the fuse in the different places where they were ready to blast.

"What fun to hear them go off!" exclaimed Esther; "it's like hearing a thunder-storm under your feet, instead of over your head where it ought to be!" Then they started for home with their pockets filled with specimens, Tod and Tad electrifying them all the way by their gymnastic tumbles over the rocks, always managing to appear right side up, just when everybody was sure they had killed themselves.



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SUGGESTIVE MINERAL FORMS.

V.

THE OPENING OF THE UNIVERSITY.

TOD and Tad were the first to reach the cabin on the eventful first day of school. As the others came in sight up the trail, they saw them vigorously pulling something hung over the door, with a piece of old clothes-line, and then a faint metallic clang greeted them.

“O see the school-bell!” shouted Frank.

“That’s a fact; you can see it better than you can hear it,” replied Guy.

“This,” explained Tod, as they came nearer, “is the old Liberty Bell, hung out of regard to the Eastern portion of our ’varsity.”

“You see it is just like it,” supplemented Tad, “if it is Mrs. Hostess’s old dinner-bell, because its got a crack in its side.” Whereupon Prudence and Guy felt called upon to give a faint cheer, and Miss Lovechild laughingly said that it would not be a liberty bell unless it proclaimed liberty.

“But that’s just what it does, though,” replied Tod. “It’s asking you all to come right in, and do as you please; Esther to sit in her hammock, Frank at his table, and the rest of us on our planks; see if it isn’t!” and Tod threw open the door for Miss Lovechild to enter.

“This certainly might be called Independence Hall,” she said, “for our business agents have remembered everybody’s tastes, and they deserve credit for their work, too, for it’s well done.”

Across the window-end of the cabin, was a pine plank table, neatly covered with manila wrapping-paper; on the side facing the window was a plank bench, made on Guy's economic basis, and covered with the remains of an old, striped canvas tent-fly (because Flossy and Prudence didn't like splinters); across the other end, facing the fireplace, stretched Esther's hammock; and in the center, due prominence was given to Frank's table and camp-chair; on the floor was a soft, fragrant carpet of pine needles, according to Prudence's dictum; and in the corner was rainy-day comfort, in a pile of fire logs and pine knots, which Gus stated were the best on the mountain. On the mantel, which Flossy had festooned with evergreen, was a bag of popcorn and in the corner hung a popper.

"If there had been any apples in market, we would have had them for Esther, but they don't get up here till late," Tad explained.

Over the mantel Frank had tacked a large picture of Liberty, which he had clipped from some advertisement. On her shield he had pasted a picture of Uncle Sam, which he had cut from a similar source; over her head was tacked an arctic scene, under her feet a tropical; on the right side loomed Bunker Hill Monument, on the left, a mining scene,—all of them set in evergreen festoons of Flossy's making.

"We are all here, you see," said Frank, "from the four cardinal points."

Flossy had not been stingy with her festoons, but had framed the windows in them, and looped them over the rafters.

"This looks as though you were ready for my part of the program," Miss Lovechild remarked. "I hope I shall fill my office as successfully as you have yours."

"We are not quite ready for you yet," said the business agents. "You didn't tell us what you wanted when we planned the room,

so we had to get something that we wanted you to have." As the boys said this, Miss Lovechild heard a rustling behind her; and when she had turned, the children put in place a large folding table and camp-chair, on a low staging which they had made for the purpose, behind their table, where Miss Lovechild could see them as they worked.

"Here's papa's contribution," said the twins, showing a large cabinet of minerals. "He sent it down from the mine as soon as he knew you were going to use these in teaching us."

"O how kind of you all to remember me so generously!" exclaimed Miss Lovechild.

"Why," said the business agents, "you didn't suppose that we were going to see you sit on a pine plank bench, when you were just giving us your time to help us, did you? And besides, Frank said he would never sit in his camp-chair if you didn't have one too. Anyway, teachers ought to be made as comfortable as possible, because I suppose it's rather uncomfortable work teaching youngsters like us, isn't it, Miss Lovechild?"

"I was just thinking," she replied, "that it was going to be just the pleasantest thing I ever did, to teach a class so full of ideas of their own. Schools can be the very pleasantest places, when every one wishes to make them such. I always measure people by the thoughts they work out. You remember that when I asked you how much you were worth, the boys dipped into their pockets at once; but what I wanted was to have you all dip into your heads for ideas, and then work them out with your hands. This you have done admirably, and I want you to keep right on doing it, and you will learn all that I am going to teach you. I wonder if any of you noticed, as you prepared our room, that though you each worked out your own independent idea, yet the success of your work has de-

pended on all of you alike. Prudence's New England forethought for a rainy day, as well as comfort and neatness, put the fire logs in the corner and the pine-needle carpet on the floor. Esther's Southern love of comfort, thought of the edibles, as well as the hammock. Flossy's New York taste for the artistic, has brightened up our room with the garlands of evergreen. Guy's ingenuity, with Gustave's application, made our seats and table, while Western energy and business talent, has rushed it all through in good shape, and short time, thanks to our three business agents;" and Miss Lovechild smiled. "You see it takes East, West, North, and South to make up America; and the more we mix them up, the better results we shall have. You have all the formality you want, I fancy, through your long winter school year, so our play school shall be very informal. You may ask all the questions you wish, without raising your hands, only do not ask them all at once! My only rule shall be to be gentlemen and gentlewomen in all you do, and we shall have a delightful class, for some one has defined politeness as 'doing the right thing at the right time,' which will cover all the discipline any school needs."

"Now let us christen our school with one verse of America, and then I will show you what I have brought for your work." And they sang with a will, "From every mountainside let freedom ring." Miss Lovechild proceeded to unwrap some very interesting looking packages,—contributions from the Cranny Crag guests for Pine Log University. First there was a roll of blackboard paper which she tacked up; then a drawing kit for each one; rulers, pencils, scissors, and compasses, and plenty of white cardboard; a roll of colored papers, and a can of liquid glue, together with several small jars of parlor paste. Besides these, there was a box of colored straw braids, all of which greatly excited the curiosity of the children.

“O do let us begin with something quick,” said Flossy, “they all look so pretty!”

“Very well, we will as soon as Frank passes the kits around. Now as he gives you your working materials, place them in order before you so that you can work faster. The kits should be placed exactly in front of you; the rulers, pencils, compasses, and scissors should be placed at your right, together with your paste and glue; after using any of them, be sure that they are placed again at your right, or else they will be confused with the things belonging to the one who sits on your left. Now we are ready for work.”

VI.

IRON PYRITES, REGULAR SYSTEM.

FORM STUDY—THE CUBE.

WHAT do you call this iron crystal in the mines, Tod?" asked Miss Lovechild, holding up before them a beautiful cluster of iron pyrites.

"Cube iron," he replied.

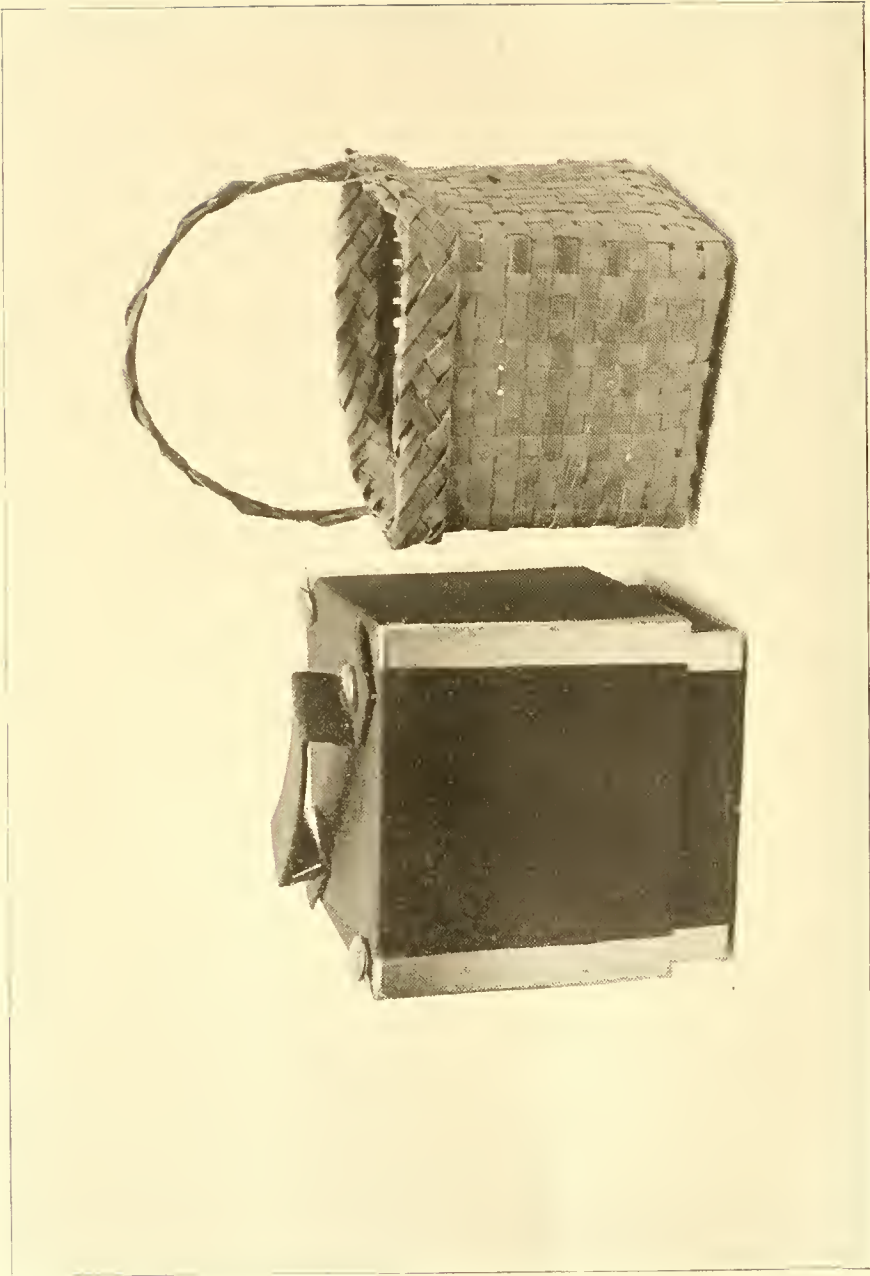
"Why?" continued Miss Lovechild.

"Because that is the shape of it. I didn't know it was a crystal, though. I thought people only called those clear, glassy forms crystals," added Tod.

"O yes," replied Miss Lovechild, "any mineral that assumes a definite form in its solid state, is a crystal. Do any of you know the meaning of the word 'cube'?"

"I guess it means something square," said Frank, "but I don't know why."

"I fancy if it could speak, this form could tell you of a great many games of chance it had played, and of many fortunes it had lost and won; for 'cube' is derived from the Greek word meaning 'die;' dice are always this shape, you know. This is only one of many other crystal forms we are going to learn about; and because they all have some points alike, they are grouped into families just as you are. The name of the family or system that this belongs to, is the regular, or 'monometric,'—one measure, that means; because if you were to imagine axes—which I used to fancy, when little, were



CUBICAL BOX AND BASKET.

like bean poles—passed through the form from each ‘lateral,’ or ‘side’ face, it would divide it like this glass cube. These strings represent the axes; and if we bring them around the outside of the model, it appears as though the cube had been ‘sub,’ or ‘under’ divided into four more cubes. Then if we can imagine axes passing through them as through the large one, we can see them subdivided, and so on and on, till no microscope could help us out. When the cubes become as small as that, we should have to call them ‘molecules,’ which is the name mineralogists give the smallest conceivable forms.” (See illustration on page 38.)

“But what makes the crystals form?” asked Guy.

“Take some salt and hot water, and you can see for yourself how it is done,” said Miss Lovechild. “Put just as much salt in a cup of hot water as it will dissolve, then suspend a string in the center of the cup, so it will touch the bottom, for these little cubes like something to cling to as the barnacles do. Then place the water where it will cool slowly, and when it has evaporated again, the salt that is in solution or dissolved, will have again crystallized on your string. Then you will understand how the string gets inside of your rock candy. I used to think when a very small girl, that the candy must be strung on like glass beads.”

“But what makes the little cube molecules fly right together?” asked Prudence.

“A force called attraction, yet scientists really know but little about all the ‘whys’ of these things. I will illustrate it,” said Miss Lovechild, “with this magnet that I hold in my hand. We will call this the attraction that brings the molecules together in these particular forms. Now I will put it in a box of loose needles, and we will see what happens. They all fly as though they were really alive, and stick all over the magnet in a big heap, do they not?”

Now if they had all stuck together in the shape of a big needle, it would show you exactly how the crystals do, for their molecules are such orderly little things that they never forget the form they are to make."

"How do they know so much without being alive?"

"Ah! that is the wonder of it! What makes a pansy always change the parts it draws from the soil, into pansies? One would think it might sometimes be pardoned if it forgot and made lilies instead. Why can an apple, pear, and plum tree grow in the same garden, and never change places? Nothing can make them forget to change that life-giving substance which they get from the soil, into apples, pears, and plums just as it was intended. If you graft a pear scion on an oak tree, as has been done, it would seem pardonable if it forgot, and bore acorns instead of pears; but does it?—No, indeed! it will change the oak sap into pear juice, as though it grew on a pear tree! So a sweet apple never forgets to be sweet, though it may grow on a sour apple tree!"

"Why, Miss Lovechild, are you telling us the real truth?" said the double T's.

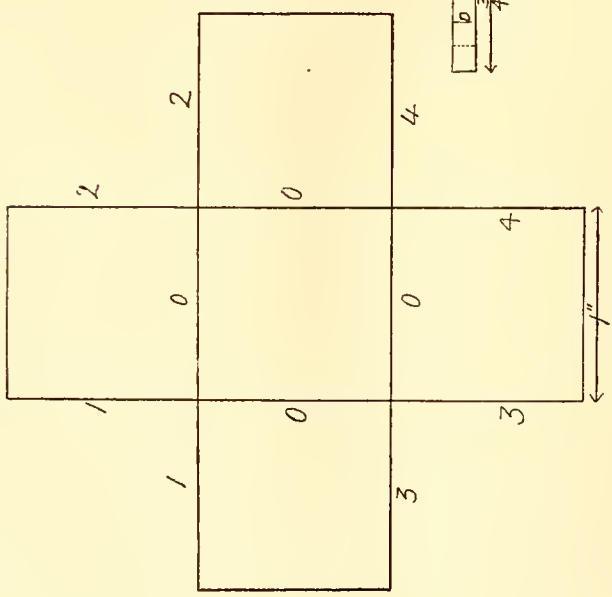
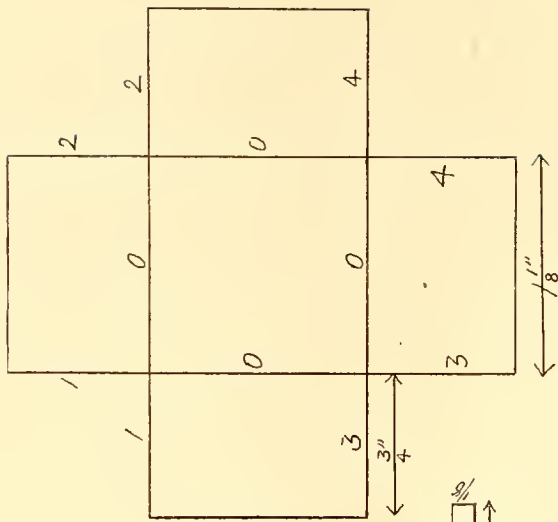
"Yes, indeed!" said she; "there is a tree at my home that bears both sweet and sour apples, and different varieties of both kinds,—all delicious eating apples, though the tree itself was a wild apple tree, whose own apples were unfit for use. Yet those different grafts never forget how to put together, or organize, that wild apple sap into sweet and sour apples of their own varieties, just as the cube-iron molecules never forget to make cubes. We may wonder, and guess, and have all sorts of theories about these matters, but all we can know is what their Maker has told us, which is not how He *could* make them, but how He *did* make them—'He spake, and it was done; He commanded, and it stood fast.' He said, 'Let the

earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, . . . and it was so.' And they have never forgotten the law of that word which told them how to grow.

"Then we are told, 'He putteth forth his hand upon the rock; ' so it is that our little crystals here have never forgotten the shape that touch gave them, but have made it a family law by which they all constitute themselves. No matter how much of a hurry your salt molecules may be in, they never forget that they must have six square faces, twelve edges, and eight angles. Now what do you think this shape was given us for? I think all these lovely forms are God's thoughts crystallized for our use, and that we should study them with that in mind.

"What is the difference between this form and some others that I have made in cardboard? See this cylinder, rectangular prism, octahedron, tetrahedron, and these pyramids? What happens when I throw them down on my table? Some fall over on one side obliquely, others lie horizontally, and some stretch up perpendicularly. Notice this cube; it extends equally in all directions, and so is the most perfect solid of them all. The ancient Egyptians used it as the symbol of truth. It expresses the thought of solidity and strength, and so is the form best adapted to represent building. We cannot build houses, however, in our limited space; but we can make some useful articles in pasteboard, which will teach us the use of the form. These iron cubes are substantial looking little things, so we must make something that shall be substantial and useful. Suppose it is a case like this. We can make it very small for stamps, medium size for handkerchiefs, or very large for a hat case.

"We would better make the medium size. I will put the drawing on the blackboard and explain it to you, and also explain the manner in which you are to finish it; but you will have to use your



memory from lesson to lesson, as only the new features in each model we make, will be explained. All edges that are to be cut and glued, will be indicated by similar figures. All edges that are to be folded or creased with a knife by cutting half through the paste-board, will be marked with a cipher. All points that indicate centers of circles where you are to place the needle-point of your compasses when describing a circle or an arc of a circle, will be marked with a cross. Where it is necessary to crease an edge on the opposite side of your cardboard from which your drawing is placed, it will be represented in the drawing as a dotted line. Differing measurements only are given. Inches are indicated by the double prime ("), and feet by the single prime ('). For instance, suppose I want you to make one side of this box four inches long. Directly under the line representing that side in my drawing, I draw two lines parallel to it, and $\frac{1}{3}'$ below it, which meet exactly under the middle of the line representing the box edge at this point. I place the figure 4 with double prime, at each end of the lines. I place an arrow-head to show that the measurement 4" is to extend to those points. Now suppose that I wish you to draw a circle with a one-inch radius, from some given point. I would indicate that point in my drawing with a cross, and the radius of the circle by a line extending from that center to where the circumference should be, which would be pointed by the arrow-head, and the 1" should be placed in the center, showing that the radius is one inch.

"Always place your drawings on your cardboard in such a manner as will make the least waste. In all of our drawings, our first line will represent the greatest horizontal measurement. By it we will square the rest of the drawing, whether it falls above or below this line, so we will call it our base-line. The base-line of the handkerchief case is 12" long; it is divided into three equal parts,

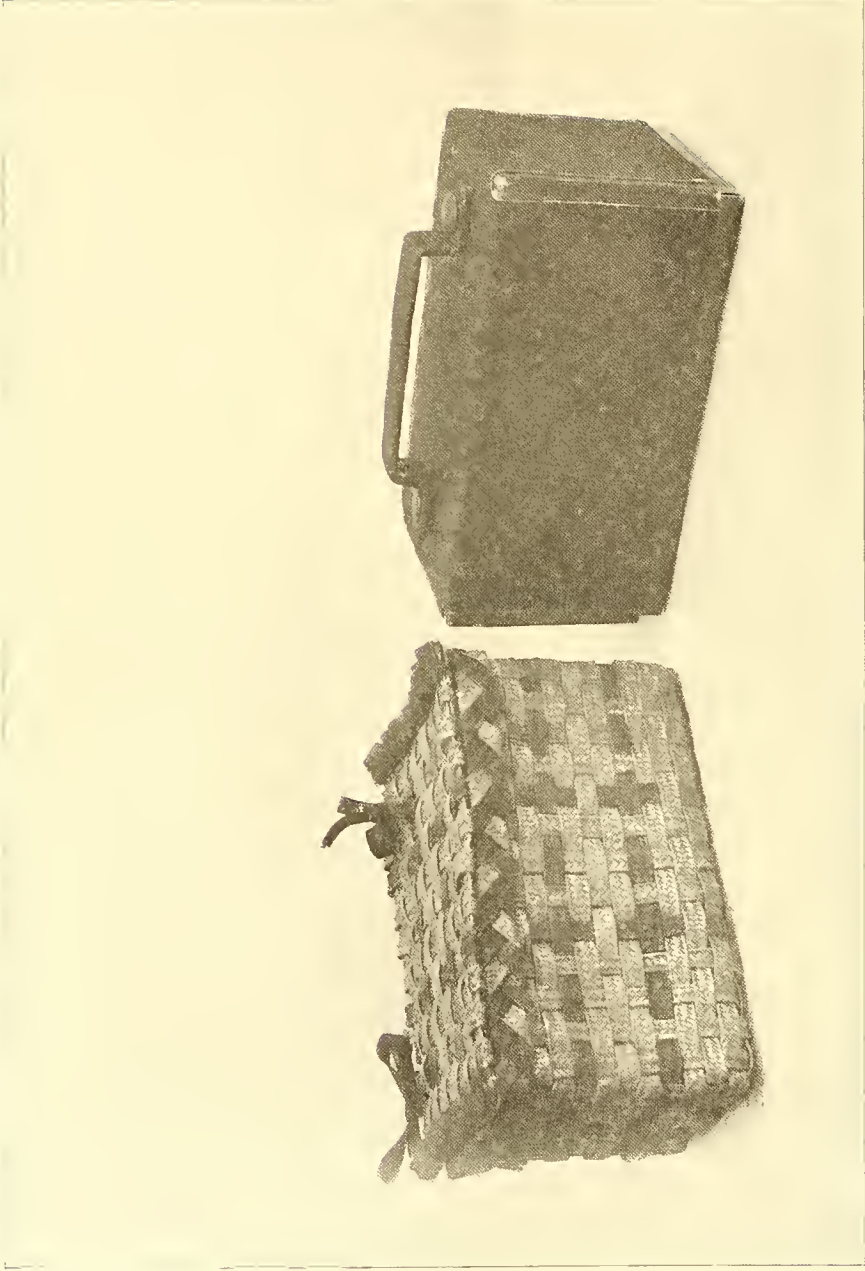
each of which measures 4". On each point of division, I drew a perpendicular line, with the use of my square, measuring 4". These perpendicular lines I connected with another horizontal line, thus making three squares. Above and below the middle one I drew other squares by my steel square. The center one is creased on every side, and then the edges, 1-1, 2-2, 3-3, 4-4, are folded together, and a small strip of thin muslin pasted around them, binds them firmly together. The box is then ready for its paper covering. The cover which completely covers the box like a telescope case, is simply a repetition of the box except that its square faces are $4\frac{1}{8}$ " instead of 4" like the box. The cover should fit so perfectly that it will slide over the box easily, and yet when the box is reversed, it should be snug enough to keep its place. It is necessary to vary the size of the cover according to the weight of cardboard and paper used.

"When you crease your cardboard, always lay your ruler on the line to be creased, as a guide for your knife, and draw your knife across the line with one firm, steady pressure, so that when the edges are folded back from the crease, they will be clear cut and even. Another point to be remembered is that your shears are not teeth. So when you cut out your drawing, do not hack and gnaw it, but cut evenly and smoothly. You can cover your boxes in any way that suits your fancy, but I have covered mine by pasting strips of silver paper over the perpendicular edges, lapping them over the top and bottom. Then I cut squares of blue leatherette, that I pasted on the sides, so as to show $\frac{1}{8}$ " of the silver margin on each side, and to lap over the top and bottom $\frac{1}{2}$ ". The covering for the cover, I cut in one piece like the box itself, only $\frac{1}{8}$ " narrower, to show the silver margins on the corners, and allowed enough on the sides to turn under the cover. The handle I cut $\frac{1}{2}$ " wide and creased on both sides as indicated by the dotted lines, then covered with leather.

ette, like the box. I then folded it down in place, and fastened on the box with nickle paper fasteners. If I had covered the edges with gilt instead of silver paper, I should have used brass fasteners to hold the handle in place to give a harmonious effect which is an object always to be kept in view.

“Now, I fancy that you all are about to ask, ‘What are we to do with that pretty colored straw?’ so I will tell you without waiting for the question. You are going to make a basket out of it just the shape of this box. And the way you are to do it is, first to make a cubical form out of this yellow strawboard, to weave over; otherwise you would have a very poorly shaped basket. Then if you select the straw that is $\frac{1}{2}$ ” wide, you cut 16 strands of sufficient length to reach around three sides of your form, allowing $\frac{1}{2}$ ” for turning in on the edge of the basket. Next pin 8 of these in place on the bottom of your form; then weave in under and over these, in the opposite direction, the other 8, thus forming the bottom of your basket. These strands are then drawn up the sides of your form, and held in place by a stout elastic band. They are the ribs of your basket, and represent what is called, in weaving, the warp; so I shall call them warp strands, and the long strand that you weave in to form the sides of your basket, I shall call the woof strand, as in other weaving, the woof is always that part that is woven into the warp. Select the woof strand, for your first basket, of some contrasting color, as it will make the weaving easier. Then fasten this under a corner strand of the warp, and pass around the form from right to left, drawing out alternately the warp strands, till the sides of your basket are completed. At the corner where you first start, insert an extra half strand of the warp, as an odd number of strands is necessary, else you would have to skip over two at this corner, when weaving regularly under and over.

“Finish the edges of your basket with a braid of the straw. Either three or four strands make a pretty plait to finish with. If you wish a handle, it should be put on before the braid, and should be made like it of a three or four-strand plait, and sewed on opposite sides or corners. Then sew the plait on, taking care that you make your stitches come under the fine strands of the straw, so that they do not show. Such baskets are very pretty for many purposes if well made. You must be very particular, however, to keep all your warp strands perpendicular with the sides of your form, and the woof strand horizontal, and pressed firmly to the sides of your form. After your basket is woven, remove the pins, and slip the basket off the form carefully, and lay your form away for another time. The success of both your basket and box will depend on how well you remember the detail of the work. So to have perfection you must remember the saying of Michael Angelo, ‘It takes trifles to make perfection, and perfection is no trifle.’”



VII.

GALENITE, REGULAR SYSTEM.

FORM STUDY—THE SQUARE PRISM.

WHAT is this form?" Miss Lovechild asked, as the children settled themselves for their second lesson.

"I know," said Guy; "it's a long cube."

"I do not think you would find that definition in any geometry," remarked Miss Lovechild; "but it is a good one, nevertheless, for that is just what a square prism is; it looks as though two cubes had been put together. What is this mineral?"

"Galenite," replied Tad.

"And what is our common name for that?" continued Miss Lovechild.

"O I know," said Gus, "it's lead, and we find it most in the silver mines; it nearly always carries the silver."

"That isn't what our pencils are made out of, is it?" asked Frank.

"My, no!" replied Tod; "this won't make a scratch."

"What Frank has reference to is the graphite of lead," explained Miss Lovechild, "which is black lead. Now though this form is so much like the cube, yet it belongs to a different family, because it has axes of two different lengths,—one long one, and two short lateral axes,—so the mineralogists have named its family dimetric, or two-measure, or it is called the tetragonal. This galenite really belongs to the monometric, or one-measure family; but when it cleaves, it as often forms square prisms as cubes, so I am going to

use it to illustrate the form. We used the cube for a handkerchief case. Now what can we use this for? What do you think, Flossy?"

"Made the same way, it would be nice for a glove case."

"Yes, that would do very well; or this form could be developed in a very large size for a telescope case, using a foundation of tar-board, and covering it with linen canvas, fastening a shawl-strap on the top for a handle. It is made in every particular like the cubical case, only double the size when used for a glove case. So I am not going to tell you any more, for I wish to see how good your memory is. Where do you see this form most commonly used? Guy ought to tell me that."

"You mean in building, don't you, Miss Lovechild?" he said.

"Yes, but in what part?" she asked.

"In pillars and in different kinds of supports."

"I know something else," said Prudence; "it is the shape that monumental shafts are made in, only they have a little pyramidal top, like Cleopatra's Needle."

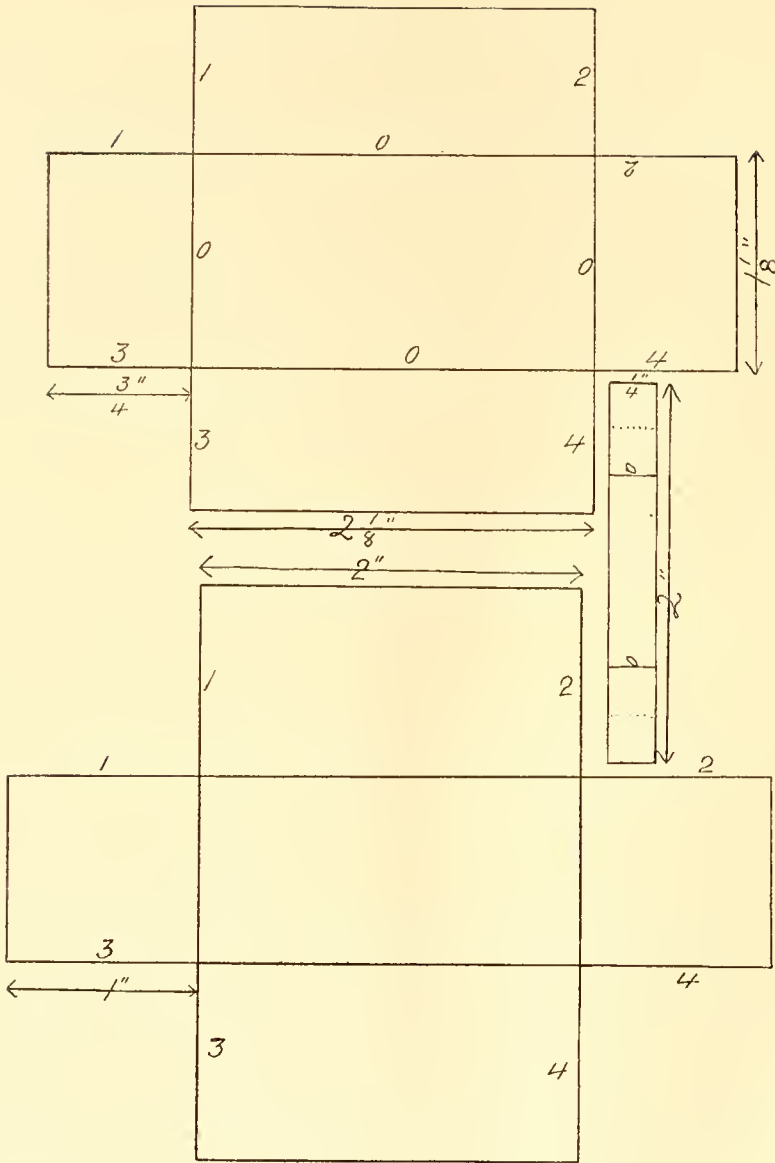
"Yes," said Miss Lovechild, "here is another little crystal really belonging to this system which is finished with a little pyramidal cap at each end. This is called zircon. These long-faced cubes have a hard life of it, supporting buildings and living in cemeteries, do they not? They are highly honored, too, however, for the highest monument in the world—the Washington—is this form. Now to what use could you put a basket made in this form? Esther, you look as though you had an idea; what is it?"

"I was wondering why a basket for ribbons and ties would not be pretty made in that form."

"They would be very pretty," said Miss Lovechild; "and you would not have to wonder where your ribbons and ties were, when you were in a hurry. How will you make it?"

“Just like the cubical basket, only double the size, I suppose,” said Esther.

“Yes,” Miss Lovechild replied, “only I would suggest that you make it out of this palm leaf instead of hat braid; it would be more suitable for such a basket. I will not repeat the weaving directions, as it will be a good memory test for you to recall what I told you about the other. Since you are a little more familiar with weaving now, it will do to weave some simple design, such as a band of color around a white basket, and a corresponding band through the center of the cover. Your cover is the only point of difference between this and your cubical basket, and should be woven, after the basket is finished, on the bottom of the basket-form; and if made of fine palm leaf, should be finished with a wide plait of the same, sewed on the edge, inside and out, to strengthen it. A corresponding plait of palm leaf should be sewed around the top of the basket, that there may be a firm edge for the cover to rest on. It should be fastened to the basket with bows of narrow ribbon or a piece of straw slipped through the cover, and woven into the basket. This same basket-form can be made very large for a picnic basket or traveling lunch case, with a woven telescope cover, and finished inside with woven apartments half the height of the basket, with a tray to fit in the basket, and rest on the partitions. Think of other models you can make out of this form, while you are at home; but whatever you make, let it be made good enough for use; but, on the other hand, do not make it too good to be used. Do you know what I mean? You look puzzled. I will put it in another way; make what is useful for the use required. I have seen girls wear very pretty silk dresses to school. They were not suitable for school, however, though they would have been very pretty for an evening entertainment—the dresses were too good for the use, you see. Others who could afford



but poor clothing, would attend school through all the cold winter, in cotton dresses, and save their one good wool dress to wear to church one day in the week. Now their cotton dresses were not good enough for the needed use, because they were not warm enough; while the one wool dress was misused since wool is worn for warmth, or ought to be. So either they did not care to be warm but one day in the week, or else they misused the wool dress by wearing it for appearance."

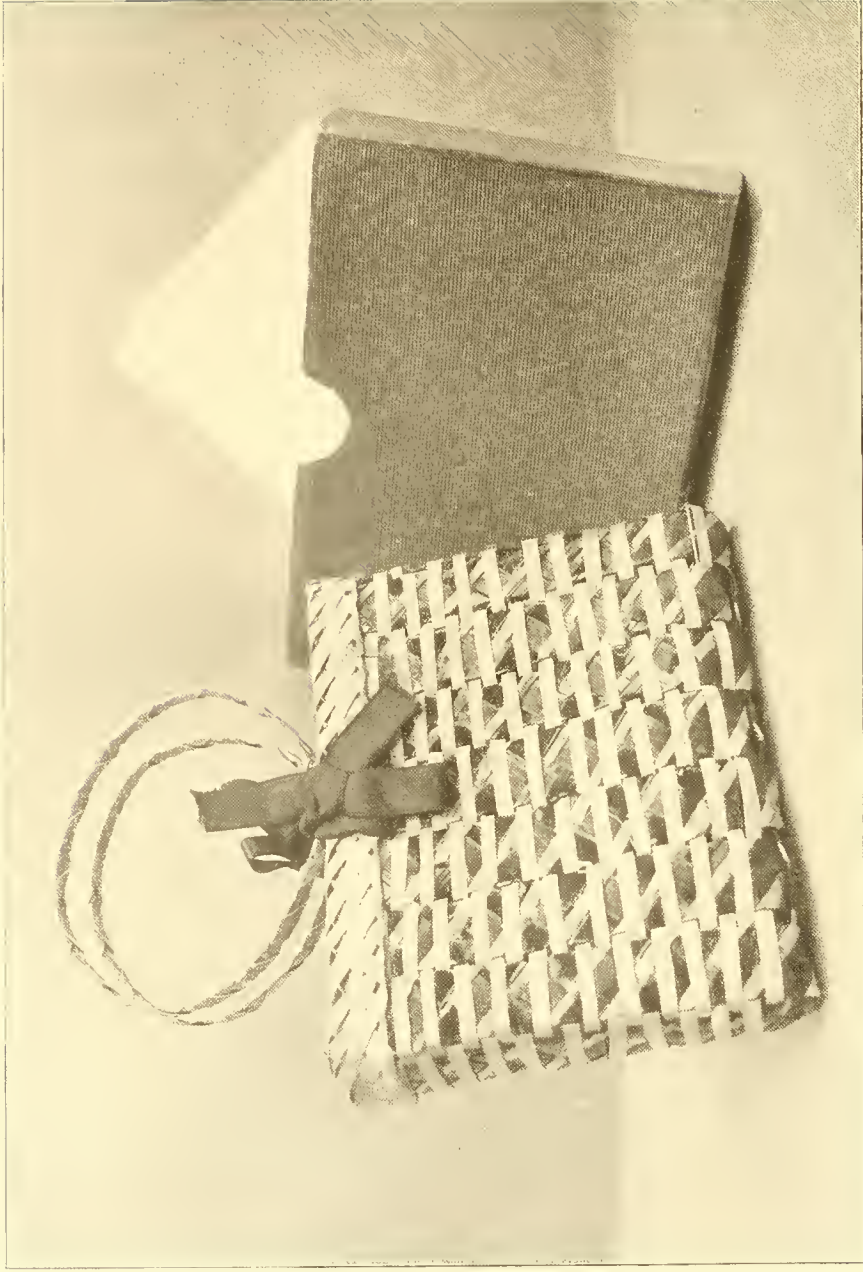
"But," put in Gustave, "my mother can't afford to get my little sister but one warm dress. Shouldn't she have something good to wear to church?"

"What do you attend church for?" asked Miss Lovechild. "If it is to honor God, I think he would be pleased to see you in the same dress that you had worn all through the week, if it was the only warm one you had, rather than see you shiver six days in order to look nice one day. It honors him to take the best care of these bodies he has given us, rather than to dress them just to look well. It would be better, Gus, for your little sister to wear her wool dress all the time and have her cotton dresses turned into aprons to protect it on school days. But what has all this to do with making ribbon-baskets? you will ask.—Just this: we cannot even make a basket without weaving into it a great many right and wrong ideas, as well as straw. You should not make your baskets so fancy that when you take them home, your mother will say, 'That is too pretty to use; I will put it in the parlor.' Ribbon-baskets have no place in parlors, because parlors are not where people make their toilet. Neither should you make your basket poorly, for then it would be put where no one but yourself would see it. The very fact of your doing so, would prove that it had no value in your eyes but that of its appearance, and we do not make these things to look at, but to use.

A poorly made basket being unfit for use, would better be unmade. When you select the straw for your basket, choose something that will harmonize with your glove and handkerchief cases, and that will look well with the colors in your room; for we are taught in nature to combine use and beauty, as no created thing was made for appearance alone. In nature all is made for use; but the use of things is made beautiful by their correct proportion, harmony of parts, and beauty of coloring."

"But weren't the flowers made just to look at?" questioned Flossy.

"No, indeed!" replied Miss Lovechild; "it is now generally known, that they are powerful germicides, and some of them are medicinal. You see, when man makes a disinfectant, he makes something that, as some one has put it, 'smells worse than the original smell.' But God makes a lovely flower that can take up the poison of its surroundings and change it into sweet perfume and beautiful color. This is God's way of overcoming evil with good. But had flowers been created alone for their beauty, they would be useful in the highest sense. We will talk, however, of the use of beautiful things some other time; just now the thought for you is to make your models so they shall be beautiful for their intended use."



RECTANGULAR PHOTO CASE AND BASKET.

VIII.

BARYTES, RHOMBIC SYSTEM.

FORM STUDY—THE RECTANGULAR PRISM.

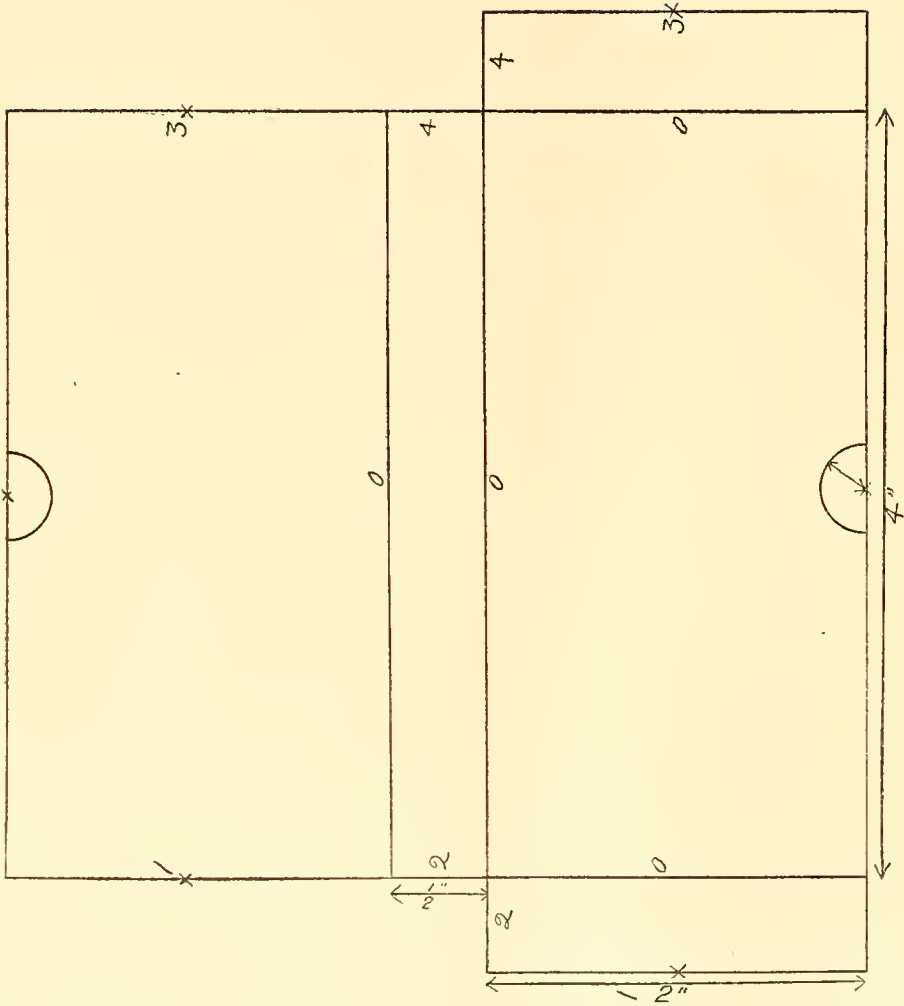
SUPPOSE that I should cut this square prism in halves vertically; what kind of axes would they have? Here, Guy," said Miss Lovechild, "take this soap and sloyd knife, and cut out a square prism; then divide it in the center vertically; then take these needles and pins,—you see there are different lengths,—and run them through the soap-form for axes. Now tell me whether they are like the axes of the square prism."

"There are the same number," replied Guy, "but they are all different in length."

"Yes, they are three-measured, you see," Miss Lovechild said; "so this family is called trimetric and also rhombic. See, this crystal has two broad faces, two long, narrow faces, and two short, narrow faces. Can you mention anything made in this shape?"

"Bricks," said Frank, "and books," added Prudence.

"Yes, two very important 'b's,'" said Miss Lovechild. "There are any number of useful pasteboard articles that we might make; but one of the simplest would be a photograph holder, or the model could be slightly enlarged and used for two or three books. Gift books are often sold in these small cases. The plane faces in your drawing are arranged much like those of your square prism; this, like the other two models, will give you practise in drawing right-angled forms. The only differing feature in this is the semicircular



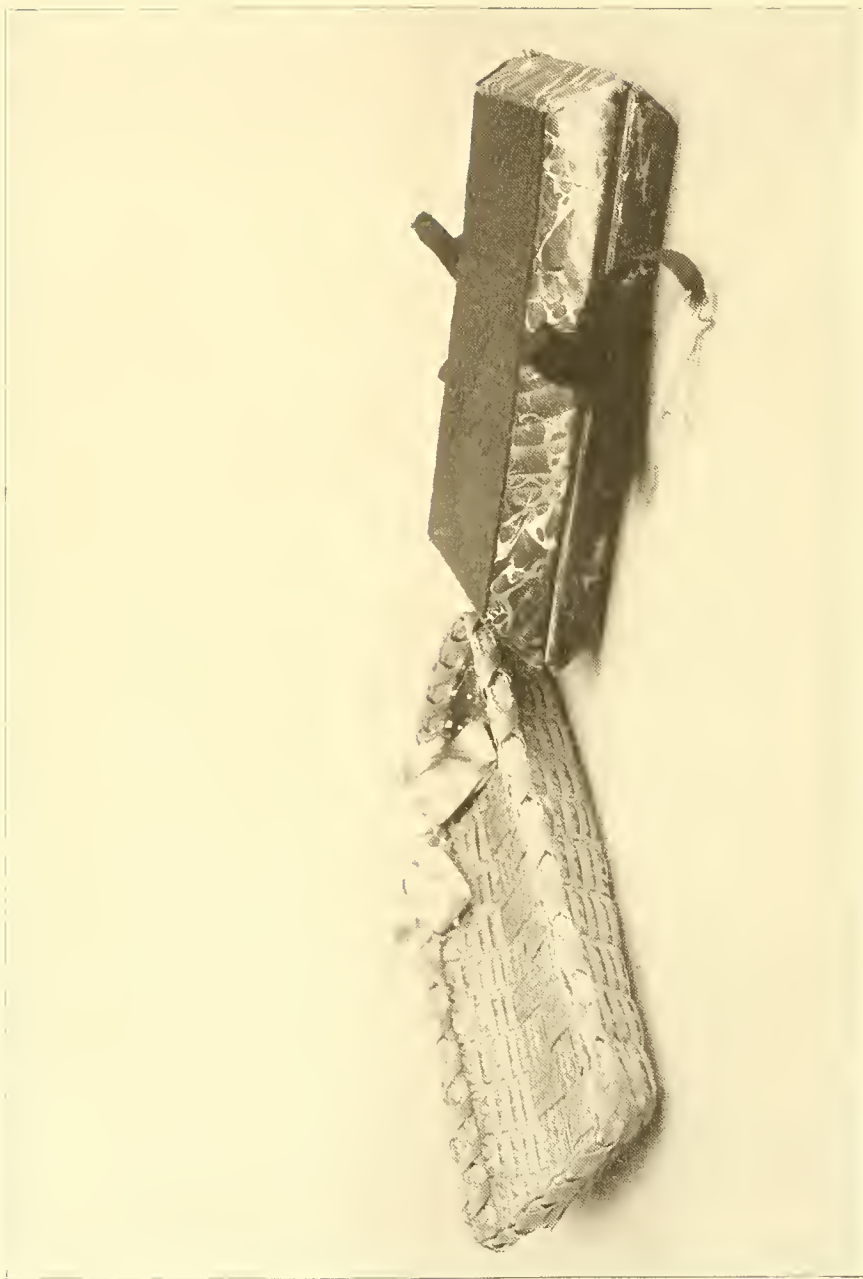
thumb holes in the sides. To draw them, take a radius of $\frac{1}{2}$ " and place the needle-point of your compasses in the middle of the line indicated by the cross, and describe a half circle. When you cover the form, the gilt paper should first be pasted over the narrow faces, and a margin of it pasted over the upper edge of the form; then it will be ready for the paper sides, which should be of fancy embossed or leatherette paper. Now what kind of basket can you make over this form that would be useful and appropriate? One for school-books would be just the thing, would it not? A good proportion would be 12" long, 3" wide, and 7" deep. You see it is the same rectangular form of the photo holder, only different dimensions. After the form is made, fasten your strands on it as you have the others, always weaving the bottom first. You may weave in any design you fancy, but it is pretty woven with all the warp strands of wide straw, and the woof with the very narrow palm leaf; this gives the effect of simply binding the warp together, and makes a pleasant change from the other baskets. Both of these models are very plain, and equally pretty if they are neatly made.

"You see how perfect the rectangular plates of these crystals are; they are beautiful because the edges are all true. Here is some galenite again. This cleaves into rectangular plates, as well as square prisms. You see the beauty of it lies in its clean-cut edges and the smooth shining surfaces of its broad sides. Your holder will be more difficult to make smooth on its sides than the cases were, and you will need to spread your paste with great care or the sides will have a lumpy appearance.

"I have made two models to show you to-day," Miss Lovechild continued; "and I would like to know which you like best. I made them to illustrate two ways of working that I see you have here. This first model has rather rough edges, you see; but I covered

them up with guilt paper, so that they would not show much. The paper is about 1-16 of an inch farther over one side than the other, and then there are a few lumps in the paste that I did not stop to get out; but I was in a hurry to finish it. One end of the box is a little longer than the other, too, but it won't show much. There are some specks of paste here and there, but it will hold photos.

“Here is another, made on a little different plan. Can you tell me which you would rather have? The perfect one, of course, you all say; and I am not surprised, but why? It looks better I know; but why does it look better?—Its edges are true, and it is cleaner and neater, Prudence says, which I know; but what do you mean when you say its edges are true? Can edges tell lies? I should like to know what you think about it, and why you like this model that has true edges better than this crooked, soiled one? None of you say anything, but look as though you thought I had asked you some remarkably silly questions. Now when you make these edges, what are they supposed to represent?—A rectangular form, which is one made of right angles,—the only kind of angle we have had anything to do with as yet, and it is 90 degrees of a circle. So you see if we make a model bounded by what we intend to be eight right angles, and they fail several degrees more or less of being right angles, they pretend to be something they are not; and is that not telling a lie? The lines that form these angles are supposed to be straight and true with the base-line; but if the angles vary, they must either bend in or out, so they are crooked when they pretend to be straight, and tell lies, too; for a straight line is the shortest distance between two points, which the truth always is. We like these straight, true things in proportion as we have in ourselves a love for the truth; and the only way we can be true is to measure ourselves according to the rule which God hath given us.



IX.

CRYSTALLIZED SUGAR, MONOCLINIC SYSTEM.

FORM STUDY — THE RECTANGULAR PRISM BEVELED.

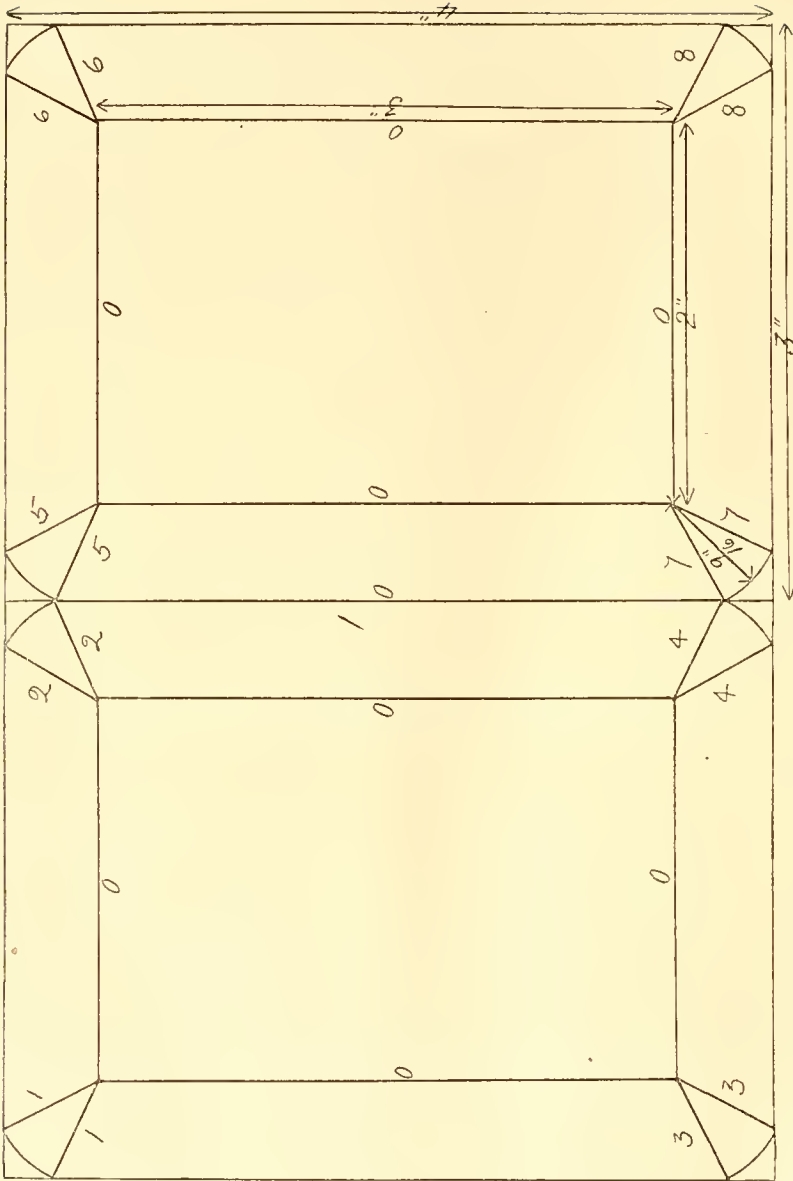
I WONDER if you can guess what this crystal is! It belongs to the monoclinic system, and is something like the rectangular plate of our last form, only it has different edges. We call them beveled when they are like this. The makers of the handsome plate glass mirrors might have taken their idea of beveling from crystals, if they had studied them, could they not? You see this crystal is almost as clear as glass and only slightly translucent. And if I did not think it too beautiful, I do not doubt you would enjoy eating it."

"O I know," said Prudence, "this is salt."

"No, it is not," replied Miss Lovechild, "but it is good to eat, nevertheless. I do not wonder that you look surprised, for the other crystals I have showed you, have not been edible. This did not crystallize in the ground, however, though it grew from the ground before it was a crystal. There, I have almost told you!"

"Sugar!" said Esther. "I know, for I have seen it grow and made, too. I never saw such a large, nice crystal, though, before."

"Yes, it is unusually fine. I had to look through a good many pieces of rock candy before I found such a perfect one," said Miss Lovechild; "and now what shall we make from this? Suppose we make a writing tablet; it would be very convenient, don't you think so? You see we could use one side for paper, and the other for envelopes, and make two leaves for the center, covered with blotting-



paper which would serve to hold the paper and envelopes in place, and be useful to write on, too."

"The drawing will consist of one rectangular plane within another, drawn on the same principle as the rectangular faces of your photo holder, the only differing feature being a V-shaped notch cut from each corner, greater or less, as you desire a slight or deep bevel. These edges are then joined, which forms your bevel. You must be very particular that your V-shaped notches are just the same on every corner, as otherwise your bevel will be imperfect, and the sides of the tablet will not come together evenly. The beveled portion of your tablet should be covered with marbled paper or plain gilt or silver, and the surface of the sides with heavy leatherette. This will be another pretty model to go with your photo holder for your table or desk or wherever you do your writing and studying; so choose the color for it that will harmonize with the rest of your table or desk fittings. Paste over the back of the tablet where it folds together, a piece of narrow ribbon or tape, to strengthen it, and do the same on the back of the leaves. The leaves are held to the tablet by ribbon, which is drawn through the inside and tied on the back of the tablet.

"How can this form be developed in weaving? It does seem a little puzzling at first; but you can make out of it, one of the most useful articles; see? Take half of this tablet opened. It is the precise form for a tray, and you can make a beautiful one by weaving a form like this, or varying the dimensions slightly; 10" long by 5" wide or twelve by eight, with a two-inch bevel, makes a pretty and acceptable bread-basket, when developed in white palm leaf. In order to shape these trays nicely, it is best to make the warp strands of wide split birch or wide palm leaf, and weave them together with the narrow strands of birch, such as the Indians use; or make your

woof strands of the palm leaf cut into strips of 1-16" in width. After taking off the form, it is finished like the other models by enclosing the edges in a double plait of the white palm leaf, or of whatever material you weave it with.

"What is the matter, Tod? you seem to be in trouble." Miss Lovechild inquired, as she finished the explanation of the drawing.

"I was in a hurry to get my tablet made," Tod replied, "and I have done it all wrong somehow, for it won't come together at all."

"Did you measure it, after finishing your drawing?" Miss Lovechild asked. "I imagine not, or else you mistook one half for one quarter of an inch. This line, which represents the back-bone of your box, is $\frac{1}{4}$ " out of the way on one end, while it is right on the other. Spinal curvatures are deformities in boxes as well as in people. You thought it was too much trouble to measure the second time, I suppose; but now you will have to make the whole model over. It does take hard work to make a tablet, or anything else, properly. We always have to pay for our things even if we make them ourselves. Do you wonder how that is? When we give care and attention and patient work and careful handling, we are paying for a good model, and it is sure to come. When we want a nice-looking model, and do not want to work for it, we feel as people do who want money but do not wish to earn it; and then you know what they are very apt to do.

"We have talked about telling lies in our work; but did you ever think that we can pay lies for things? Honesty is just truthfulness applied to the value of what we buy and sell. Suppose that we should dress up a piece of furniture that was not worth much, and make it look well, and then sell it on its appearance. We would be taking an untruthful value for it. So when you agree to work for somebody, and give them a certain amount of time for a certain

amount of money, and then give as little work in that time as you dare to, you are paying an untrue value for the money you receive. You are laying the foundation for all these lying values when you lazily and carelessly work out a model and make mistakes, and then try to pass your model off as the best you could do. Be assured that you cannot be paid good values for poor work, in the shape of good models. They always tell the true story, and only pay you for what you have given, be it lazy, careless effort or hard, faithful work. This is why a model is of such value; it shows to every one the truth of your work; for this reason I do not wish to draw so much as one line for you, or help you at all in your work, for then it would be just showing people what you and I could do together, or worse still, letting you palm off my work as yours.

“I am always willing to help you by making parts of a model myself, with different material, but I never wish to touch your work, for it would spoil it.

“Many times when I had worked long and faithfully on some drawing, which I did when a child, to show my friend what I could draw, my teacher would take the work from my hands and touch it up here and there with her practised strokes. Did it please me to take home a better-looking drawing than I could do?—Indeed it did not! I could hardly choke down indignant tears to see my work spoiled. My mother did not wish a sample of my teacher’s work, she knew that she could draw, but she wished to see my own effort. Teachers like to have their pupils reflect credit on their teaching, and so they make it appear that they are doing remarkably well by touching up their work. If I should do that, you see I would be a dishonest teacher—my teaching would not tell the truth. I do not want the boys or girls that I teach to endanger themselves, through dishonest work, of developing into land ‘sharks.’ Do you know

what they are? Perhaps not, if you have never been unfortunate enough to make a meal for one of them. But we meet them everywhere. I suppose they took their name from their man-destroying, water original. A water shark's main idea, you know, is to fill himself up at the expense of others, and that is why we call men "sharks" who, when they deal in real estate, mines, stocks, etc., fill themselves up at the expense of others. And it is an excellent name for every one who deals on this principle.'

"Sometimes whole shoals of these sharks get together and make a 'corner' on some good thing that everybody needs, and have things all their own way in their select, sharking pool, and make a rare feast off their victims. They probably like to have good things without working for them, just as some of you would like to have a fine-looking model and have every one say, 'How nicely that boy works,' when you had put but little painstaking effort into it. It seems to be the nature of every one, however, to like something for which they do not pay. That is the reason so many girls and ladies like the 'bargain counters' and 'slaughter sales.' They do not realize that everything must have its true value, and that somebody must pay for it, if they do not. But you may depend upon it that when there is a slaughter sale, somebody is slaughtered, and it is not the buyers. They go off satisfied with the bargain they got for less than half cost. Neither is it the sellers. They made their regular profit, and that is as far as the people usually go. They forget the manufacturers, and that it means that they have paid correspondingly less for the raw materials and the labor required to make the manufactured article. So the people who pay for your bargains are those who give the real labor of furnishing the raw materials, and making them up,—the very ones who should above all others have their honest profit."

“But are there no honest bargains?” put in Frank.

“Certainly; take remnant sales, for instance; the merchants have made their profit on the goods; small remnants are not valuable, and they can afford to sell them at cost, if the purchaser can find a use for them. So with many articles whose salability is dependent on the prevailing style. Merchants usually ask enough more for such an article when in style, to secure themselves against loss, for what has to be sold when it is a little out of style. So a mark-down is made which is perfectly legitimate, for the seller offers to sacrifice some on his profit, if the customer is willing to sacrifice *style* to save money, so the bargain is a true one. But always remember when you have money to spend, and are looking for bargains, to stop and think whether you are feeding parasites or making one out of yourself.”

X.

APOPHYLLITE, TETRAGONAL SYSTEM.

FORM STUDY—SQUARE PRISM WITH TRUNCATED ANGLES.

WHAT form shall I call this?" asked Miss Lovechild, holding up a beautiful specimen of apophyllite.

"I think it looks like the old New England barns with their curb-roofs," said Prudence.

"It looks more like a house with four gables," said Guy, "only the gables are upside down."

"It is the square prism again, is it not?" said Miss Lovechild, "only its angles have been truncated, or cut off, leaving four equilateral triangles in their place. Here is the same model in a soap-form. Now see what happens when I continue truncating these angles. There; I have a figure now of eight equal angles, or an octahedron. You see this form is a square prism that had started to make an octahedron of itself, and stopped when it was half done. Now this is a fancy shape, so let us make a fancy box from it, such as confectioners use for bonbons; and as it is to hold something so delicate to eat, we must make the box as dainty as possible. The drawing is like that of the square prism in different proportions; and the new feature of this is the equilateral triangles on the corners. I have left the arcs on one corner, so that you can see how it is formed. I first placed my compasses exactly in the right-angled corner, and described a circle with an inch radius; then I connected with straight lines the points of intersection that the circle made with the edges or lines



[92] SQUARE PRISM BASKET AND BOX WITH TRUNCATED ANGLES.

that represented the edges of the box. These form the true outlines of the box. At the points where the circle intersects the rectangle, which represents the top of your cover, place the needle-point of your compasses, taking a radius equal to the distance between the points, and describe two arcs. Their point of intersection will give the vertex of the equilateral triangles that form the corners of the box. Your drawing is then ready to crease and cut as indicated.

“This box has a cardboard lining, which holds the cover in place so the box and cover exactly meet. It is cut 1-16" smaller than the box, and should be of thin white or lightly tinted cardboard. The box is covered with light pink enamel paper, and also the sides of the cover. The paper for the top of the cover is cut to extend over the triangular corners, where it is held in place by a heart-shaped seal of deeper pink enamel. Then there are two narrow, light pink ribbons, the shade of the covering paper, crossed in the center of the cover, and held in place by another heart-shaped seal. When the cover is put on the box (which you can imagine is filled with candied fruits to send to some friend), the ribbon should be brought around and tied, and your card slipped under it. To draw the heart for a seal, make an equilateral triangle first, one side of which we will call the top; then divide or bisect exactly in the middle. From this point to the opposite angle, or vertex of the triangle, draw a straight line. Take one third of this as a radius and the point of bisection as a center, and draw a semicircle which shall cut the perpendicular, and will, of course, just meet the side of your angle which you took as the base. With the same radius, bisect each arc thus formed, using the point where the semicircle cut the perpendicular, as a center. Then with this point of bisection as a center, on each side draw arcs, which form the top of the heart; they will meet exactly in the middle, and extend to either end of the

base-line. I have given this to you in proportions instead of any definite measure, because you can remember better the principle of drawing a heart, as it is often used in various designs.

“When you make the form for your basket, it should be made like the bottom of your box, with the triangles on the corners of the basket instead of on the corners of the cover. The basket should be woven out of two shades of narrow straw tape, using the darker for the bottom; which is woven like your other baskets till you reach the vertex of the triangle. Here the ribs of your basket are interwoven, forming the triangular corners, and the woof strand with which you are weaving the sides, is passed under every corner, leaving them woven in solid colors. The edges are finished in the usual way. The cover is flat, and rests on the basket like the others. It is woven over a piece of cardboard, cut the shape of the top—a rectangle with its corners cut off. The dark strands are fastened on first diagonally from corner to corner, and woven simply under and over, where they meet in the center. The light strands representing the woof are then woven across the narrowest way, and are passed under the woven diamond, formed by the diagonal weaving, thus leaving it in relief to correspond with the triangular corners.

“It will be necessary for you to make this box and form with the greatest precision, or they will be a total failure. A line made with an ordinarily sharp-pointed pencil, measures $\frac{1}{32}$ of an inch. Now suppose that you make your drawing only two lines' breadth out of the way on each side of your triangles. When you are ready to glue the edges together, you will find them to be one half of an inch lacking or one half overlapping, which would be sufficient to spoil your box.

“The reason that you are so apt to make imperfect drawings, is because you attempt the drawing before you half understand what it

is you are to do. Better spend one half of your lesson in looking at your subject, and the other half in correctly expressing it, than to plunge into a drawing at once, and have to make it over several times in order to have it correct.

“Flossy, your father has a camera, and you have watched him make negatives. Can he print a good photograph from a poor negative? or can he make a good negative from a poor subject?—No, of course he cannot; and how can your minds make good reproductions of what they do not more than half see? They correspond to the sensitive plate, and your eyes to the lens; so be sure that they reflect your subject well before you try to reproduce it. Remember that photographers spend the greater part of their time in focusing and arranging the light and shade, and in making a general study of their subject. The taking of the picture is only the work of a moment.

“The world’s greatest artists have been remarkable for their accurate memories of their subjects; and so well trained were their eyes to see, that a single look at a face was sufficient to produce a perfect portrait. A Japanese boy’s eye is so well trained that he can give you a description of an object more readily, perhaps, with his pencil, than with his tongue.

“Train your eyes by looking carefully at a form; then shut them and think the form out in all its detail. If you have forgotten anything, it is because you have not sufficiently exposed your ‘mental plate.’ Many do not know how to look at an object, but seem bound to get one-sided views. Always look first for the perfect whole, and then examine the details that go to produce the subject as a whole. You can apply this same principle in the matter of ‘getting lessons’ as you call it. Did you ever wonder why some people learn so much more quickly than others?—It is because they

understand how to look at their work. They look at it so carefully on all sides, that a perfect understanding is had of it first; and that really is the 'getting' part of it. The detail of expressing it afterward, is the least of the lesson.

"Did you ever notice how a hen looks at anything? She is just like some people who cannot focus both eyes at once on a single object. They are always taking two views of a subject at the same time from different standpoints, instead of centralizing all their mental effort *from* one point *on* one point. Their mental vision is apparently on opposite sides of their heads like a hen's. A hen may be looking at a fly with one eye, and at an angleworm with the other. If she could speak, we would not be at all surprised to hear her say that angleworms had wings, and could fly, and that flies were long wiggly things, that squirmed in the dirt. She would be absolutely positive of the fact, too; for had she not seen them with her own eyes? About half the serious controversies of the world, and some of its saddest mistakes, can be explained by this universal habit of one-sided seeing; and I am inclined to think that all of your mistakes could be put down on that score, aren't you? When a boy or a girl has one eye on his neighbor's work and one on his own, or one eye on the work in hand, and the other on something he is going to do, the chances are that there will be worse combinations than angleworms with wings."

XI.

ZIRCON, TETRAGONAL SYSTEM.

FORM STUDY—THE QUADRANGULAR PYRAMID.

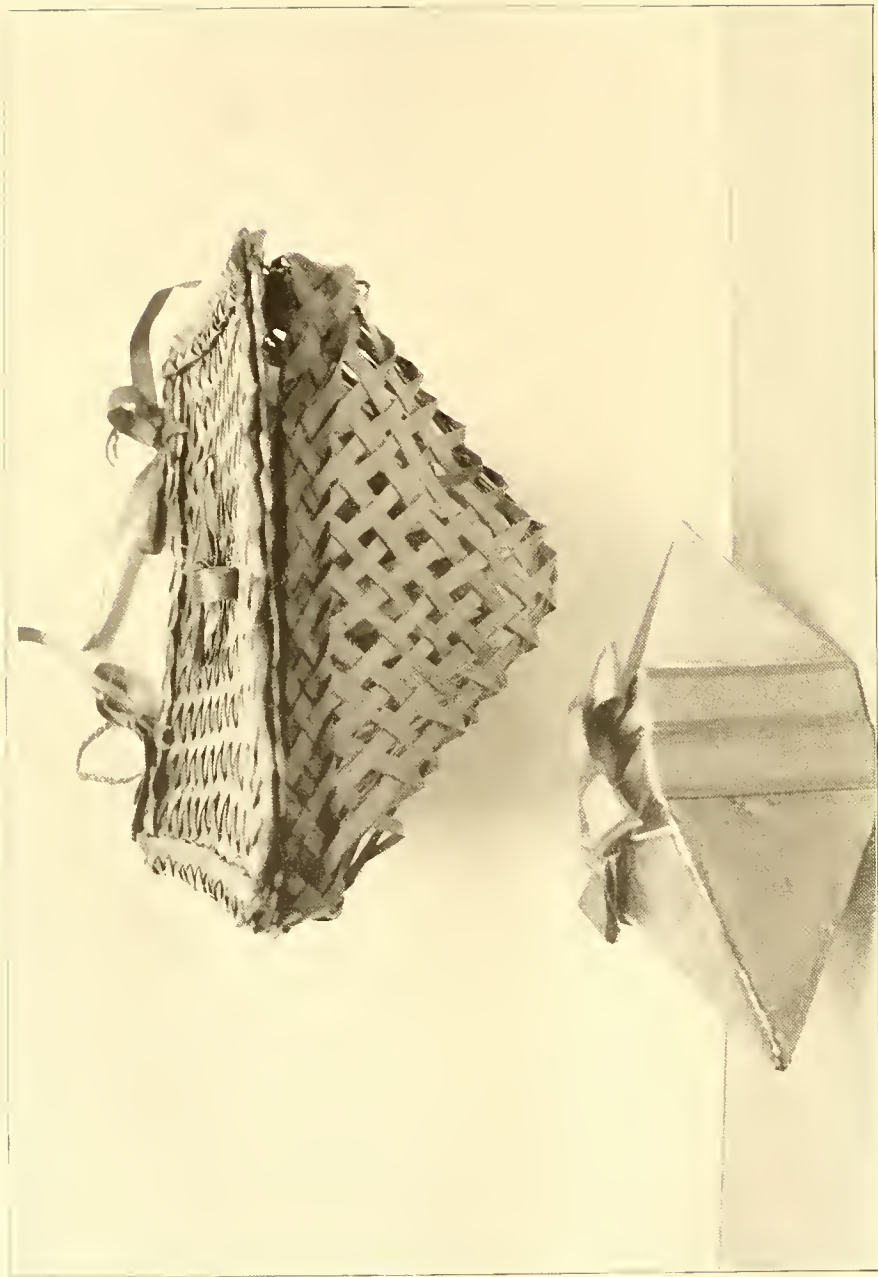
DO you remember what that crystal of apophyllite was trying to make of itself, Prudence, when it stopped just half way?"

"Wasn't it an octahedron?" asked Prudence.

"Yes," said Miss Lovechild, "but what kind of one? See these little brown opaque crystals in my hands? They are zircon crystals from Tennessee, and look like two pyramids put together at the base. Each pyramid is made of four equal-sided triangles. When they are formed this way, we call them 'regular,' and two such pyramids united make a regular octahedron. But suppose that two sides of each one of these triangles are the same length and longer than the base. An octahedron made of them, would be formed by truncating the angles of a square prism, all of which would be isosceles. I have chosen this zircon for our model, though there are many other octahedrons. Here is a pyramid of alum in the regular system. You have only to imagine two of these, placed base to base, to have a still more perfect octahedron.

"Can you tell us, Frank, what practical use we can make of this form?"

"I don't know," he replied, "unless it is to make a Cheops pyramid. And then I don't know what we would do with it; but I suppose it must be something useful. But I don't think of anything useful that we can make out of it in pasteboard. If we were only



SQUARE PYRAMIDAL BASKET AND TWINE-HOLDER.

building, we could finish off the towers and roofs of our houses with pyramidal tops."

"I see you are rather skeptical, Frank, as to the uses of pasteboard. How is it with the rest of you?" asked Miss Lovechild.

"I have seen fancy boxes something like that, but we will have so many of those," replied Flossy.

"We can't think of a thing," said the double T's, "but sheet-iron chimney caps!" at which the class laughed.

Then Miss Lovechild said, "I see ideas run low to-day, and that I shall have to help you out, though I admit that this pyramidal form is best suited for architectural purposes. The Egyptians were not alone partial to it, for the form was prominent in the massive structures of the Babylonians, and in all Mesopotamian art. The Dravidian, or Indian, architecture also gives prominence to the pyramidal form. But, as Frank says, we are not building, and it is more difficult to know what we can do with it in pasteboard. Imagine this zircon crystal to be hollow, and that it is possible to open it here in the center where the pyramids meet. We could make a capital twine-holder out of it by punching a small opening in the vertex of each pyramid, through which we could pass the twine to unwind it. Here is one I have made for you; there is room for two balls of twine in it—one coarse and one fine, or two different colors. The bases of the pyramids meet, and are fitted like the bonbon box, and the twine unwinds, you see, through the vertex of each pyramid, and so does not become entangled.

"The drawing I have given you, hardly needs explanation because it is so simple. You can vary the proportion if you like, though a good one is to make the base of each pyramid 3" square and $1\frac{1}{4}$ " wide. Then you have simply to erect an equilateral triangle on each side of the base, leaving margins when you cut them

out, to lap the sides on when gluing. The pyramids are pretty covered with gilt or silver paper, as both reflect the light; and a ribbon tightly drawn around the base of each, secured with a bow and knot, makes a pretty finish.

“The basket-form for this is more difficult than the pasteboard. This is the first model you will make that has not had a square or rectangular base and top. Here I have inverted the pyramidal form, and have woven it for a waste-basket. It has no woof strand, but the warp does double duty by interweaving with itself diagonally. After making your pasteboard form the desired size,—eight or ten inches square at the base is a good proportion,—select two colors of palm leaf, and cut the strands of sufficient length to reach diagonally around the form from vertex to base. Some will necessarily be very short and others longer, so you will need to measure each one. You should begin at the vertex to weave, by pinning a long strand on the form diagonally; then pin one a little shorter of the same color, just above it, and so on like stairs, till you reach the top. Then begin on the opposite diagonal of your pyramid with your contrasting color, and pin these strands in place like the others, interweaving them where they meet. By this arrangement, if your colors are yellow and white, two sides of your basket will be mixed, and one side will be solid yellow and the other plain white. The cover should also be diagonally woven to correspond with the basket. It is intended to hang over the side of a desk or table, so you will need two rings which should be fastened between the inner and outer plait, which finishes the edges of the basket. The rings can be made by twisting palm leaf around a wire, bent the required shape. One should also be made to be fastened in the center of the cover. Tie the cover to the basket on the side you fasten your rings. This can be developed in very large size for a clothes-basket, by using

heavy straw with rattan. It would try your patience, of course, to weave it; but like all other good things that work develops, it would pay you.

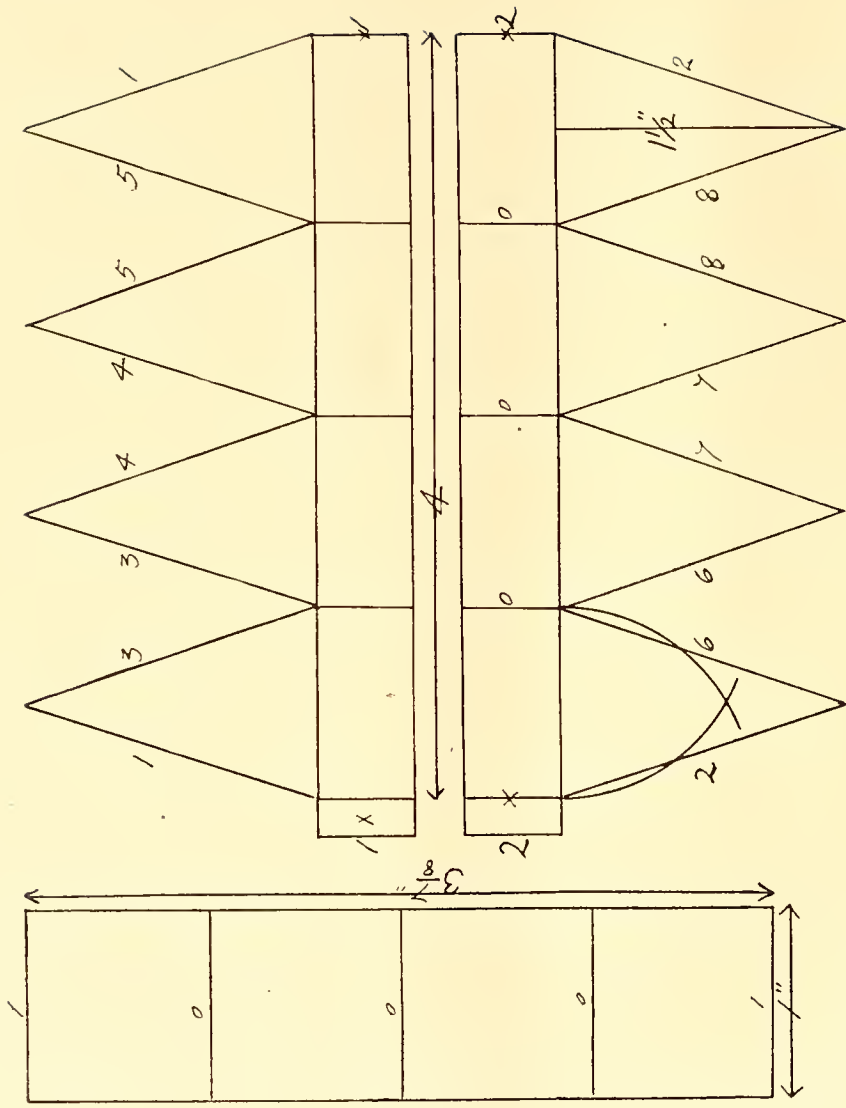
“What is it Guy? I see you want to ask a question?”

“I want to ask you why the Egyptians built so many great pyramids, and all alike,” he replied.

“I know that if I have never been to a back-east school,” interrupted Tod. “They built them to bury their kings in.”

“Well of course they did!” responded Guy; “every one knows that. But why did they always build just that shape?”

“There goes another corner,” said Miss Lovechild, laughing. “What you wonder, Guy, is only what many others have wondered before you; though no one is sure what they were made for, yet there are some very probable reasons assigned for their purpose. One is, that they might have been connected with the ancient worship, and used for astronomical purposes also, as astronomy was always associated with the worship of the ancient Egyptians. This seems quite probable, as the pyramids are so placed that the sides exactly face the four cardinal points, and the entrance to them all, is from the north side, down an inclined passageway, from the bottom of which it has been calculated that the pole-star, at the time of their erection, could be seen, so exactly was the inclination of the plane calculated. Then the obliquity, or slant, of the pyramids, is such that it corresponds with the slant of the sun’s rays at its summer solstice. One meaning given the word ‘pyramid’ is that of a flame or ray of light. If you notice the sun some time when it is ‘drawing water,’ as it is commonly called, you will readily see that the rays have a pyramidal form. In other nations where there has been sun-worship, the pyramidal form is prominent in their temples. As the Egyptians were especially given to worshipping the sun, it is



very probable that the pyramids were in some manner used in its worship.

“But the pyramids have other points of interest besides those generally mentioned. They are monuments of labor, and represent the work of a nation of slaves. We are told by Herodotus that it took one million men twenty years to build the pyramid of Cheops. If you have ever read the ‘Ethics of the Dust,’ you will remember the impressive lesson that Ruskin draws from the Pyramid of Æschylus, which he makes represent servile work, as it was built of millions of sun-dried brick, made by Egyptian slaves, to show the power of a monarch who could have such a working force at his command. He fancies a dream in which he makes Ptah—Egypt’s beetle-headed god, who symbolized mere physical force—the artificer of this pyramid, and Neith, who represented thought and wisdom, reproves him for his soulless labor. It shows in a most charming way the true thought of work, and you must read it, if you have not, at your first opportunity, for there are Ptah worshipers outside of Egypt.”

“Why, Miss Lovechild, there is no idol-worship in this country,” interrupted Prudence.

“What did people worship, Prudence, when they made these idols? It was not the idols themselves. They were mere symbols of the force, or power, that attracted the people, and this power displayed in different forms of nature, belonged only to God. So the sin of the world has been in separating the attributes of the true God, and worshiping them individually under various types. Wisdom personified was to the Romans, Minerva; to the Grecians, Athena; to the Egyptians, Neith; and to the lovers of God it is ‘Christ the power of God, and the wisdom of God.’ In him were inseparably bound the *wisdom to make* and the *power to make*; for ‘without Him

was not anything made that was made.' Separating the knowledge of making from the making itself, has naturally resulted in forming the head and hands of society, which have existed since there was a nation. Every country has its hands in its slaves, coolies, peasants, and working men, symbolized by the blind Ptah of Egypt, as ignorant or eyeless labor. And every nation has its head, whether it is called nobility, high caste, or capitalist. And so labor and wisdom that should have gone hand in hand, have fought, and made misery for ages, nor can we expect anything else till we combine wisdom and power as they were given us; for what is separated in the individual, will be separated in the classes.

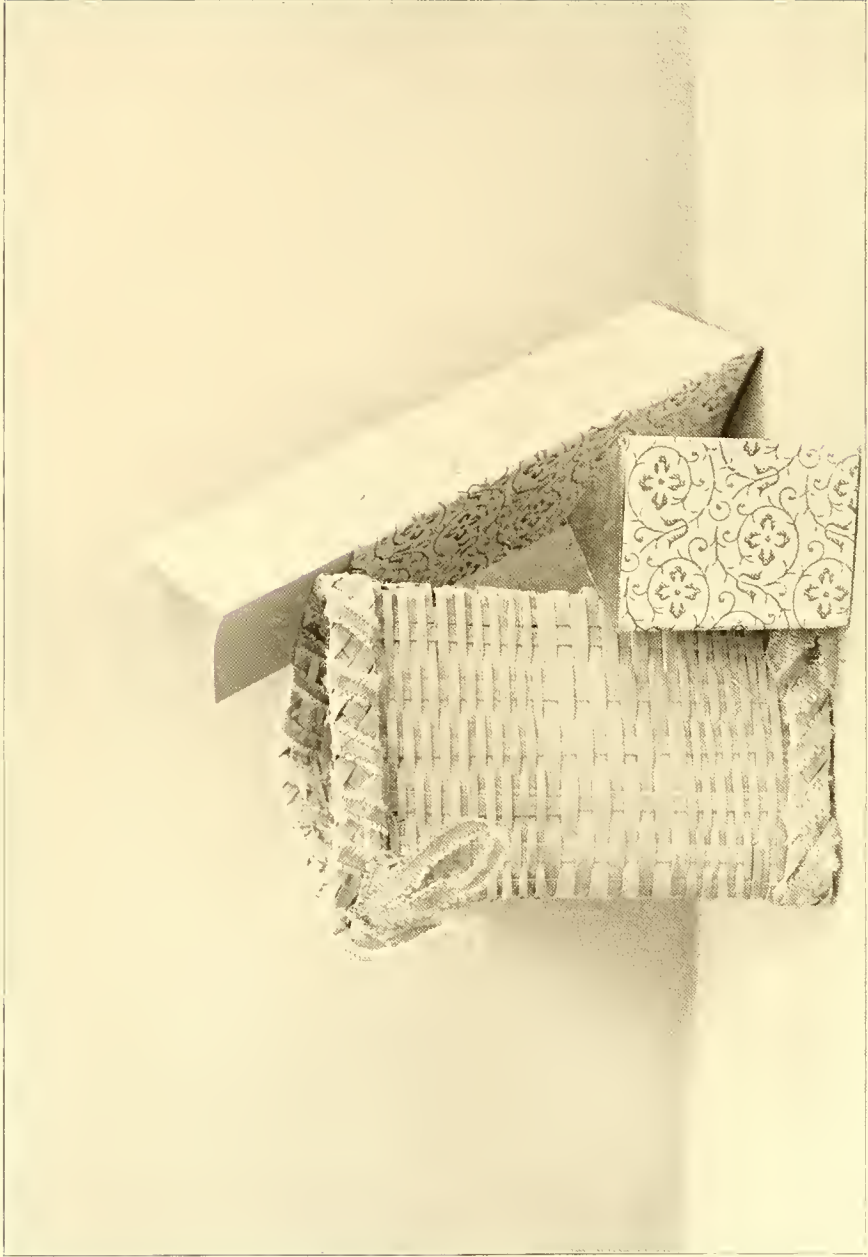
"The ancient deities, as they were worshiped by different nations, had, besides their central, or main, attribute, usually some distinctive national attribute, or some attribute peculiar to the place or time when it was worshiped. So I fancy we can see a modern Ptah. In the long intervening centuries, he has developed a commercial side, and becomes quite an international deity. But he is as blind to everything but his side of the dollar, as was Egypt's beetle-headed image. He works not because he loves to work, but because he has to work; and he values work not for its own sake, but for its return in dollars and cents. Nothing is of any value that does not show its dollar equivalent. In his right hand he holds some scales; they were not borrowed from Justice. In one side is a human brain, a feather's weight to the dollars that drop the opposite balance. Instead of wearing his Egyptian work-apron, he has wrapped himself in glaring advertisements, in which Ptah the Great is magnified; and all the people from the least unto the greatest, bow the knee and cry, 'Great is Ptah of the ——;' finish to national taste.

"Now we all know that this Ptah exists. His devotees surround us; they fill our houses; we meet them wherever we go. They

cook for us, not because they enjoy cooking, or like to make such combinations of food as will give us the best health, or because we need food, but because they need money. So they make our garments, not because they enjoy producing something that shall be artistic and comfortable for us to wear, but they mechanically throw together a pattern that shall meet our requirements, so we may give them our dollars. And so they build our houses, not that a beautiful structure shall be raised which will give pleasure to all who see it, but to build their fortunes. Thus they furnish our homes, not with beautiful thoughts worked out in carpets, draperies, and linen, but with mechanically woven patterns, with which they expect to weave a silver lining for their own pockets. The furniture they make us, merely meets the primitive need,—something whereon to rest ourselves when weary, and wherein to keep our possessions. It is turned out by machinery according to the latest fad, with as little cost and trouble to the manufacturers and as little real value as they can put into it and hold our custom.

“Then there are little Ptah worshipers, too; small editions of the parental, though. There were some in a class of mine once, one of whom, a boy, looked up from his sloyd bench, and asked, ‘How much can I sell this paper-knife for when it is done?’—‘Possibly for twenty-five cents,’ I replied; ‘but you are not making it to sell; it is paying you acute brains, and skill of hand, for the effort you are putting into it.’ Again, a youngster asked as he was toiling over a ball cap he was trying to sew, ‘What’s the good of doing this anyhow? My father can buy me a better cap than I can make, for only a quarter.’ ‘And can he buy you a cap full of brains thrown in besides?’ I inquired. ‘They are something that I have never seen for sale, though I know that it is sometimes expected that for a certain compensation, teachers shall put their brains into their pupils’

heads. But that is not the way that brains grow. They come only by hard work like all other good things.' Now if we do not wish to become Ptah worshipers of any sort, we must make labor and capital meet in ourselves, as head and hand work, thought supplemented by execution, then there will be fewer Ptah worshipers, big or little, to spend their labor for that which satisfieth not, for they will have heard Wisdom's voice calling, 'Receive my instruction, and not silver; and knowledge rather than choice gold.'"



TRIANGULAR BASKET AND PENCIL BOX.

XII.

TOURMALIN, HEXAGONAL SYSTEM.

FORM STUDY — THE TRIANGULAR PRISM.

WHAT pretty black prisms!" exclaimed the class, as Miss Lovechild held up a specimen of black tourmalin embedded in quartz.

"Taking an end view of a prism, it looks like the triangles on the corners of our bonbon box, only these curve out," said Prudence.

"Yes, this is a convex triangular prism," said Miss Lovechild, "like the equilateral triangles you constructed before you cut off the arcs. This is the first prism we have studied, that has not had a right-angled base of some sort. If I could cut it open and spread it out on paper, it would look like this (drawing a rectangular plane, 4" long by $2\frac{1}{4}$ " wide, divided horizontally into three equal parts). These long narrow parallelograms represent the sides of the prism. On each end of the middle one, construct an equilateral triangle as you did in the drawing of your bonbon box. These are the triangular ends of your box. Measure off one inch from one end of your rectangular plane, with one of the triangular ends for the cover of the box, which is held in place by an inside lining like your last models. Cover the ends with gilt or silver paper and the sides with some sort of fancy paper. The covering for the sides is cut in one piece with a margin allowed for folding under; the joining should always be made on an edge."

"What shall I do with it when it is done?" queried Tod, "I don't do my hair up."

"Perhaps your mother does," said Miss Lovechild. "We are not supposed to make these things for our own use alone. But if you must have something that you can use for yourself, make this a little larger around and longer, and use it, as a case for pencils."

"That suits me exactly," said Tod, "I am always breaking the points off."

"Your basket-form for this is a waste-basket, too; but a standard one instead of one that is hung to your desk. Make your form a large triangular prism that shall measure 10" on each side, and stand 14" high. Place your warp strands from the top down each edge of your form, and up the center of the opposite face, then fill in the space between these with other strands brought around opposite sides. Begin at a corner to weave in your woof strand, and weave plainly one third of the distance to the top; then you can vary your weave to suit your taste, either by weaving in a different color or by leaving a few of the warp strands unwoven for inserting ribbon. Either is pretty for the center third of the basket; the remaining third should be plain like the first. The top is pretty finished by weaving ribbon over the edge. A triangular piece of cardboard should be cut for the bottom, to prevent the scraps of paper from falling on the floor, as the bottom is open weaving. You can develop the same form in different proportions and heavier material, for an umbrella holder by using willow or rattan for the ribs, and coarse hat straw for the woof. A triangular tin pan should be substituted for the pasteboard bottom, which any tinsmith could easily make for you; and you would have a very convenient umbrella holder for standing in the corner of a hall way."

"Does this form have any special use of its own?" asked Frank.

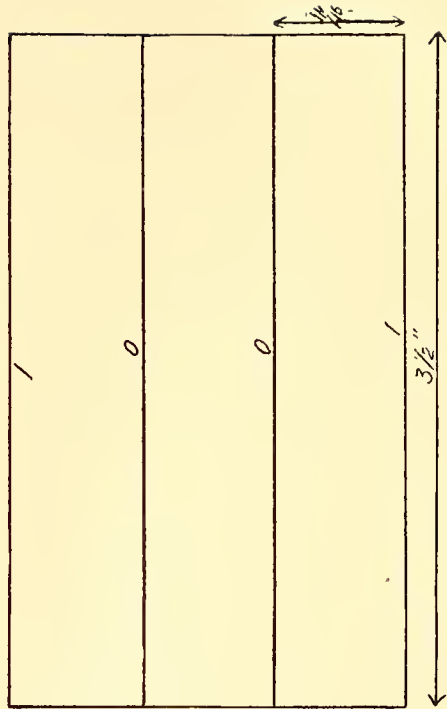
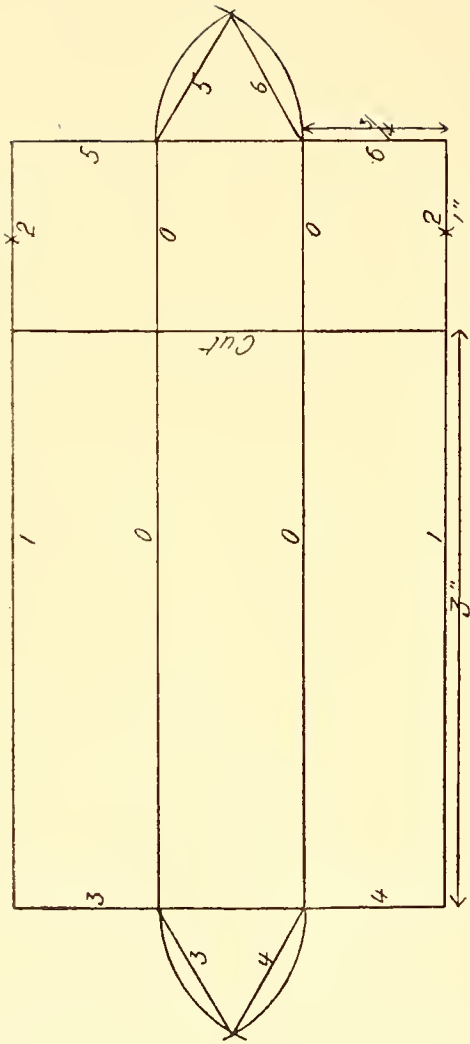
"I know," said Flossy; "may I tell him, Miss Lovechild? There are so few things that I do know." Miss Lovechild nodded

her assent, and Flossy continued, "It's the form they make glass prisms to show the spectrum of colors, and it is the form of the hollow glass prisms that they put into our kaleidoscopes that make such pretty designs."

"Yes, Flossy has given the most common uses of the form. The triangular faces of the ends, we often see in church ornamentation. The form is sometimes developed by three fishes or three leaves so arranged that their contour presents this convex triangle to represent the trinity. Three is a sacred number, and so you will often see it in various combinations in church ornamentation."

"I always wondered at some of the strange carvings in our big cathedrals at home," said Flossy. "I did not know that they all meant something, though."

"They are only beautiful as they do mean something," replied Miss Lovechild. "The object of real ornament is not to surround ourselves with meaningless forms, but with the expression of beautiful thoughts, to give us pleasure and make us better. Our average homes usually express only the necessities of living. They are simply places to eat, sleep, and work in; and if that is all there is to living, they certainly 'fill the bill,' as Tod says, which they probably do for the many people who only live to be alive. Then there are many who think it is a sin to have anything else in a home but that which pertains to the necessities of living. They do not know what ornament means. They are people who would trample on daisies and violets, and carefully turn aside that they might not step on a potato vine, because they could *eat* potatoes, and only *look* at daisies, thus showing that they enjoy the pleasure of eating, more than of reading a beautiful thought that God wrote for them in the gold and white of the daisy. The greatest student of men and things, perhaps, who ever lived, was Solomon, because he went to



God for his wisdom. He tells us that 'as a man thinketh in his heart, so is he.' Now what we *see* is the food with which we feed our minds, so that our minds or hearts are composed of what we look at, just as our bodies are composed of what we eat. So we must feed our thoughts with beautiful things, if we would have beautiful minds.

"But can't we do that," put in Prudence, "by reading good books? They are so plentiful."

"What is reading?" inquired Miss Lovechild.

"Why, everybody knows," said Prudence. "Don't you think I know?"

"That is just it exactly, my dear," replied Miss Lovechild; "because if you did, you would not have asked me that question. So I shall tell you that it is simply looking at some one else's thoughts, expressed in words, about what they have seen. It's like looking at God's beautiful sunlight through stained glass windows. It is colored by the window you see it through. And while it may be a very beautiful window, to get the life of the light, we must have nothing between us and it. Our minds are much better fed if surrounded by the beautiful objects themselves, than by reading a written description of them. I prefer the perfume of a real white rose to the bottled extract that passes under that name, don't you?"

"Then wouldn't you have us read?" inquired Guy.

"Certainly; the question was not as to whether we should read, but whether reading should take the place of beautiful surroundings. Nothing feeds our minds as looking at God's thoughts just as he gave them to us."

"But, Miss Lovechild," interrupted Esther, "suppose you didn't know how to read them."

"You can take up a little dingy stone, and see as many wonderful things in it as Alice did in Wonderland."

"But I can't see anything but a dirty piece of ore, till you have told me."

"Then I suppose other people's thoughts about things will have to serve as primers to teach you how to read them yourself," Miss Lovechild answered laughingly.

"But how are we going to know what things are true ornament?" asked Guy.

"Let us take a peep at the meaning of the word first," said Miss Lovechild. "To ornament is to make beautiful; and beautiful is defined to be that quality that pleases all the higher tastes of the mind and imagination. Now what is it that all of the great artists have produced that have that quality? sculptures and paintings of what?—The things that God made for us to look at—truthful representations of nature, in a form and color that can be carried with us, or representations of spiritual truths in the symbolism of nature's forms, as in religious paintings. The dove symbolizes the Holy Spirit; the lily, purity; and so on indefinitely. Ornamentation is true in proportion as it represents to us the original inspiration. I see these rare mountain flowers, for instance, with which God's goodness has brightened up these otherwise dreary rocks and barren mountainsides. How I wish I could look at their beauty, and God's goodness in it all the time, and make them ornaments of my home! But God has not given me the power to create the real thing; but he has given me the power to make a copy that shall keep before me the loveliness of the original. So I paint a frieze of these wild flowers to ornament my room when I go home; and it will be a true ornament in proportion as my painting is true to the original. True beauty originates in nature."

“But,” suggested Prudence, “would n’t it be a truer ornament to have the flowers themselves pressed and prettily mounted on cardboard, with their stems tied with ribbon?”

“I will answer you with a question,” said Miss Lovechild. “Which is prettier, a skeleton or a portrait?”

“A portrait certainly,” answered Prudence.

“But would not the skeleton be truer? Probably both it and the pressed flowers would be truer for anatomical purposes; but neither would inspire with the thought of the original. But again, the painting or other reproduction of nature or thought, may be true to the original, and yet not be a true ornament, as its object may be simply a display of the artist’s technic, as would be the case when an artist takes for a subject a wretched-faced criminal or a person undergoing physical torture, simply to show his skill at portrayal of severe emotions. Such a picture might be a great work of art, but it would not be a true ornament, for there would be nothing in it to inspire the higher sensibilities with a sense of beauty. The only influence of such a picture would be to excite admiration for the skill of the painter, and horror of the subject.”

“Then should any one paint people or things that are not beautiful?” questioned Flossy.

“I think the beautiful should always be made the subject of the picture—its *light*; and the evil should only come into it as a shadow to heighten the effect of the light; for example, in pictures of Christ’s trial, the evil faces that surround him only heighten the wonderful goodness and peaceful beauty that radiates from his face. That is very different from a picture where the subject is evil.”

“Isn’t there any ornament, then, but good paintings and sculpture?” asked Frank. “I thought that vases and such things were ornaments, too.”

"Everything with which we furnish our homes can be ornamental," Miss Lovechild replied; "but few of them are. We need only remember to have a beautiful thought expressed in everything, to make things ornamental. Vases may or may not be ornamental. I suppose you refer to the many little knickknacks that pass under that name, few of which are really ornamental. The purpose of a vase is to hold flowers. The flowers are to do the ornamenting, so the simpler the vase the better. I know some regard the vase as the ornament, and place that where it will be seen, using the flowers as mere accessories; but the true thought for a vase is simply a setting for the flowers, so the flowers and not the vase should be conspicuous."

"But," interrupted Tod, "why aren't tumblers then as good as anything else? and what is the use of having vases at all?"

"Because tumblers are made to drink from, and are not a suitable setting for anything so lovely as flowers, which represent God's choicest thoughts. We show respect to the Maker when we show regard for his works! It would be worse than framing Raphael's Madonna in pine boards. A vase should be opaque to conceal the stems of the flowers. The enameled porcelains in rich, solid colors, are a beautiful setting for colors; but even the little ten and fifteen-cent rose bowls, in delicately tinted colors, are pretty as well as inexpensive."

"What is it, Frank? I see you have something on your mind."

"I was thinking that these plain geometrical forms that we are making are beautiful; but they do not express anything that I can think of," he said, with a puzzled look.

"No, of course they do not express any particular sentiment or object in nature; but they may express abstract qualities that are pleasing or otherwise. See these three lines that I am making?"

This first is an uncertain zigzag; the second is a straight line, made with even pressure of the pencil; the third is curved, and sometimes called a line of beauty. Now which gives you the most pleasure?"

"The curved line," the children all said; "and next to that the straight."

"And how about this zigzag?"

"It makes me feel cross," said Prudence.

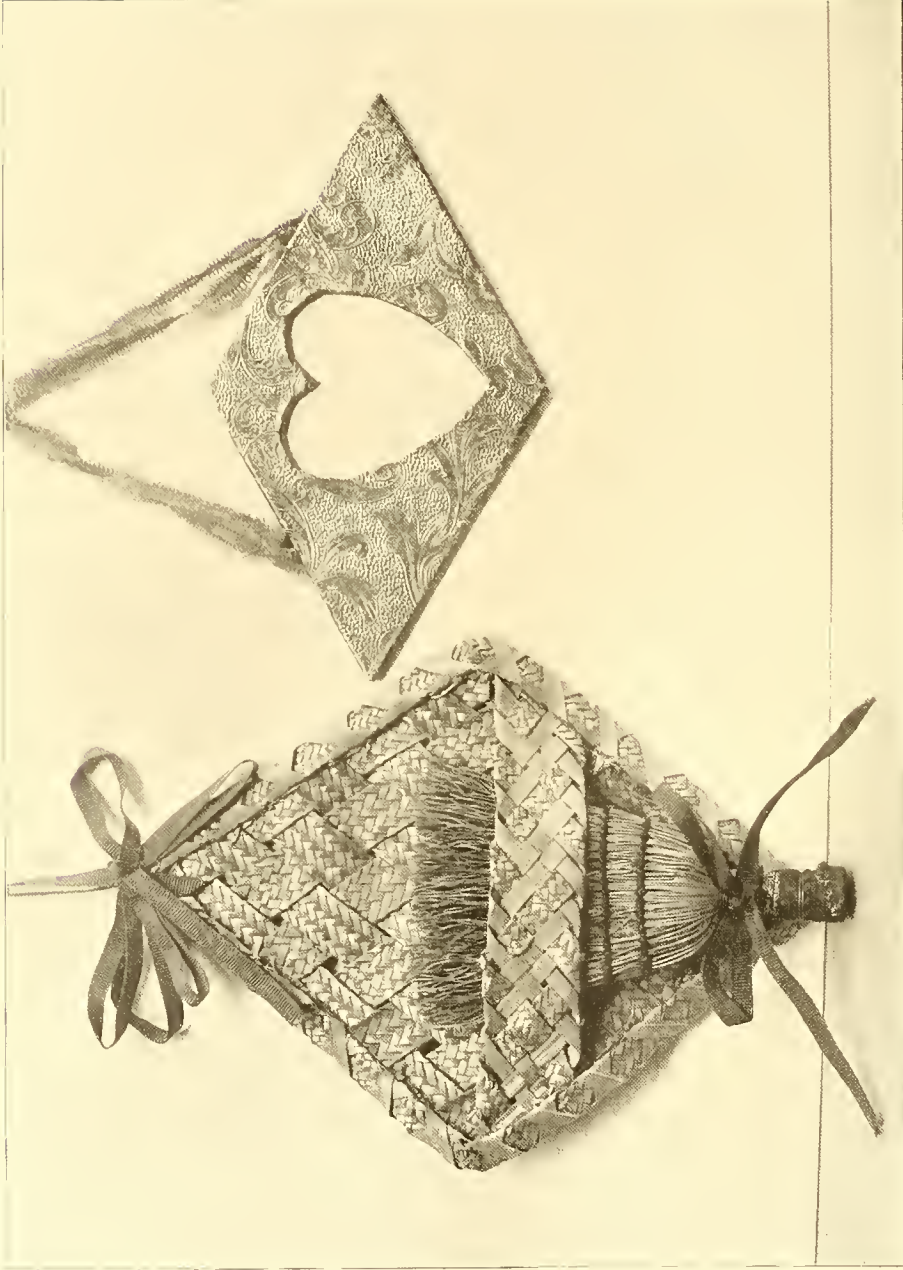
"It puts me out of joint," Frank said.

"Then these lines must express something, or they would affect you alike. You see it is abstract qualities they express. This straight line represents strength, because the arrangement of matter to produce strength always makes these outlines, and to produce beauty falls more or less into curves. You never saw a flower with straight outlines. Disorganized matter is always a shapeless mass of zigzag contour. So the bare lines, you see, express abstract qualities, and so may geometrical designs express abstract qualities. Many regard a love for the beautiful as something to be suppressed instead of a necessity to the perfect development of our natures. Many have so long lived for the necessities of life, that they can see nothing else. God would not have filled this world with beautiful things, had he not intended us to enjoy them. He even put it in the nature of some birds to love ornamentation. The bower-birds of Australia make low, half-round bowers of twigs and grasses, and decorate them with bits of shells, feathers, or any bright trinket they can find; and then chase each other through these little bowers in play, evidently thinking them very fine art galleries."

"How about people so poor that they cannot afford to buy beautiful things?" asked Gustave.

"There are many beautiful things that are not expensive, Gus. Good taste can make a beautiful home out of things that are inex-

pensive. People need only to apply sense in the matter of ornament. Many will spend money for a bright chromo that expresses nothing but a jargon of colors, or an ill-proportioned medley of objects, when a fine photo of some beautiful scenery might be had for less money, and be of real value. Beautiful house plants can be had for almost nothing; and no home need be bare with a tasteful arrangement of shells, minerals, books, and photos. It all lies in the person, Gus; anybody who will walk on a daisy and spare a potato plant, is not likely to make anything beautiful, because he cannot see anything beautiful. I heard of a farmer once, who stood before a fine painting of the Tivoli Falls, in Italy, brought from Europe. As a mere accessory, in one corner of the painting was a group of cattle and peasants about to ford the stream below the falls. He stood meditatively before the scene, evidently impressed, and then remarked, as he passed on, "Them's the long-horned breed of cattle." That was all the Tivoli Falls meant to him. Such people would probably prefer the chromos accompanying various patent medicines, and any little gewgaws that had a bit of gilt and color, just as the Indians like calico and gilded beads. In fact there is altogether too much of the calico and bright-bead style of decorating done by people who ought to know better. Such decorating is worse than useless, as it wastes time and money, and has no influence for good on our lives. So remember that ornamentation is true and beautiful as the purpose behind it is true and beautiful, and we can only appreciate it as we are true ourselves.



XIII.

MUSCOVITE, RHOMBIC SYSTEM.

FORM STUDY—THE RHOMBUS.

WHAT do you suppose she will have us do next?" remarked Tod to Tad, as they waited for the others to come.

"There's no telling," said Tad. "I can't imagine what we will make out of that six-sided crystal, can you?"

"No, I haven't the least bit of an idea about me. Some folks seem to be made of ideas; I wish I was."

"It is a very easy matter if you study everything you see," said Miss Lovechild, coming in just then with the others. "Now who will tell me what this diamond is, embedded in this piece of quartz?"

"I believe I know what that is," said Tod.

"Of course we do," said Tad, "that's isinglass, and there is a whole rock of it near here."

"What is the other name for it?" inquired Miss Lovechild.

"Mica," said Guy.

"And who knows the other name for this form we call a 'diamond'?—It is a rhombus, and belongs to the rhombic division of the mica family. Now what shall we make of it?"

"I can't think of anything but a wall-pocket," said Flossy, "and they are such common things."

"What would you think of making a photo frame out of one? See, here is one that I have made," said Miss Lovechild. "I suppose Flossy would call this a common thing, too; but most useful things are common. We can vary them, though, by finding new ways of

making them. This, you see, is just two diamonds folded together, and glued; the photo is slipped in place from the top, just behind this heart-shaped opening. The drawing consists of two large equilateral triangles, one constructed on the base of another, and in the center a small equilateral triangle, out of which a heart is constructed, and cut out to form the opening for the photo. The drawing is only a repetition of what you learned in drawing the bonbon box. I have covered my frame with embossed gilt paper, but you can use your own taste, only remember that we learned yesterday about true ornament. The woven form for this is so simple that you can almost see how it is done without being told. The diamond is outlined on cardboard, and then the strands are placed across it diagonally from one side. The other strands are woven in diagonally, and secured on the edges by a narrow plait. A wide plait of twelve strands is made to hold the broom in place, which is fastened to the diamond a little below the center; then a bow and loop of ribbon finishes it at the top. It is prettiest made out of straw that is flat and thin; otherwise it is apt to be cumbersome. What is it, Flossy? you seem to have a very important idea that you want us to know."

"I wanted to ask you if I could not cover my frame with water-color paper, and paint on it. Wouldn't that be pretty?"

"That depends on how well you can paint, and whose picture you are going to put in the frame. If it is a picture of your father or grandfather, it would hardly look appropriate to see his strong face in a dainty, bluebell painted frame, though it would be pretty for a child's or young girl's face."

"Then I guess I will make my frame as I want it, and find a photo to fit it," Flossy replied.

"No, no, Flossy, that is wrong, for the frame is to be the setting for the picture."

"Then I know what I will do. Papa is going to take a photo of our university, and I will make the frame for that. Now what shall I paint on it?"

"Think of something pretty that grows around here," replied Miss Lovechild.

"Chipmunks and pine-cones," suggested Tod and Tad.

"Prickly pears," said Esther.

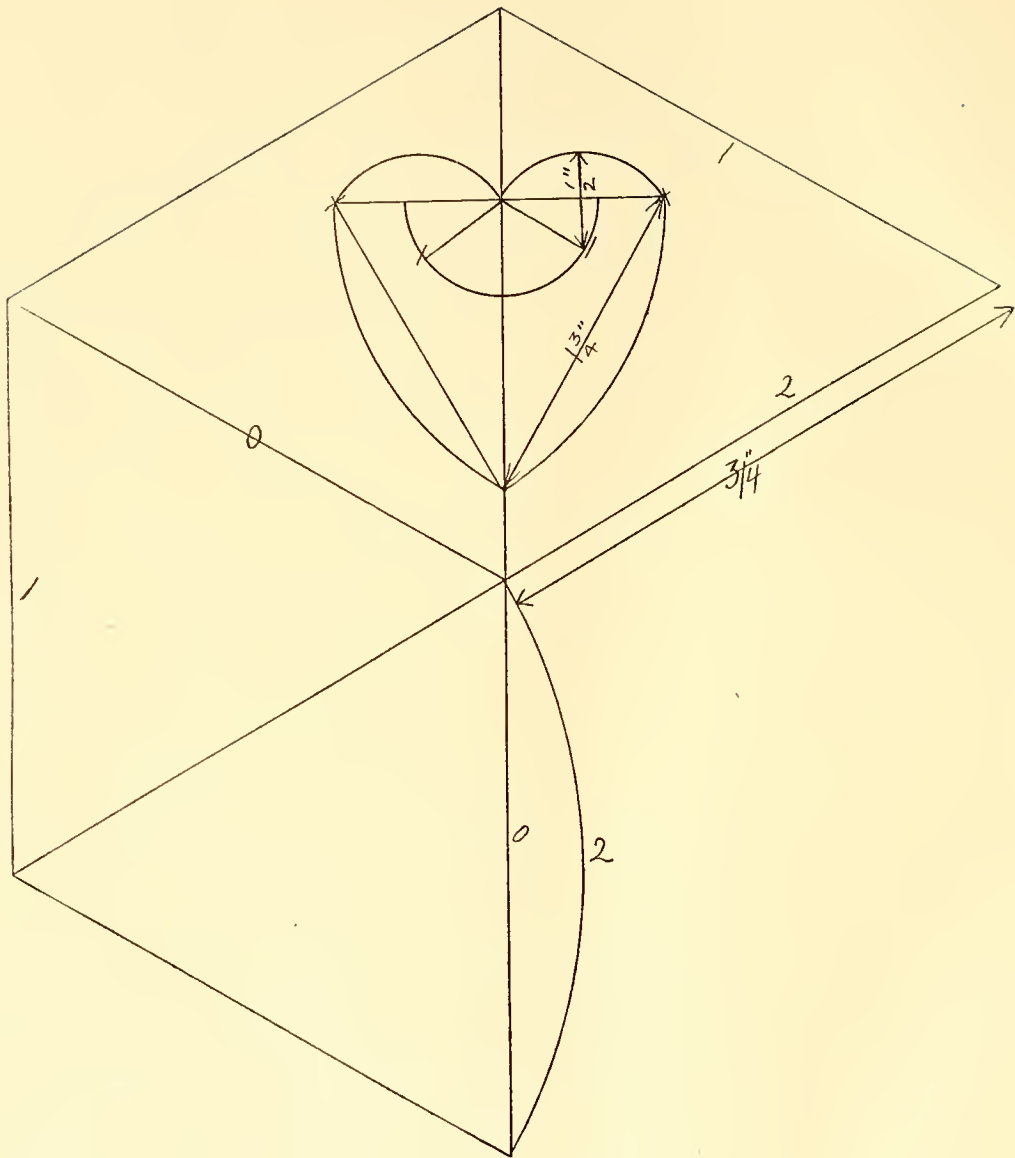
"Pine trees," added Prudence.

"O I know," said Flossy, "painters' brushes. They grow here and are pretty and have a Western look, too. Then they are bright, and the photo will be rather dark."

"Yes, that is a good idea," said Miss Lovechild. "But now suppose you had decided to paint your frame with greenhouse roses; how would they look for a setting for a log cabin? Don't you see how ridiculous such a combination would be? Yet we see just such absurd things done all the time by people who try to ornament."

"But I think it is dreadfully hard always to stop and think whether you are doing just the right thing or not," said Esther. "I would rather just go ahead and make what I think is pretty, whether other people like it or not."

"You will be perfectly safe in doing so, if you learn to like pretty things," rejoined Miss Lovechild. "I suppose most people like their own things, because they look at them so constantly that they have formed the habit of liking them. Our eyes have the habit of liking best what they see most frequently, just as boys, after repeated trials, become fond of smoking, though it is distasteful at first; and we all learn to like various foods that are distasteful to us at first, by continuing to eat them. If we did not have habits of seeing, I do not suppose that we would have to be governed by any such thing as fashion.



“Do you remember in Charles Kingsley’s ‘Water Babies,’ how one little caddis fastened a long straw to her tail, and then all the little caddises in the pool were not content till they had straws on their tails, too? This is Mr. Kingsley’s bright way of showing how foolish ladies are sometimes,—if one wears a trained dress they all must. Now there is a reason for this like everything else, if we will take the trouble to think it out. You will notice that a new style always has some distinctive feature to catch the eye,—something that the eye will form the habit of noticing. Then where it is lacking, the eye sees something amiss. Thus it learns to require certain styles, no matter how utterly senseless they may be. So it is with savages, who manifest this habit in various fantastic decorations of the body, such as tattooing, wearing nose rings and earrings, piercing the lips with bone rings, flattening their heads, or compressing their feet, as the case may be. The mind requires what is seen. Civilized nations are only a step in advance of them, for they yield to this same habit of seeing, by the ever varying fashions of their clothing. They distort that instead of their bodies; and there is scarcely any one who arranges the clothing with an eye to the natural artistic proportions and contour of the body. One season, to be fashionable one must have arms as large as the body. Another season the arms appear as though they had been melted and run into the sleeves when soft, so perfectly must the sleeve fit the arm. Then again, one season the whole feminine world turns street-sweepers, and trail their skirts through filth of every sort. At another time the skirts must be short enough to show the ankle. One season, broad effects are ‘the thing,’ and we grow suddenly stout with crinoline and bustles; another, nothing will satisfy the demand of the eye but clinging draperies, so scant that we nearly break our necks when stepping from a street-car or a carriage.

When the popular eye discovered that full sleeves, increasing the breadth of the shoulders, were prettier, everybody became broad-shouldered. Young girls measured from shoulder to shoulder as much as their fathers!

“Now don't you think it worth the study to discover the cause of the peculiar affection of our eyes that makes a huge sleeve pretty one time, and a close-fitting one pretty another time? It is the same thing applied to our eyes, that makes a man like to drink till he is intoxicated,—simply a *habit*. Repetition is a law of our beings. We want to *look* again at what we have seen once; we want to *taste* again what we have tasted once; and we want to *do* again what we have done once. The enemy of all *right-doing* and *right-tasting* and *right-seeing*, knows this; and so he influences us to form habits of wrong-doing; our sight is perverted as well as our taste. We hear much from temperance societies about keeping our boys and men from forming the liquor habit, and it is doubtless needed, for we hear much of the desolated homes and ruined families, made by drunken fathers. But I think that societies are equally needed to help the women dress temperately. Think of the husbands and fathers that are worked half to death, and are often tempted into forgery and stealing in order to keep up the family purse, so the wives and daughters may keep in style!

“How many women and girls do you suppose would be willing to sign the following dress pledge? ‘*I promise not to dress myself in a manner to make my form appear abnormal in any respect, or that will hamper in any way the free movements of my body, or that will require an extravagant and unnecessary amount of material.*’ Are you brave enough to do right though all the world does wrong?”

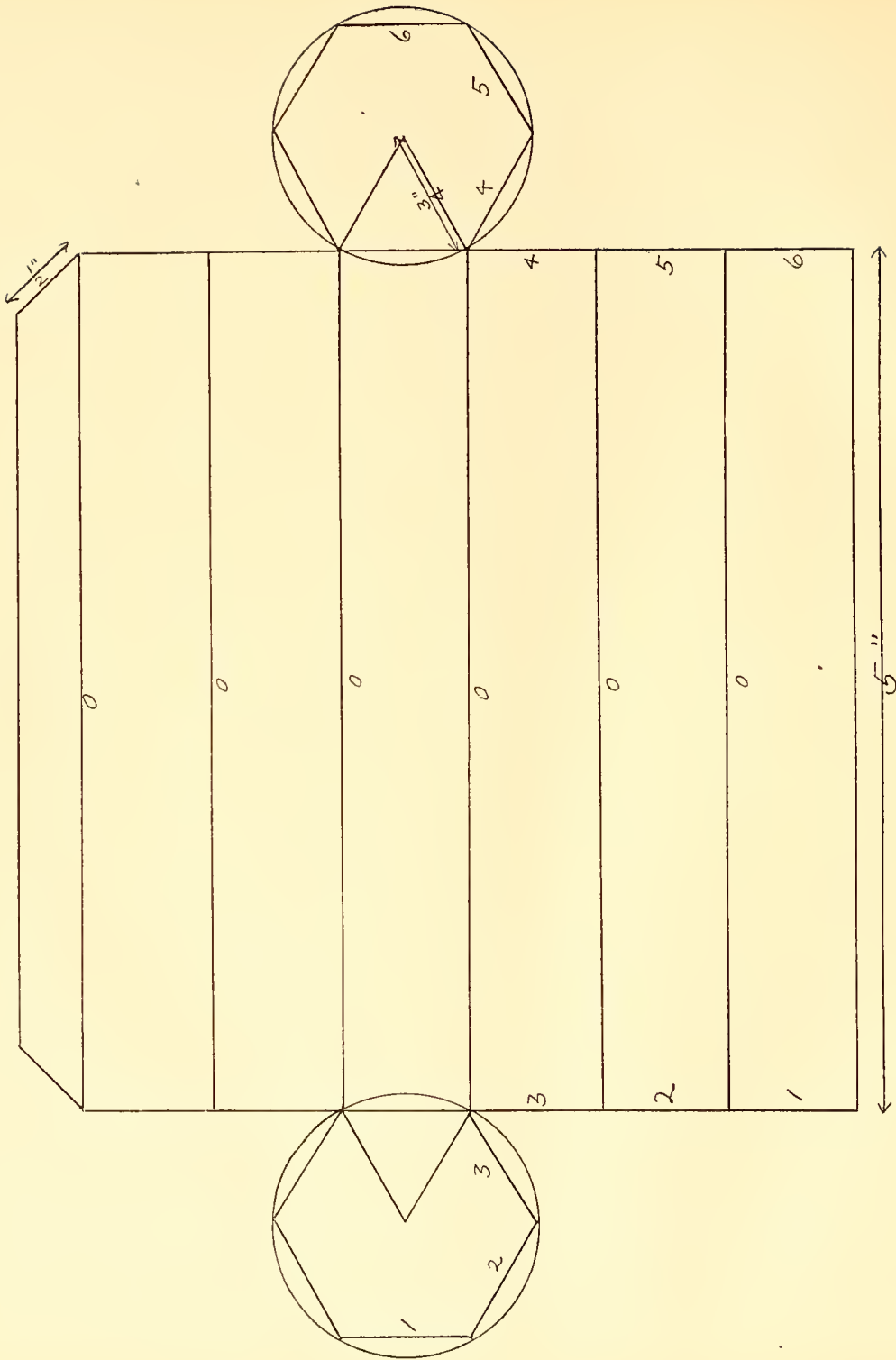


XIV.

BERYL, HEXAGONAL SYSTEM.

FORM STUDY — THE HEXAGONAL PRISM.

TAKE six of the triangular prisms you have made, and arrange them around a central point; then look in this cabinet, and see if you can find a form that corresponds to it. Yes, Gus has one, and Esther another. They are the same forms, but different minerals. Esther's has a pyramidal cap, and is a quartz crystal. The one Gus has is a simple prism, and is beryl. You see his is very nearly opaque, and has a greenish tinge. You are most of you familiar with this, as it is a form that we see everywhere in architecture and ornament; the end faces are hexagons, that means 'six-sided,' and these crystals belong to the hexagonal system. It is made up by arranging three diamonds or six triangular prisms around a common center. I have developed the form for a music-roll, though it is a convenient shape for many other articles that you may like to make sometime. The drawing is much like that of your triangular prism, only this has six parallelograms instead of three, and around the one equilateral triangle, you are to describe a circle, with its vertex for a center, and space the circumference into six equal parts. Connecting these points with straight lines will give you the hexagonal ends. Cover the ends first with gilt paper, and the sides with leatherette or cloth. Two of the parallelograms are left free from the ends, you see, to fold over for a cover. A ribbon is fastened to the back by paper fasteners, and brought around, and tied to hold the cover down.



“The basket-form of this model is different in proportion, being shorter and larger around than the music-roll. A basket 4" deep, and 3" on each side of the hexagon, is pretty for worsteds. Cut eighteen strands of sufficient length to reach around the basket, allowing six strands to a side; interweave where they cross in the center, and you will have a pretty six-pointed star for the bottom of the basket. The cover is woven like the bottom, and the strands are held in place by the narrow plait on the edge. Fasten the cover to the basket by knots of ribbon. This is also pretty for collars and cuffs, to match your ribbon-basket.”

“Can't we make the music-roll whole instead of open on one side?” asked Flossy; “it would be so much easier to make, and we could make an inside case to hold the music which would slide into this outside cover. We could fasten the ribbon around just the same, and tie, so that it would look as though it opened on the side like a roll.”

“Yes, you could, but it would be working out a bad idea though, Flossy. You would be pretending to open your roll on the side, when it really opened on the end. If you prefer an opening at the end make it that way, but do not put the ribbon on.”

“But it would look prettier,” replied Flossy.

“An untruth never looks well,” replied Miss Lovechild. “There are many of them worked out I know, in architecture and house furnishings, but they are always disagreeable to people of a true taste. Take, for instance, the false windows. It often happens that windows on a house do not correspond, and to make a lower window correspond with an upper, would sometimes mean cutting through a staircase; so instead, a false casing is made, and blinds hung, and to all appearance there is a window unless you try to look out of it.”

“But what is the harm?” said Frank.

“The harm lies in accustoming ourselves to falsities of any kind. You remember that we talked day before yesterday of how our minds were made of what we looked at. So if we surround ourselves with false devices, we grow unconsciously to make no difference between truth and untruth. ‘Murder will out,’ it is said; and so will lies usually, whether they be spoken or worked. I was once invited to spend the evening with some slight acquaintances. In the course of a very pleasant chat, I noticed what was presumably an organ or an upright piano, though the characteristics of neither were very pronounced. I was about to ask for some music, but having an uncomfortable feeling about the nondescript article, I refrained, for which I was sincerely thankful, as I afterward found it to be a bed. Imagine my feelings had I asked my acquaintance for a selection from Schumann or Beethoven to be rendered on her bedstead. At another time I had occasion to wait in a parlor where stood apparently a good-sized book-case, and I proceeded to help myself to a book, when a wire bed-spring met my astonished gaze. Again, in a dining-room, I was decoyed into an apparent china-closet, to find myself face to face with the inevitable bed-spring. Now if it must be that necessity shall force the presence of a bed into parlors and dining-rooms, which should only find a place in sleeping apartments, do let it be in the recognizable form of a couch or lounge, that can be unfolded for the desired accommodation, which would save the embarrassment of attempting to find books and dishes in beds, or of asking for music from wire springs.”

“But should we never use folding beds, Miss Lovechild?” inquired Prudence.

“In a bedchamber certainly, when lack of room makes a folding bed convenient, or makes possible the presence of two beds. One does not look for china-closets, book-cases, and pianos in bedrooms,

however, so they are perfectly legitimate there, though the easily aired genuine article is much preferable. Sometimes one sees apparent cases of drawers, and attempts to open them only to find themselves pulling at a thing of the imagination. Such a bed is an imposition anywhere. Then we see little falsities in dress. We may innocently ask a lady friend to remove her jacket supposing it to be an outer wrap, only to find it is one of those pretend-to-be-what-it-is-not things, worn for 'looks,' with a false front. So our dresses are finished with buttons for trimming, when the primary use of buttons was that of holding our garments together. So also false materials are used, and false jewelry. Cloth that looks like wool is pronounced 'just as good.' Plate that looks like gold is 'just as good.' Even our food does not escape these falsities, for the market is loaded with adulterations that doubtless look 'just as good' as the genuine, and are much cheaper. There is a mill for making marble dust in an Eastern State, that cannot supply the demand for marble dust to adulterate flour. You see it makes it weigh more, and it is so soft and white that 'it looks just as good,' and flour enough is put with it to make it taste all right, and so it passes, and the conscienceless seller is remorseless, as long as the public demands nothing more than that an article shall appear all right and cost little!

"You see in all these false devices, whether of furnishing, clothing, or food, *appearance* is made the standard of value instead of *actual worth*, and if you do not form the habit of using falsities in little things—even a music-roll—you will abhor them in everything."

AMETHYST, HEXAGONAL SYSTEM.

FORM STUDY — HEXAGONAL PYRAMID.

WILL you please go to the cabinet, Prudence, and select a six-sided pyramid? Flossy may find one, too," said Miss Lovechild.

"Oh how perfectly lovely! Here are a whole group of violet-colored ones. What are they?" asked Flossy.

"Amethyst crystals," replied Miss Lovechild.

"Really? Is this the kind they use in jewelry?" asked Prudence.

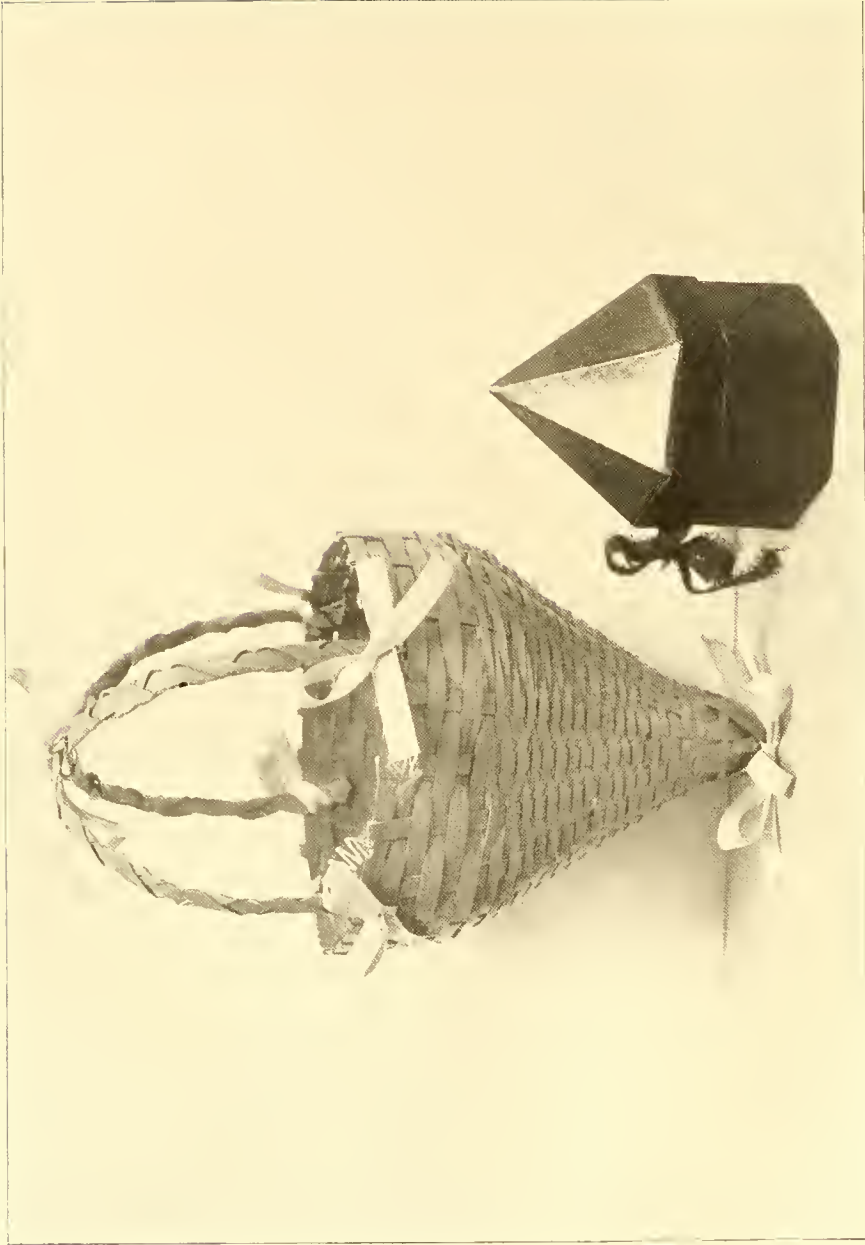
"Yes, only a more common variety. And what have you, Prudence?"

"I don't know what it is," she said, "only it is like dark quartz, and is a short, six-sided prism with a little pyramidal cap."

"That is smoky topaz, and is like the quartz crystal Gus selected yesterday, only it is smoky instead of clear. Now what shall we make?"

"I haven't the least idea," said Prudence; "these pointed shapes puzzle me so."

"You see them very often, though. It is a common form in architectural ornament; nearly all school towers and church spires are this form elongated. I have used it in two ways," continued Miss Lovechild, "one by inverting it, and weaving a flower basket, and the other by making it on a short base, for a pen and stamp box. I



HEXAGONAL PYRAMIDAL BASKET AND STAMP BOX.

have divided the inside of the box by partitions. It makes a pretty little desk ornament, besides being useful. The pyramid should be covered with gilt or silver paper as it reflects the light so prettily, and the base is best covered with leatherette.

“You notice that the drawing for the box itself is precisely like the drawing for the six-sided prism, only shortened, and it has a lining like the bonbon box for holding the cover in place. The pyramidal top is made by taking the slant height of the pyramid as a radius, and describing a circle with it. Then space your compasses the width of one side of your box, and point off six spaces on the circle. Connect these with straight lines, and on one draw a rectangle representing one side of your cover. Extend this till of sufficient length to fold around the pyramid, after it is united. This should be covered with leatherette like the box. Be particular that the cover and the box are perfectly joined. They should be hinged together by ribbon. The basket-form is made like the cover of the box with a radius of 4" for the slant height, and 3" for one side of the base. The warp strands are crossed at the bottom, and radiate out to the top. The woof strands should be of split palm leaf and woven from the vertex of the pyramid to the base. Two handles crossing each other are pretty arched over the top. They can be made of the palm leaf twisted with the fine palm leaf. The success of this model will depend upon the nicety with which you weave the pyramid. The strands should be firmly pressed down to the vertex of the pyramid, and secured with pins as you work, and they should also be creased as you turn the angles, else your pyramid will have the effect of a cone.”

“Oh dear!” exclaimed Esther, “I do hate to be particular. I like things just as well if they don't come together so that they are geometrically exact.”

“That is the reason there are usually two or three of your shoe buttons off, and one or two of your dress buttons; and why your hair ribbon is always untied,” said Prudence. “I like to have things ‘just so,’” she added, “and not all sixes and sevens.”

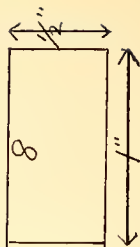
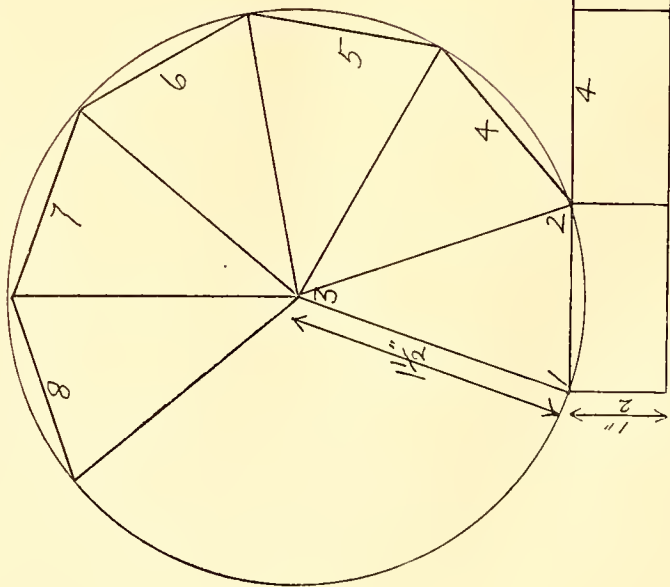
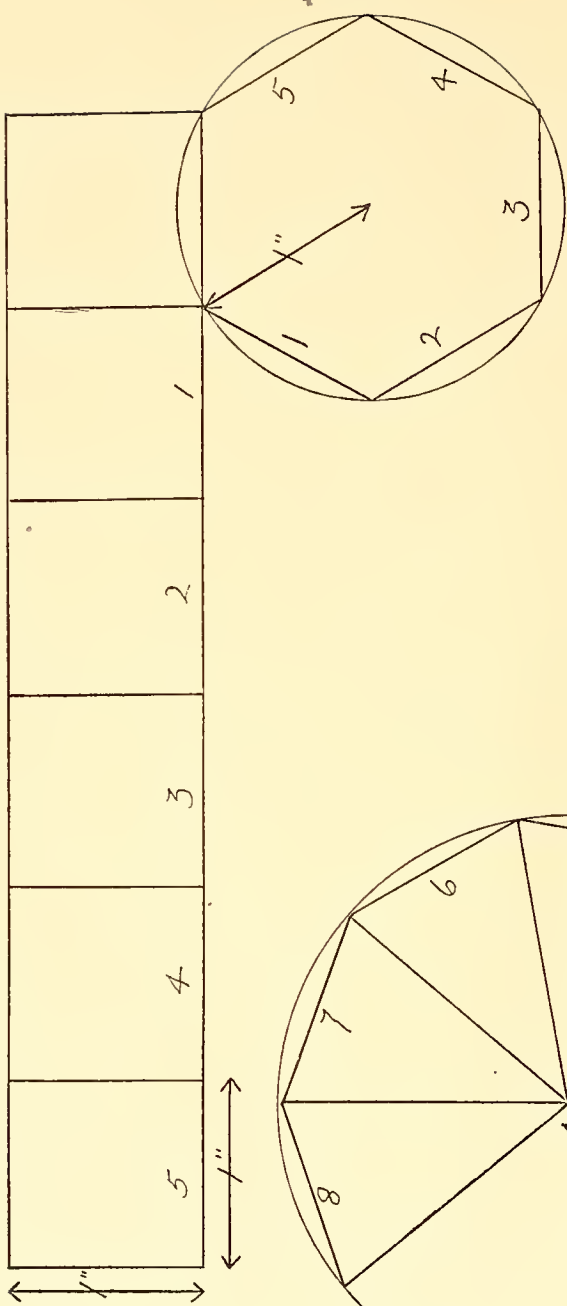
“Corners!” interrupted Miss Lovechild. “I think, however, if not one of you should tell me which models you had made, I could give them all to the right owners, just because I know your likes and dislikes so well. We are all very apt to reflect our tastes in our work; in fact, everything we make is just a *character-graph* of ourselves. I always imagined that ‘the house that Jack built,’ that we used to hear so much about when babies, must have been a very dilapidated structure, because the people that lived in it were so distressingly out of order. You remember the man ‘all tattered and torn,’ and ‘the maiden all forlorn, who milked the cow with the crumpled horn.’ You see, it is not probable that if they could not keep themselves in order, they could their house.

“Let us imagine that the scientific people had sufficiently developed the X-rays to have made patent X-ray eye-glasses, and we will put them on, and take a walk through town that we may study the inside as well as the outside of some of these character-graphs we call homes. Here we are at a little, oblong, brown house with a ‘lean-to back,’ as you call it out here. Perhaps it is some miner’s home. As we enter we notice there is a kitchengarden on each side of the walk; evidently somebody lives here who prefers potato vines to flowers. The front door opens into a large, long room furnished with two or three large tables, cupboards, and a big stove; a good-sized pantry opens off one side, and two very small, dark bedrooms from another. You see, the room the owner thinks of greatest importance is the kitchen; he is a man that lives and works to eat. He does not care where he sits or where he sleeps; the kitchen is

good enough for him, he is at home there. He has no books, you see, but an almanac, and a few others that tell about his work. On the kitchen shelf are no ornaments but a clock; they are not necessary things. Nothing is necessary to him but what pertains to eating and sleeping and working. You can see him from this character-graph, can you not?—a roughly dressed man, anything is good enough to work in; his face is coarse; he has never looked at refined things; he is not intellectual; he has never thought it necessary to feed anything but his stomach. He is physically healthy, a reasonably happy animal when he has plenty to eat.

“Here we are at our second character-graph. This house has one more room than the other, and a bed of showy flowers. The people here like a place to sit and chat; they are a little social. Then they have a few ornaments here and there, somewhat on the calico-and-bright-bead style of decorating; but they have some ambition to have things pleasant. Their books, you will see, are stories of other people; they are not thinkers, but live for something besides eating. If we should walk in now we would see kindly faced, comfortable people, who would ask us to stop a while and tell them the ‘news.’

“Our next character-graph has a fine front door and door-bell, but the side door looks more used so we will go in that way with our X-rays. You notice this house has much superficial ornament, and is finished in several shades of paint, all of which are in sharp contrast as though each was trying to make itself seen. The door takes us into a small dining-room, bare, but for one or two chromos, a table, and some chairs; a brightly colored table-cloth is on the table, as it won't show the dirt. No matter if the dirt is there, if it is n't seen, and it is good enough except when there is company. The kitchen is small and hot, but it will do ‘just to cook in,’ the

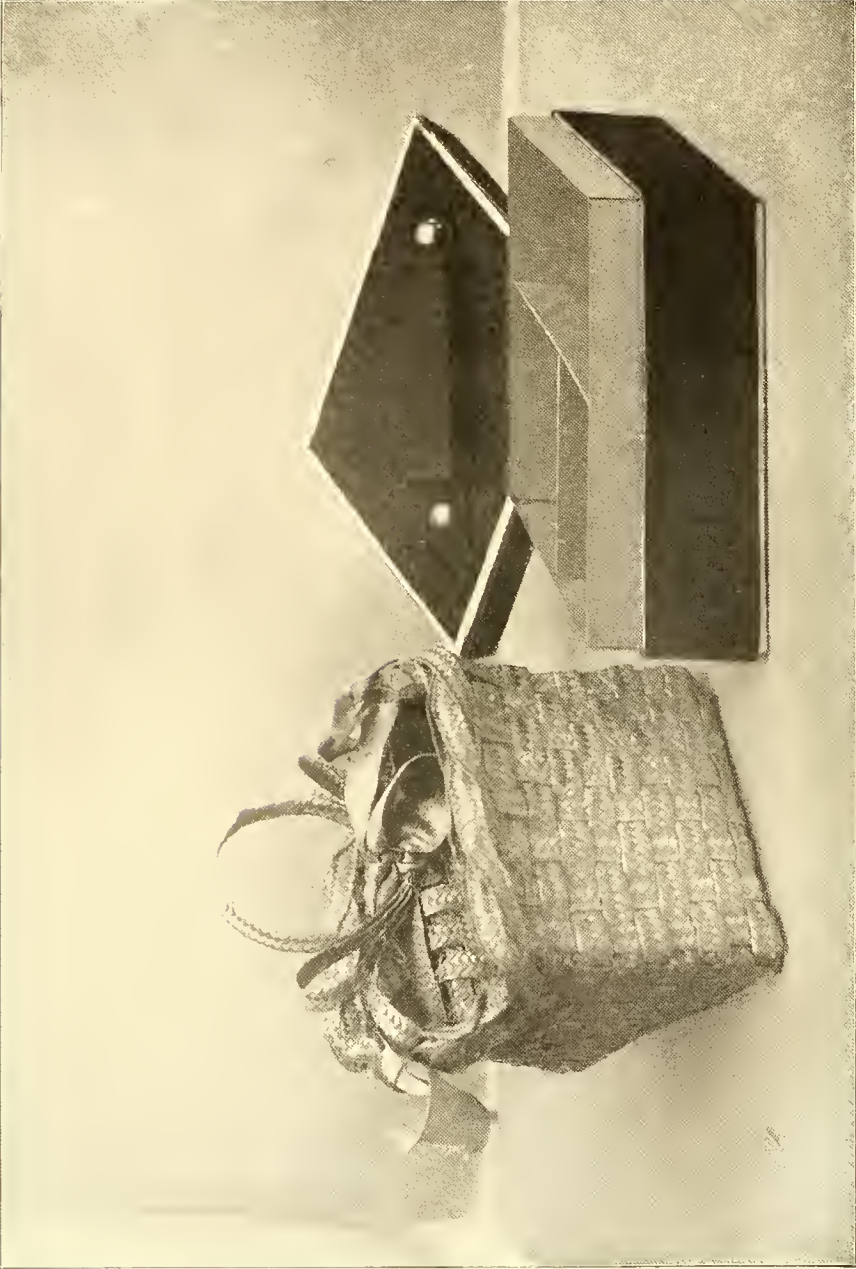


people think. The sitting-room is small, but 'it does not matter, there is a parlor for company.' It is a good place to put the old furniture and everything else that is most worn out, or that is not good enough for company. There is a 'spare bedroom,' too, small, stiff, and uncomfortable, but it is a fine place for the display of quilts, which are remarkable for demonstrating a whole plane geometry in dazzling colors. Now we come to *the* room of the house—the parlor. It is large, and has evidently absorbed everything that ought to have been spread out over the rest of the house; every piece of good furniture, every little pretty thing that is cheering and restful for tired eyes to look at, has been stored up where it does no good but to show the accumulation of the family possessions, and that is just the object, to show all their company how much they have, and what nice things they have. They would not like it at all, if their company should happen to come in the back way, and see all the things that were not 'nice,' for they want to appear very nice. How would they look? That depends on which door you enter. If it is the side door, you will find them in very old clothes, as it does not matter, they will say, just to work in, and they can save something that way. If you go to the front door, they will meet you (after you have rung several times) with something 'good' on, and seat you in the parlor, and make you feel that *they* are very 'nice' people. They would *look* to be very nice people whether they are or not, because they want you to think so anyway; in fact, children, they would be just as nice as cotton-backed ribbon with the satin side out.

"Now we are ready for another character-graph. Which way in? It does not matter, the front door is open and looks hospitable; the hall is large, and pleasantly furnished; the parlor correspondingly so, not pretentious, but restful and homelike. There is a library adjoining it, filled with books and flowers; the books, though not misused,

do not have that painfully new look that suggests ornaments rather than 'friends.' Then there is a music room on the other side of the parlor, and a cozy corner for a studio, with some choice bits of art here and there. Then there is a dining-hall, bright with flowers and dainty table furnishings. The kitchen is just as cheery a place, airy and comfortable, with boxes of garden herbs and parsley in the windows. And what kind of people live here, rich?—No, not in the sense of having a great many dollars or expensive things; but they are rich in beautiful thoughts,—thoughts of the beautiful world outside, which they have wrought out in their home for the enjoyment of their family and friends. They do not dress beautifully in the sense of rich, costly clothing. They prefer to clothe their minds; nevertheless they wear that which becomes them, simply made.

“Now here is another home that many say is beautiful. The architecture is said to be very fine, but it is the thought of the man that designed the house, not of the owner. The style is picked up from various types, and simply expresses the latest building fad, and the dollars that went into it. *They* appear at every angle. Here we are. Inside are elegant parlors, hall ways, libraries, music rooms; everything that anybody could possibly want is profusely provided, and you can almost imagine that you see a floor-walker coming toward you to ask what department you would like to look at next. The house is sort of a standing advertisement of the best decorators, household furnishers, authors, and artists. And if you saw the owner, you might mistake him for a gold dollar on legs. So you see his character-graph is a good one. Now take off your X-ray eye-glasses, and settle down to your models, remembering that they are your character-graphs.”



RHOMBOIDAL BOX AND PHOTO BASKET.

XVI.

SELENITE, MONOCLINIC SYSTEM.

FORM STUDY — RIGHT RHOMBOIDAL PRISM.

WHO knows what this form is?" asked Miss Lovechild; "let me have your answers quickly."

"It's a crooked diamond," said Tod.

"An oblique parallelogram," said Prudence.

"A rhomboid," guessed Frank.

"An oblique rhomboid," added Guy.

"It is—I don't know what it is," laughed Esther.

"I think it is a rhombus," said Flossy.

"I don't know anything about it," confessed Gus, who never tried to answer a question he was not sure of.

"I expected it would puzzle you," continued Miss Lovechild, "for this form and two others are very often confused. This is a right rhomboidal prism, and is confused with the rhombohedron sometimes; but a rhombohedron always has six *equal* rhombic, or diamond-shaped, faces, and an oblique rhomboidal prism is one whose every face is a rhomboid, which is an oblique, unequal-sided parallelogram.

"As this drawing is a little puzzling, I have numbered the lines so that you will understand my explanation more readily. First draw a diagonal between points 1 and 2, that represents the diagonal length of the bottom of your box. Then space your compasses by the longest side of your box, and place the needle-point on point 1, and describe an arc; then on point 2, and describe an arc on the

opposite side of your diagonal. Then change your compasses to the length of the shortest side of your box, and place on points 1 and 2, and describe arcs on opposite sides of the diagonal that shall intersect the others already drawn. Connect the points of intersection with straight lines, and you will have the plain rhomboidal base for your box. Then, with the use of your square, draw the rectangular sides of the box, being particular that they are exactly perpendicular to the base. Draw the cover in the same manner, taking care that the diagonal of the cover lies in the opposite direction, else the cover will not fit the box. An inner cardboard lining is made for it on the plan of the bonbon box, and two partitions of the same, one dividing the box in the center, and one subdividing the division thus made. These partitions are held in place by rhomboidal bases that exactly fit the spaces made by the partitions. The rectangles 1 and 2 fold together, which are supported by the bases 3 and 4. A handle is made for the cover like that on the glove case, and the box is covered with leatherette, as a work-box should be as substantial as possible. The basket-form is just like the box, and the basket is woven with one partition for photographs, and a fancy handle made of three or four loops of straw and fastened on the partition by a knot of pretty ribbon."

"Oh what dreadful models to make!" exclaimed Esther.

"I don't believe that I ever can do them nicely," said Flossy.

"It needs nothing at all but some faithful work," replied Miss Lovechild. "You ought to be glad that I have given you the opportunity of showing me what you are capable of doing. You never heard of any one growing great in this world, did you, by doing easy things? There would be no credit in that. You are, of course, familiar with Dickens's Mark Tapley, and remember how he never considered it any credit to be cheerful under cheerful circumstances,

and was always trying to find some surroundings that would test his cheerfulness. So I want you to be Mark Taplys in your work. Look for hard work and you will be surprised to find, after a time, that there is nothing hard for you to do."

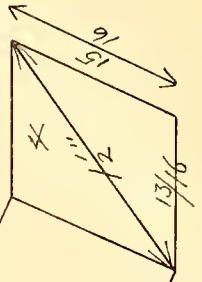
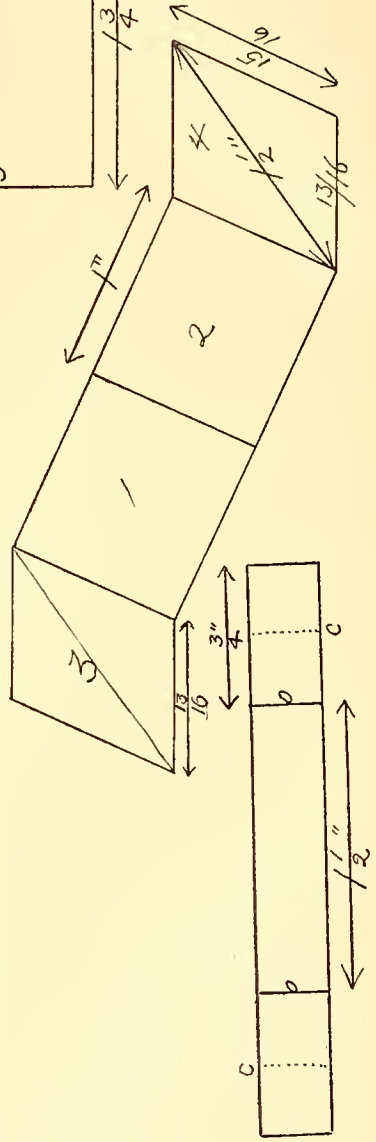
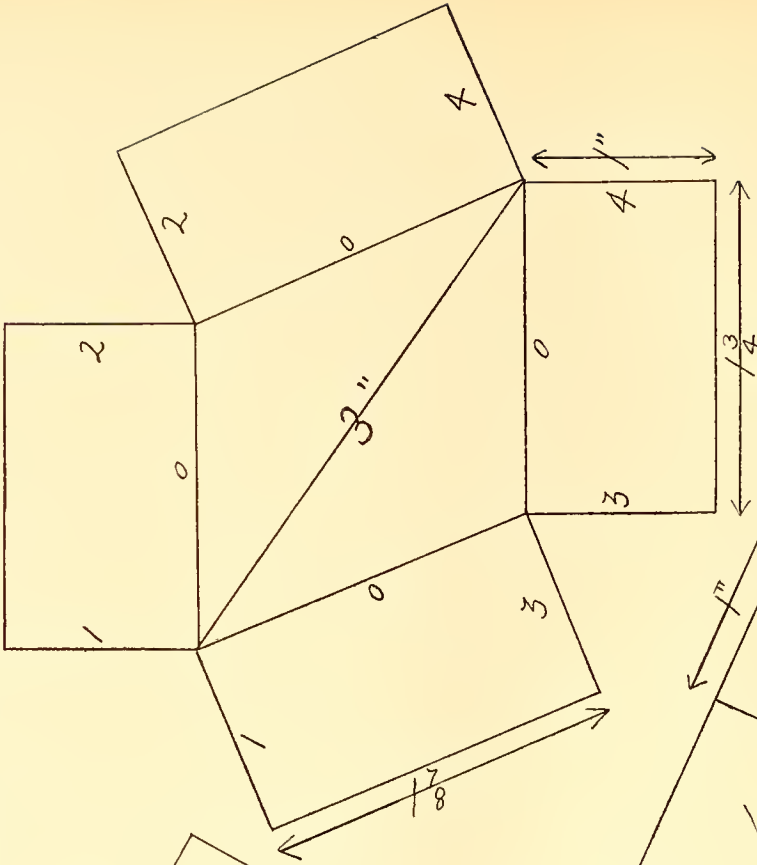
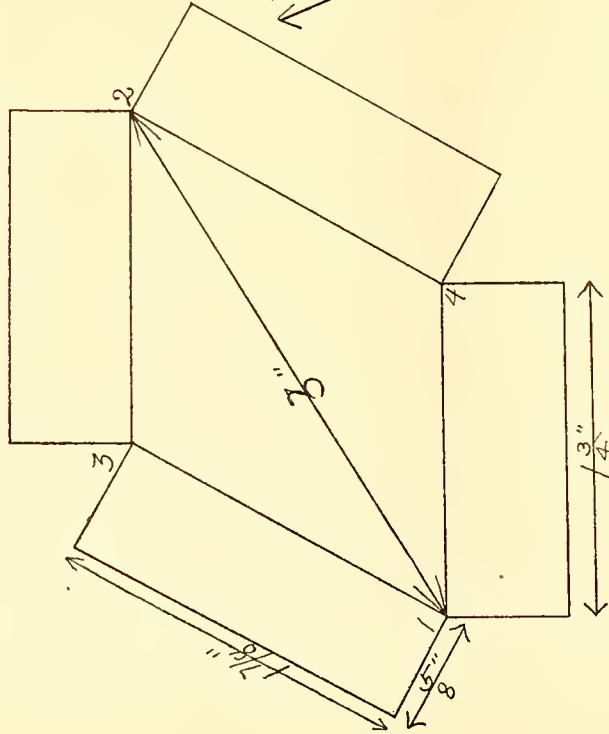
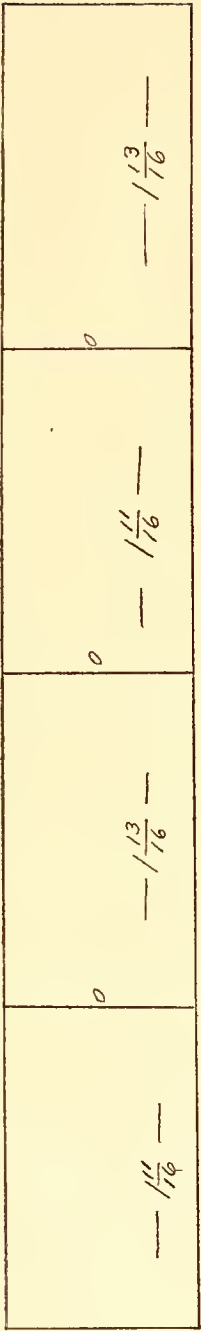
"But what is the use, Miss Lovechild, in having these careful drawings? Why can't we use patterns, and cut our models out from those?" questioned Frank.

"I do let the smaller grades in school have patterns till they learn to use their hands some. I thought you were old enough to work without them; but if you are not, I suppose I can get you some patterns, too."

"Well, I am no baby," said Guy. "I have my drawing nearly done while you have been fussing over yours," he said; "and it isn't so awfully hard, either."

"But really, Miss Lovechild," said Frank, "what is the use in our making these drawings till we learn geometry?"

"A great many people are fine geometricians, Frank, who could not possibly make one of these boxes. They learn how to make the drawings, but not how to use them. We should only *learn* as we can make *use of what we learn*. It does no good to cram our heads with geometrical facts. We cannot even be sure that we know them until we have expressed them. This box is just an expression of the knowledge of this form, that we have in our heads; and I never feel sure that I have anything in my head until I can take it out and look at it. A learned person used to be considered a sort of walking dictionary of facts; but now learning that cannot be materialized is very much to be suspected. Imagine your teacher of the piano-forte, Flossy, filling your head with all the principles of the art, accustoming your eyes to read the notes and musical signs, and then saying that you were ready to make music with your fingers. Or

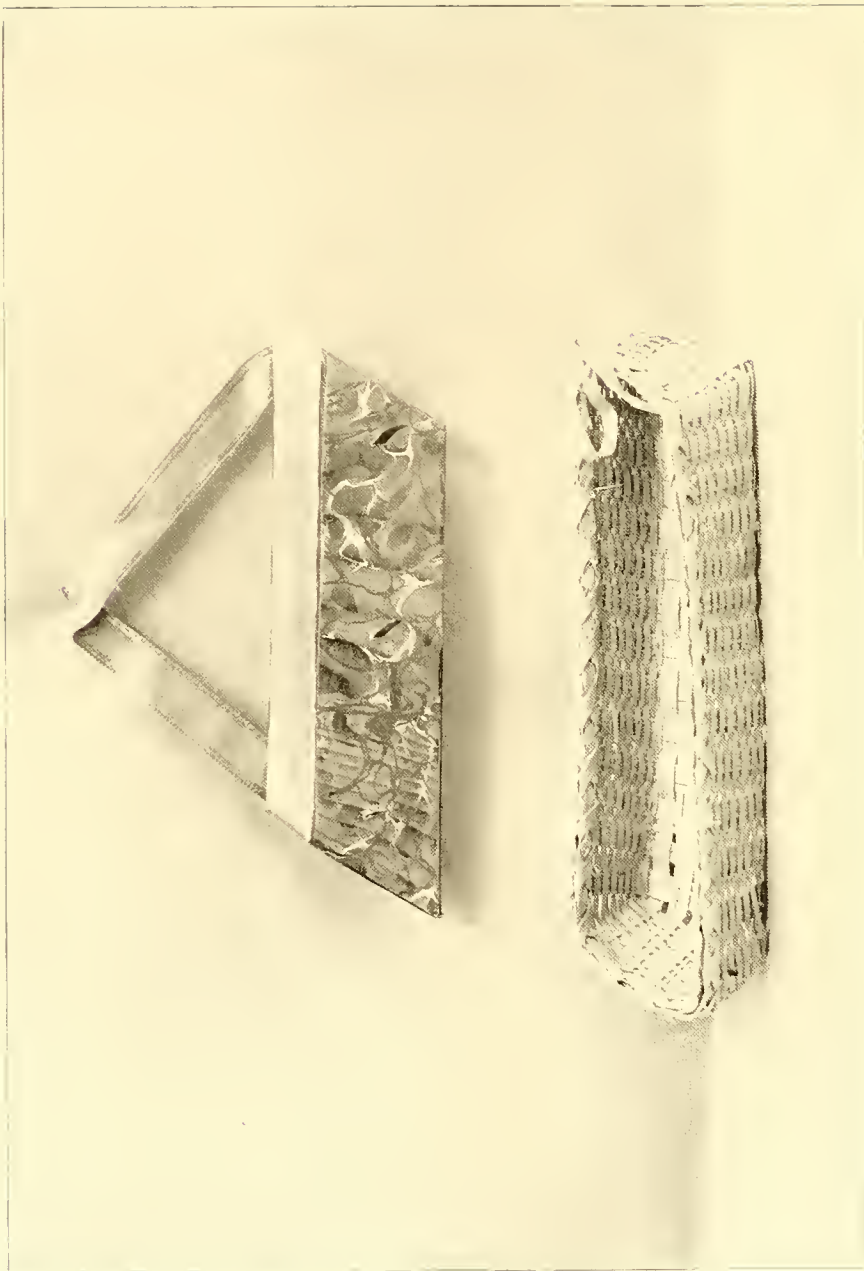


imagine a vocalist as filled with all the various systems of elocution, rules of expression and gesture, and then let him attempt to entertain an audience. How much would he express with an untrained voice? How much of a picture could a man produce who had diligently studied all rules of proportion, form, action, light and shade, and artistic composition, who had never handled a palette and brush?

“If a mind is well trained it should be acute in all directions. The world often wonders why ‘So-and-so’ with such a splendid education, did not accomplish more, and is equally surprised that somebody else with no education, made so much of himself. The fact is that the self-made people, who are such surprises, were obliged to gain their knowledge by practise,—they only know what they can use,—while the ‘well-educated man’ knows very much more than he knows how to use, which is as bad as not knowing it at all. It is one thing to know something inside of a book, and another to know it outside. It may be very instructive to study about the wonderful possibilities of heat and water; but it will be immensely more so after you have applied water and heat to an innocent-looking pan of dried beans, which you intend to put through the process known as boiling. The chances are, if it is your first attempt, that when you have finished cooking them, you will be able generously to feed a regiment of tramps. The growth of the yeast fungi is a very interesting bit of science to read about in somebody’s ‘Tell-you-all-about-it’ cook-book, but it is far more interesting after you have used up some two hundred pounds of flour in trying to make one good batch of bread.

“I knew of a couple of well-educated Easterners, interested in mineralogy, who, while being shown about a Western ranch, asked permission to carry off some specimens of a very beautiful, clear crystalline substance, which they noticed lying in the fields. Their gen-

erous guide assured them that they were welcome to all they wished, as there was no one to dispute their claim but the cattle, whose interests were alimentary rather than mineralogical. They may have known about rock salt in books as 'halite,' but they probably did not remember it outside of books. Then I once knew of a lawyer who probably knew a great deal in books, who attempted a garden, but he told a neighbor, in disgust, that his beans all came up wrong end first, so that he had to replant them all. He probably discovered that there were some things to be learned outside of books. So much for head learning. I saw a girl of fourteen, who had been a deaf mute since she was a little child, taught vocalization by feeling the vibrations of the voice of her teacher, and then imitating them herself. As she learned to speak, her voice had the sound of a baby's, it had been so long unused. So I have seen manual work done by experienced teachers, that presented the babyish appearance of a child's first work, because their hands had remained untrained since babyhood. Thus the unequal development of mental ability and hand skill is often displayed; more often than it would be if it was regarded as it is,—an educational deformity. Can we call ourselves educated while our hands are helpless to materialize the products of our minds? We train our eyes, our ears, and our voices, yet our hands are left as helpless as a baby's. What a disgrace unskilled hands should be!"



OBLIQUE RHOMBOIDAL BILL FILE AND PENCIL TRAY.

ICELAND SPAR, RHOMBOHEDRAL SYSTEM.

FORM STUDY — OBLIQUE RHOMBOIDAL PRISM.

DO you remember, class, that I illustrated the square prism by a lead crystal, because the lead would often cleave into perfect square prisms, though it belonged to the regular system? These crystal systems or families are very puzzling sometimes, for they have a strong enough resemblance at times, to be brothers when they may be only cousins. Now we sometimes find Iceland spar, which is rhombohedral, in prisms resembling the oblique rhomboidal. Here is one, that, speaking geometrically, we would call a rhomboidal prism, but if broken, it would doubtless cleave into rhombohedrons. I am going to let you use it to suggest the rhomboidal models you are to make to-day. You see each face is a rhomboid instead of a rhomb as the rhombohedrons have, and it has four long, oblique parallelograms for four of its faces,—two wide and two narrow,—and a smaller one for each end. I have used the form for a bill file.

“Now I see you look very much afraid of this, but it is simple enough if you will only think so. In the first place, draw what is to be one of the broad sides of your prism; it will correspond with the bottom of the work-box, and is the base upon which we will build the rest of our drawing. Extend the lines 1 and 2 to 9, and 3 and 4 to 10. Connect these and you have one of the small rhomboidal faces that form the end of your prism. Then extend 3 to 5, and 4 to 6, and connect, which gives you one long, narrow face of the prism. Space

your compasses $\frac{1}{2}$ "', and draw arcs to intersect at 8, using points 3 and 5 as centers. Connect 8 with 1, which gives the diagonal for the other end of the prism. Then with your compasses, find point 7, and connect 8 with 7, and 7 with 1. Extend this line to point 11, and connect with 12, which completes the other long, narrow face of your prism. Then extend lines 1 to 14, and 2 to 12, to points 12 and 14, and connect, which completes the remaining face of your prism. Crease the lines indicated. Then insert paper fasteners in points 15, 16, and 17, securing the heads by gluing a strip of cloth firmly over the entire surface. The points will project on the opposite side on which the bills are to be filed. The prism is then folded together, and glued. To strengthen it, it is best to paste small strips of muslin over the corners, then cover the narrow faces and ends with gilt or silver, glue loops of ribbon on the back to hang it in place, and cover the broad faces with fancy paper. Make the same form in heavy pasteboard from the woven form which is this little tray, and weave it as you did your first tray, only this is of course more difficult on account of its oblique sides. It is finished in the same manner and woven of the split palm leaf."

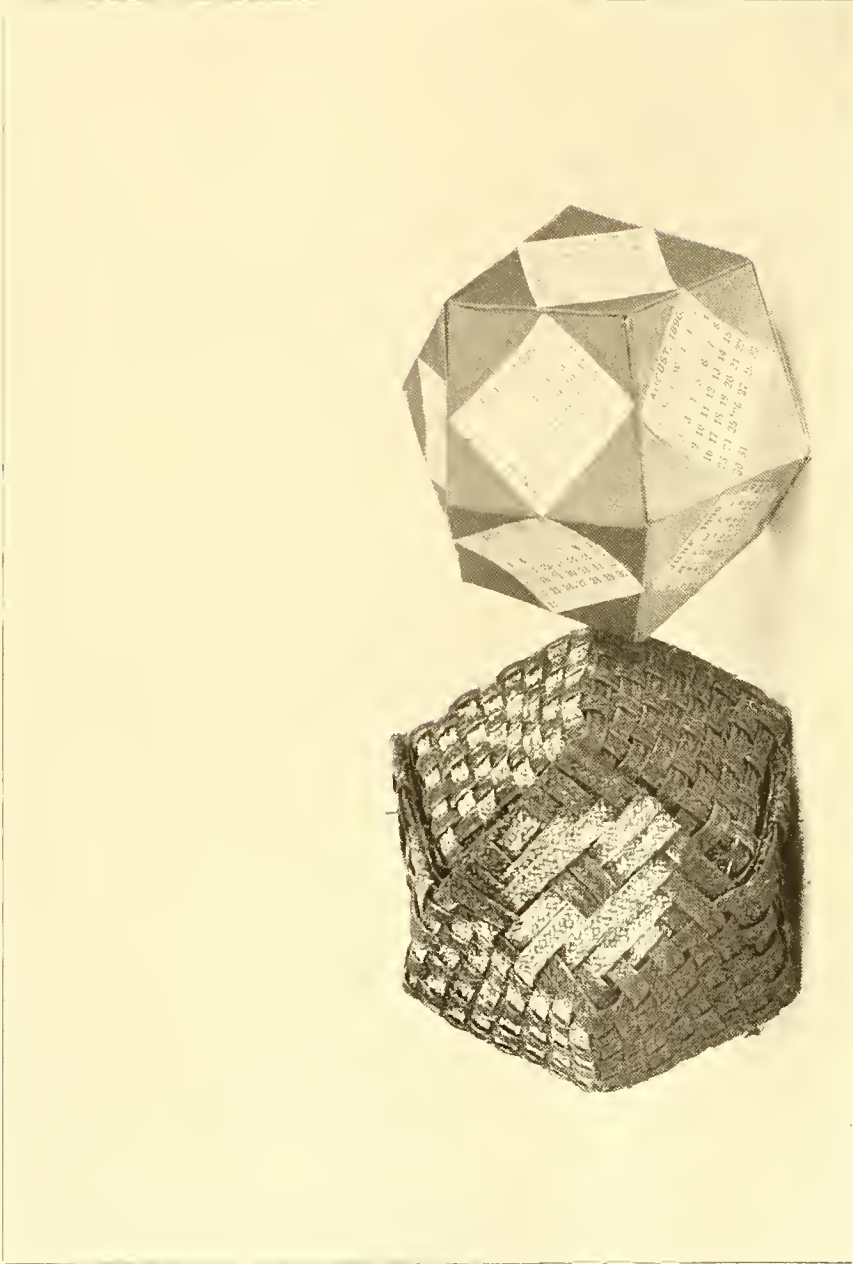
"What is this tray to be used for?" asked Prudence. "I thought I would like to make mine as a mate for the other tray. I planned that larger, you know, for mama's brush and comb, and this would be a lovely shape for hair-pins."

"It was designed for pencils," Miss Lovechild said; "but you can, of course, use it for whatever you wish, though I prefer to reserve trays for serving food, and for various domestic purposes, which was their primary use. I think we should always adhere to the appropriate use of things in spite of popular fads; and it seems to me that it is more appropriate to keep our brushes and combs and other toilet articles in drawers or cases where they will be free from

dust. These fancy little trays are appropriate and useful for the desk or table, for pencils, scissors, knives, or any little articles that we may wish to have conveniently ready for use. Always employ reason in regard to the use of any article, and you will not use it inappropriately. You remember in our talk about true ornamentation, we found that there is much which is called ornament that is not such. So there is a true or appropriate use for every article.

“There would be none of that cheap art called decorative, if the appropriate use of articles was studied, and we would be spared these epidemics of household decoration, that have raged for different periods, as, for instance, one winter everybody who indulged in this kind of ‘art,’ must have decorated dust-pans tied up with a bow of ribbon and hung in the parlor. Another time fire-shovels were a similar favorite, with a dauby sketch in the shovel, a gilded handle, and ever-present bow of ribbon. Then bread toasters had a corresponding day for holding letters, being decorated with ribbon interwoven in the wires; then the cow stable was robbed of its three-legged milking-stool, which, with a decorated top and gilded legs, with bow on one, walked into the parlor. Then wooden spoons with decorated bowls were a similar fad. In fact, it is hard to think of any common domestic utensil that has not figured in decorative art.

“What is the harm? you ask.—It dulls the sensibilities to the appropriate use of things. Look at the ridiculousness of putting a beautiful flower in your dust-pan, and laying it on your parlor table! Apply your test for true ornament here. What would it express?—Nothing in the natural course of reasoning, but that you had swept up a flower that was destined for the ash barrel. How about the appropriateness of landscapes in fire-shovels? Then what is the analogy between toast and letters? or what appropriate thought is suggested by seeing a milking-stool in a parlor?



[160] RHOUBIC DODECAHEDRON CALENDAR MOUNT AND KNITTING-BALL BASKET.

XVIII.

IRON AND GARNET, REGULAR SYSTEM.

FORM STUDY—THE RHOMBIC DODECAHEDRON.

YOU don't have any balls in minerals, do you, Miss Lovechild?" queried Guy.

"Not as a perfect geometric form," she replied. "The rhombic dodecahedron is the nearest approach to that. You may look in the cabinet and see what you can find."

"Here is an ugly looking black thing that is almost a ball," said Guy. "It looks as though its sides had tried to make diamonds and could not."

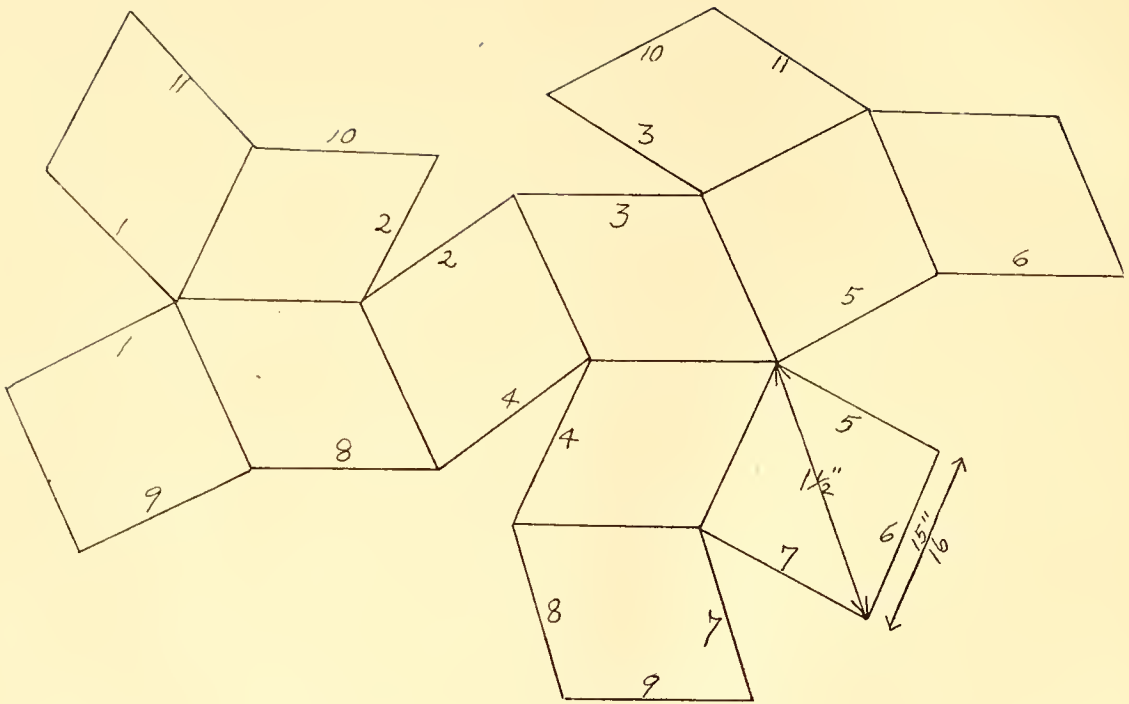
"That is very beautiful, though," said Miss Lovechild, "in spite of your unappreciative description. It looks like ebony, and is wonderfully perfect as crystals go. Wait till you make a dodecahedron as perfect as this yourself, Master Guy, before you criticize Mother Nature. And what have you found, Esther?"

"Some pretty little wine-colored glass balls," she replied.

"Look at them under the glass and see if they are really quite balls," Miss Lovechild said.

"Oh how pretty! Every side is a cute little diamond. It is just like that black thing that Guy has."

"Yes, it is garnet, and has fallen out of this piece of gneiss. Here you see are others like them, and that dodecahedron of Guy's is another form of iron. We often speak of the yearly cycle, or circle,—an imaginary division of time. As it takes just twelve



months to make this 'circle of the year,' let us imagine the year as a dodecahedron of time, and use this form as a calendar mount, to illustrate the thought. Each rhombic face represents a month, you see, and each should be of a different color, with three or four silver and gilt rhombs to give variety. So they will each have to be separately drawn, and cut with narrow margins for gluing together. When you join them, glue four together so that their acute angles meet. Then glue a rhomb in each of the obtuse angles thus made, and unite with another four rhombs, that have been united at their acute angles. None of their angles are quite acute, I know, but I mean the more acute.

"The form for the basket is easier made in one piece, arranging the rhombic faces as I have in this drawing. The rhombic basket is for holding a ball of knitting yarn or crocheting cotton, so that it can roll on the floor, or anywhere, without injuring the yarn. It is made in two parts, consisting of eight rhombic faces, as when the two sides of the basket are slipped together, it is necessary that they overlap in order to be secure. Select two different shades of this narrow, straw tape, and allow thirty-six strands for each half of the basket, eighteen of each color. Suppose your colors are bronze and dark green, like this. You would first pin nine of the dark green strands in place, bending them around the form over four of the rhombic faces; then pin nine strands of the bronze in place, parallel to those on the opposite side. Then, in the opposite direction, weave in your woof strands, weaving the green woof strands into the bronze warp strands and vice versa. You can weave any design you think pretty.

"I have woven mine so that each end presents two rhombic faces in the plain bronze, two in plain green, two having a figured center of green, and two having a figured center of bronze. It will appear

a little puzzling to you at first, but you will soon catch the idea as you study it. Its success will depend on the nicety with which you draw the strands around the form so that the shape will be preserved perfectly, and the weaving must be absolutely exact so there is no space left between the strands. The edges are finished by simply turning back the straw and weaving in on the under side. If you wish, the two parts of the basket can be fastened together by ribbons, but it is not necessary, as they will keep their place, if well woven."

"What color shall I take for my basket?" inquired Flossy.

"Any one you please, if it is appropriate to roll on the floor, as knitting balls are very apt to do," said Miss Lovechild.

"This white and light blue would look so pretty," said Flossy, "but I suppose that you would say that it would not be at all appropriate."

"Think how pretty it would appear after rolling around in the dust for a few weeks," suggested Miss Lovechild; "nothing can be pretty, you know, if it is not pretty for the use for which it is intended. Suppose we take an out-of-door color lesson. What colors were we given to walk on?—Brown and green in the summer when the sun is high and the dust flies; and in winter when there is much cloud and the sun is low, we are cheered by the brightness of the snow. It is only given us to walk on, however, when Mother Nature has stopped working, and the wind has swept her floors, and Jack Frost has hardened them, so her white carpet can be kept spotlessly clean. I think after an unusually sunny winter's day, we are all thankful that she changes for a dark carpet when spring comes; for then our eyes are protected from too strong lights, by the green scenes of the shrubbery, whose value we realize when we go sailing on the water, and our eyes are surrounded by a glare of light above and below.

“Nature’s business dress always shades on the browns, greens, and grays, singly or in mixtures, touched up here and there, of course, by the bits of color given the flowers. Even our sky light is softened by the tint of blue. Imagine a glaring white sky, a scarlet ground, light blue tree trunks, with pink foliage! Dear, dear, it makes my eyes ache to think of it! In fact they would feel as they sometimes do in the schoolroom, when one girl wears bright pink, another Turkey red, and some others near by will be in blue, yellow, and green effects. If it were not for the browns and grays on the boys’ side of the room, I should fear for my eyes. This does not apply to my little school here, for your clothes are always in taste, but in the large, public schools of the cities, we see color combinations as I have described. Colors are pretty, of course, if used as Nature uses them; her flowers, you know, are set in dark leaves. How pretty would a red rose look if its bush was covered with pink, yellow, and blue leaves? In nature we never see masses of color unrelieved by subdued colors; nor do we see mixtures of several different brilliant colors.

“It is especially poor taste, if we are to be seen in any public place or gathering where many people are to be present, to wear any striking color, as it is extremely disagreeable for those who wish to center their attention on the speaker, to be obliged to look over or between variously bright-colored costumes and hats, which often totally eclipse the speaker. Audiences sometimes present the appearance of a brightly colored patchwork quilt. True gentlewomen, and the girls who make them, will not wish to be seen by their clothing, unless they consider their clothing of more value than themselves. So select the color for a costume, that a stranger in describing you, would ask, ‘Who was that intelligent-faced girl?’ rather than ‘Who was that girl in the red dress?’

“The dainty pink arbutus looks doubly sweet for the rough, brown dress of its leaves. Absence of all color in nature is as disagreeable as too much color, and denotes death, so there are places where nature is generous with her colors, as out on the barren brown prairie, and up here in the gray, rugged Rockies, where there is scarcely a bit of foliage to relieve the eyes. Here she has put her brightest colors. Those on the prairies are not as bright as those on the mountains, and those on the lower mountains are not as brilliant as those on the higher, where there are fewer trees; and up and above timber lines where there is nothing but gray rock and snowbanks, she has put her treasures of color in the flowers,—the most brilliant scarlets, crimsons, purples, and golds, everything to warm and cheer where there is nothing else. One can almost warm his hands on the flame-like petals of the painters’ brush. Follow nature’s suggestions in your coloring, and you cannot go far astray.”



XIX.

CALCITE, RHOMBOHEDRAL SYSTEM.

FORM STUDY—THE CONE.

ARE not these little cones of white spar, or dog-tooth spar, beautiful? They appear like cones, yet are really like pyramids in structure. I am going to have you tell me what to make with them. I am not going to know anything. You are all to be my teachers, and tell me what form this suggests to you that is useful and ornamental. I have my cardboard all ready, what shall I make, please?" asked Miss Lovechild.

"O you do not really mean that we must tell you something to make, do you?" questioned Flossy.

"Certainly," replied Miss Lovechild, "have n't you heads, and brains inside of them? You know this work was not given you to develop other people's brains, but your own. Now I am ready. Who will tell me the first thing to do?"

"Well," said Guy, "I know you can make a cone out of the third part of a circle, but I don't know what use you can make of it."

"Candy cornucopia," suggested Esther.

"But that would n't be anything new," said the double T's; "I have seen cornucopias ever since I have seen daylight."

"I know," said Prudence, "we can make a triple cone out of one circle."

"But what shall we do with it after it is made?" persisted Guy.

"O hang it underneath a hanging lamp for matches," said Prudence.

"Humph, the fire insurance companies would be after you, if you kept your matches in a pasteboard match-safe," remarked Tod.

"Well then let's make it of sandpaper," said Flossy.

"That would n't do," said Prudence, "because when it is made out of one circle, both sides of the paper show, and only one side is sanded."

"I have it," said Frank, "make it out of celluloid."

"That would never do," put in Gus, "because it is explosive."

"I have an idea," said Guy; "we will make it of mica. Miss Lovechild had some left over from her models, didn't you?" asked Guy, turning to Miss Lovechild; "and when it is split very thin, it bends easily."

"Anyway, we don't care if it is hard," laughed Prudence; "for our pupil can do 'most anything."

"Very well, but what shall I do first, please?" asked Miss Lovechild.

"Take your compass and draw a circle on your mica, with a four-inch radius," directed Guy.

"But, if you please," interrupted Miss Lovechild, "it is hard to find such a large piece of mica, and it will not take a pencil mark after it is found."

"Oh dear! I never thought of that," said Guy. "I know, though, what you can do. Take a smaller radius, and scratch a line with the needle-point of your compass, instead of drawing it with your pencil."

"Very well, now I have done what you say; what next?"

"Cut your circle out," said Prudence, "and make one cut to the center from the circumference; turn each side back to form a cone,

leaving space enough in the center to form another." And the teacher began obediently her appointed work.

"But how am I to get them all equal?" inquired Miss Lovechild.

"I'll tell you," said Guy; "scratch off your circle into thirds first, then slice one third of the pie to the center, fold back a third on either side to the center, and bend the middle third, into another." The idea of a pie was suggested by the shape of the section.

"But how shall I hold them in place?" asked Miss Lovechild.

"Punch holes with the point of your compass, and weave ribbon through," suggested Prudence.

"Yes, that is a very good idea, and the model is quite dainty. Now do you not think that it is fun to think something out for yourself? Tell me how to make the basket, now."

"I like to weave, may I tell?" said Esther.

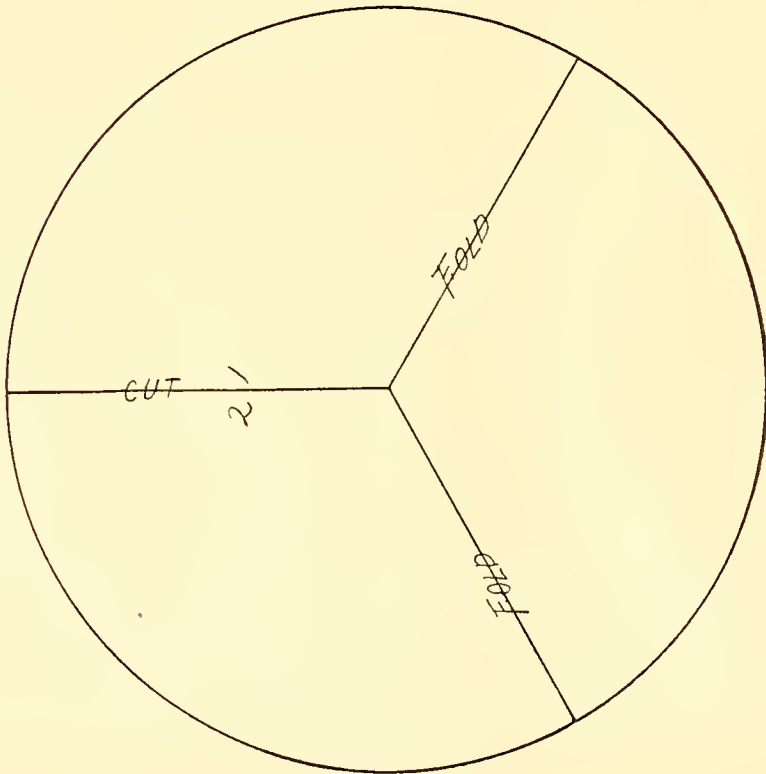
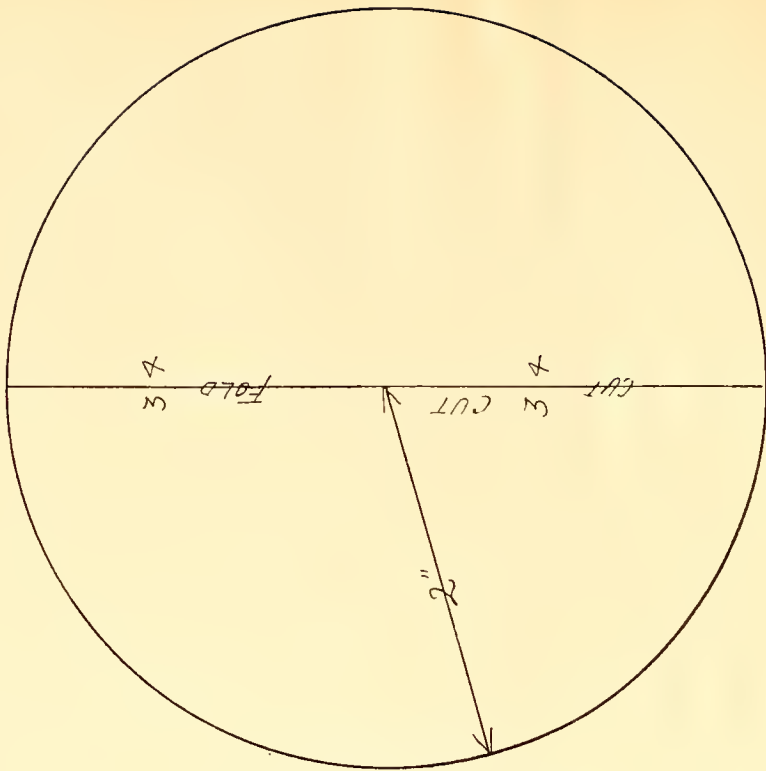
"Certainly, any one may tell, for you are all my teachers," replied Miss Lovechild.

"I thought a cone-shaped pocket for paper and twine, would be nice. We could weave a plain cone first with split palm leaf, and then put in a sort of envelope partition in the center for the twine," said Esther.

"But how would you weave the partition?" queried Guy.

"I don't know," Esther replied; "only I know I want one."

"I know," said Prudence; "it would have to be cone shaped to fit in the basket. We can cut a plain cone from pasteboard, and then interlace the palm leaf strips over it, diagonally on both sides, beginning at the vertex just as we did for the pyramidal scrap-basket; then slip the cardboard out, and it will be just like an envelope. That is Esther's idea, isn't it? Only she needed help to think it out."



“Well, I don’t care what you call it,” said Esther, good-naturedly, “as long as you have done it. I suppose I am lazy.”

“Your idea is a good one, at any rate,” Miss Lovechild said, smiling. “I always insisted, you know, that the East, West, North, and South ought to help each other out by combining ideas, thus forming a complete country, bound together by mutual interests.”

“I would like to know anyway,” said Esther, “why Yankees are said to invent so many things.”

“I do not know, Esther, unless it is that they are lazy, too, as you say you are, when it comes to doing hand work. Ever since the ‘hands’ and ‘heads’ of society were separated, you know, the hands became servants, and so hand work became associated with the idea of service which an ideal Yankee most thoroughly detests. He is perfectly willing, however, to stand in a mechanics’ shop or a dirty factory all day, running machines. His objection is to being ‘run’ himself. It is against his principles to recognize anything like a peasantry. To him, ‘everybody’ is just as good as ‘everybody’ else, providing he is his own ‘boss.’ So disagreeable is the idea of service to them, that Yankee girls will go into factories and do doubly hard work rather than work out in an easy place in a household. A typical Yankee is always willing to spend twice the time in thinking up some contrivance to do his work for him that it would take to do it by hand, that he may have the satisfaction of simply turning a crank or pressing a button to make his work do itself. Then, too, he is always in a hurry; he can never take time to do anything. It is surprising that he can find time to live, in fact, he does not live in the fullest sense of the term. More properly speaking, he exists—is kept running himself by his numerous machines, which do everything for him, till one sometimes wonders that he can even take time to live by machinery. Some verses from an old school

speaker, very accurately describe this human phenomenon, called a Yankee boy. I will repeat two of them for you:—

“ By his genius and jack-knife driven,
Ere long he'll solve you any problem given;
 Make any jimcrack, musical or mute,—
 A plow, a couch, an organ, or a flute;
Make you a locomotive or a clock,
Cut a canal or build a floating dock,
Or lead forth beauty from a marble block;—
 Make anything, in short, of sea or shore,
 From a child's rattle to a seventy-four;—
Make it, said I?—Ay, when he undertakes it,
He'll make the thing and the machine that makes it.

“And when the thing is made,— whether it be
To move on earth, in air, or on the sea;
 Whether on water, o'er the waves to glide,
 Or upon land to roll, revolve, or slide;
Whether to whirl or jar, to strike or ring,
Whether it be a piston or a spring,
 Wheel, pulley, tube sonorous, wood or brass,
 The thing designed shall surely come to pass;
For, when his hand's upon it, you may know
That there is go in it, and he'll make it go.”

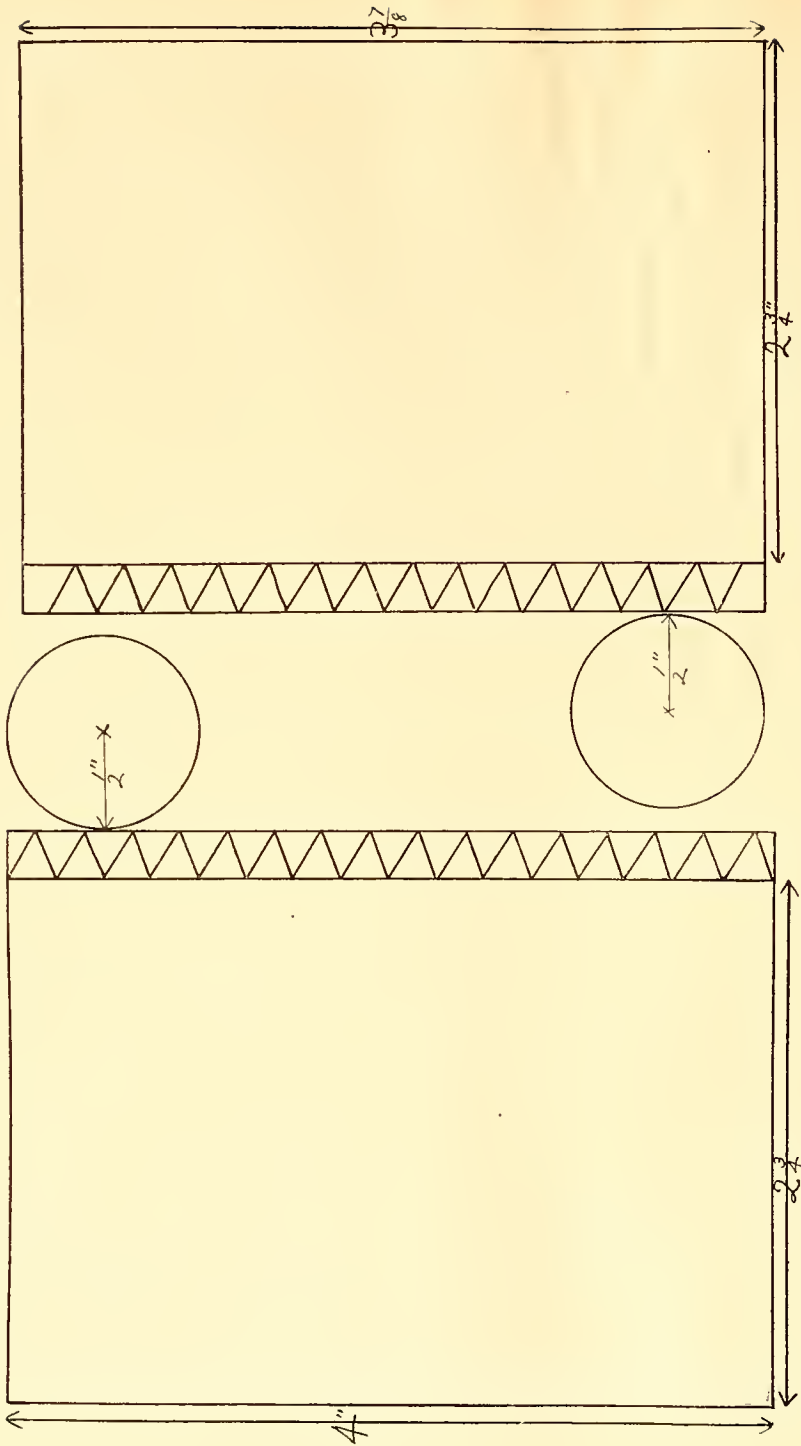


CYLINDRICAL BOTTLE COVER AND BOTTLE CASE.

A STALACTITE.

FORM STUDY—THE CYLINDER.

HERE we are, on next to our very last model. What shall it be?" inquired Miss Lovechild. "I have chosen this piece of a stalactite," she continued. "But there is no such thing as a cylindrical crystal, or conical crystal, but minerals sometimes aggregate or form by the action of water, in these shapes. How would it do to make a cylindrical bottle-case from this form? It would be very serviceable, would it not, to protect bottles from breakage while traveling, or to make them look more presentable for our toilet-tables? Here is the one I have made. It is simply two cylinders with projecting ends, one smaller than the other, the outer covered with leatherette, and the inner covered with gilt or silver, like the ends. The drawing consists of these two bands, with teeth-shaped margins on one side, which are glued to the circular ends and then covered. The woven companion form is a covered glass bottle. This woven covering prevents breakages as much as the pasteboard covering of the bottle-case. I chose a cylindrical cologne bottle for mine, in order to harmonize with our model form. Six strands of palm leaf are crossed over the bottom and drawn up on the sides, being held in place by an elastic band. The sides are woven with split palm leaf, which is drawn together as closely as possible. The weaving is started by slipping a piece of the palm leaf under a warp strand where it is bent up to form the sides of the bottle, and then weaving,



as on the sides of the boxes, to the center of the bottle, where it is pretty to weave a band of some contrasting color. The neck of the bottle is finished by binding over and over with a piece of the split straw, and then tying a piece of ribbon around it. The space between the shoulders of the bottle and the neck, is left unwoven, the warp strands making pretty open work."

"That is very pretty," said Flossy. "I am going to make some like it for Christmas presents, if I can find suitable material at home."

"That's something I hadn't thought of either," said Prudence. "What shall we do for materials when we get home?"

"I can tell you where you can obtain materials," replied Miss Lovechild; "but I would much rather have you utilize whatever materials you have at hand. Esther I know can obtain beautiful palmetto near her home, which is just as good as the palm leaf for many things. You can obtain pasteboards from the cast-off boxes of shops, and pretty papers can be bought at reasonable prices from any bookbindery or printing-office. You can always find some materials wherever you are."

"What would you work with if you lived in Greenland?" asked Guy.

"I would cut up strips of skins and weave them together, if I could find nothing better," replied Miss Lovechild; "they would at least make strong baskets. In southern Africa the scales of fish are used to make very pretty ornaments. There is always something everywhere."

"I don't see what we Western boys can find," said Tod.

"You can rip up your old straw hats if you can do no better," said Miss Lovechild. "They make excellent material if the hat braid is white. You have only to rip them up and cover with hot water

for a few minutes, then take out and dry. When half dry, iron with a hot iron, and the straw will look as fresh as new; but you do not have to confine yourself to the weaving of straw; reeds and willows can be very prettily used, and grasses make very pretty material by plaiting them together in long strands. When you are puzzled to know what to use, put on your thinking cap, and look around you. There is hardly anything that cannot be utilized for weaving. Weaving is one of the oldest arts.

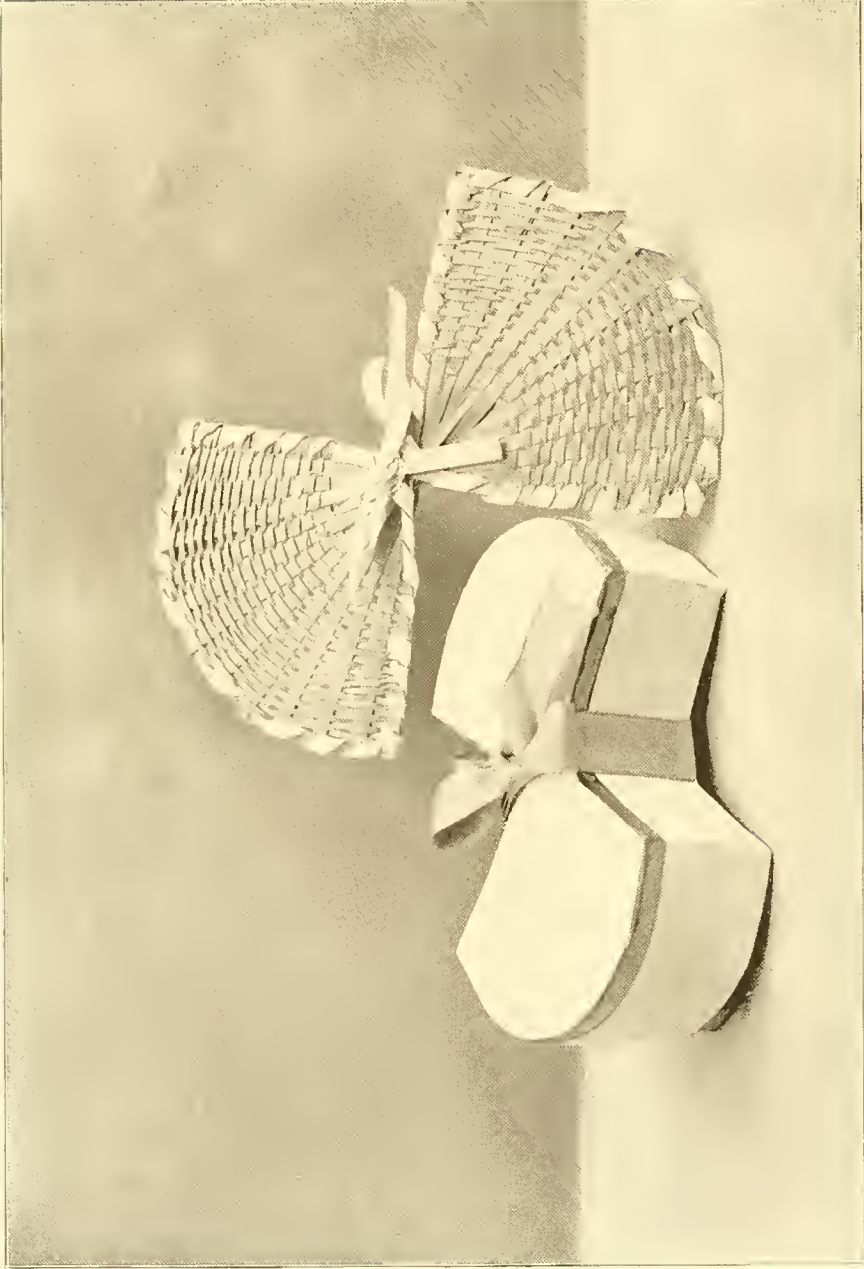
“The ancient Britons were noted for their weaving, and the Romans considered their woven works of sufficient value to exhibit them in their triumphal procession, on their return from conquering the Britons. They wove their boats, their houses, their baskets, and even the cages for their captives taken in battle, and later they wove their carriages, as well as their clothes. The ancient Egyptians also wove baskets and cloth, and made their houses by binding together the reeds of the river banks, out of which they also wove their boats and covered them with pitch to make them water-tight. Do you not remember the baby commander that sailed upon the Nile in such a boat? Many have been the fugitives that have been lowered over the walls of ancient cities in great baskets, and so escaped. History might have been very different had it not been for the art of weaving. The old warriors even made their armor of finely woven shields. East, west, north, or south, wherever you go, the rich and poor are alike dependent upon this art of weaving. It makes the fisherman’s boats and nets, as well as baskets, and the dainty draperies and carpets of the wealthy home. It makes alike the straw matting and the Persian rug. The peasant’s homespun, and the delicate lace of the society belle, the rich damask and the coarse dish towel. It is an art that no material can defy; it weaves the iron cable that supports bridges, as it weaves the fancy silk used for finest embroideries; it

weaves the wire-netting for screens, the wire-springs for beds, the iron dish-cleaner, the sieve for flour, and the seats of chairs, and even makes entire sets of furniture. As you study what the art of weaving has done, you will never be without suggestions what to make. Of all arts it is *the* art that belongs to women. The very word 'wife' comes from the old Saxon word meaning 'weaver,' in connection with which Ruskin brings out the beautiful thought that every woman must be a 'house-weaver' or a 'house-moth'—weaving men's fortunes or destroying them. This is just as true to-day as it was when the Saxons coined the word, although the spindle and distaff have been modernized. You remember that among the chief virtues of the perfect woman mentioned in Proverbs, were these: 'She layeth her hands to the spindle, and her hands hold the distaff. She stretcheth out her hand to the poor; yea, she reacheth forth her hands to the needy. . . . She maketh herself coverings of tapestry; her clothing is silk and purple. Her husband is known in the gates, when he sitteth among the elders of the land. She maketh fine linen, and selleth it; and delivereth girdles unto the merchant. . . . She looketh well to the ways of her household, and eateth not the bread of idleness.'

"Skilful hands were an honor then, and manual work was no disgrace. The modern American woman is apt to think herself a great improvement on the old-fashioned ideals, who could be content with the well-doing of the homely virtues. But let me transpose her now with the ideal of Proverbs, that we may see how they compare. She layeth her foot on the bicycle pedal, and her hands hold the bar. She stretcheth out her hand after politics; yea, she reacheth forth her hands after office. She maketh herself coverings like the men, and weareth bloomers to walk in. She readeth Greek at sight, and teacheth it, and delivereth lectures unto the people. She forgetteth

well the ways of her household, and eateth the bread of bakers. Her husband is known in the clubs, and hath dyspepsia worse than other men.'

"You look so shocked, girls, I shall have to stop, and I do not wonder I hope you will be shocked at the reality as well. Do not be afraid to grow up into the sweet, old-fashioned ideal of womanhood. There is more grace in using the spindle and distaff than in riding a wheel; and more joy in stretching out womanly hands to help the poor, than in reaching them up for political honors. Just as well wait for your Greek till you are thoroughly at home with the best English literature, and then you won't care for it; besides, if you are all you should be in your home, you will not have time for both, and husbands prefer English to Greek for every-day wear. And don't stretch out your hands after politics unless you prefer them to your husbands' society. They will find all the politics they want, together with other masculine accomplishments, away from home, and will prefer a home and wife to a club and feminine politician. Let the spindle and distaff be the symbol to you, girls, of the happiest life you can live, in the happiest place—*your home*."



SHEAF-FORTIED BOX AND FAN.

XXI.

STILBITE, RHOMBIC SYSTEM.

FORM STUDY — THE SHEAF.

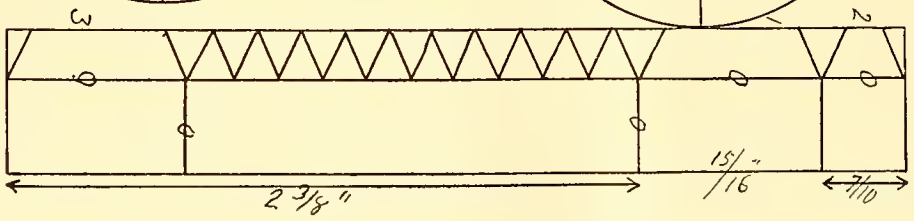
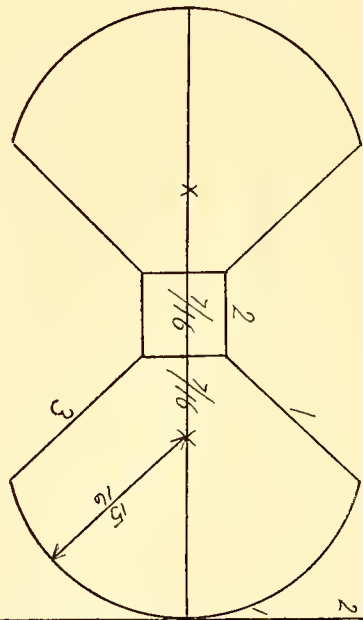
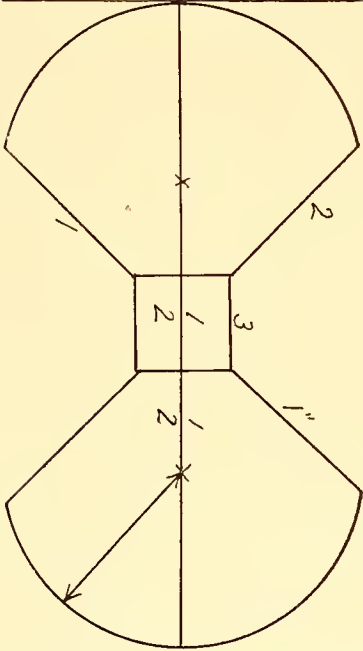
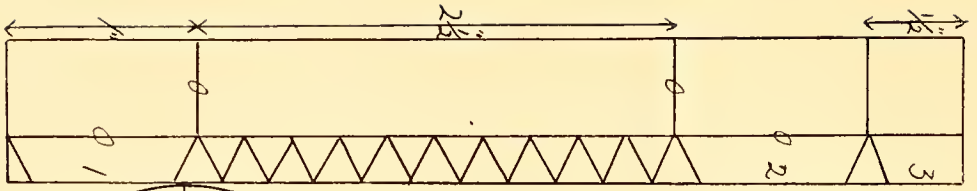
ALL of the crystals that we have used thus far, have had some distinct geometrical form; but I have something here which, though a mineral, imitates vegetation in form, and I would like to have you tell me what it suggests to you. Here it is," and Miss Lovechild held up a specimen of stilbite.

"A double fan," said Frank.

"A bow-knot," said Flossy.

"A sheaf of wheat," added Guy, "or perhaps two tied together in the middle."

"Yes, you have it, Guy," said Miss Lovechild. "It is called the 'sheaf form' in crystallography, and as it is shaped something like a bow-knot, it makes a capital form for a tie-box, for our pasteboard model, and as its plane faces resemble a double fan, as Frank suggested, I have woven a fan on that plan which is very convenient. To make the box, first draw a plane square, of whatever size you wish, representing the center of the sheaf. Then draw a line through the center of this horizontally, and extend on each side the same length as the square. Take a radius twice the distance of one side of your square, and using each end of the center line as a radius center, describe a semicircle; then with the same radius, changing to the angles of your square for centers, draw arcs intersecting the semicircle. Connect these points of intersection with the angles of



the square, and you have the outline of the bottom of your box. The top of the cover is the same, except it is one-eighth larger; the sides of both, you see, are simple bands, of sufficient length to reach around the base, and creased with a knife, at every corner turned, also cut with teeth-like margins for joining to the curved ends. The box is prettiest covered with some light paper, and finished by gluing ribbon under each edge of the square center of the cover, and drawing it up the sides and fastening with a bow on top of the cover. The form for the fan is the same as that for the plane face of the base. The fan consists of flat weaving. The warp strands are cut the entire length of the fan and cross the center diagonally. The narrow woof is then put in near the center, and woven across, under and over, and is drawn into a semicircular form like the plane face of the fan. The design can be varied by weaving in one or more bands of color."

"It is very pretty, but I shall not want to use mine after it is made," said Prudence, "it will be so much work to make it. I intend to lay all my models away, in the book-case when I get home, as they are too precious to use and wear out."

"We are going to use our models for Christmas presents," said the double 'T's.

"I think I shall burn mine," said Esther, "I am ashamed to show them."

"Mine are going to be laid away in a box where nothing will hurt them," said Gustave.

"I am going to put mine in a cabinet where I can look at them, and show them to my friends," Flossy stated, with a superior air.

"Humph! what's the good of having them, if they are just for looks?" questioned Guy. "I am going to use mine for just what I made them for."

“I am going to sell mine,” announced Frank.

“What! only two who are going to do the right thing with their summer’s work!” exclaimed Miss Lovechild. “Frank values his for what he can sell it for. Esther does not value hers at all, and the others, excepting our double T’s and Guy, value their work for just the work’s sake; they worship the things which their hands have made as much as though they were idols of wood and stone. Frank, I am afraid, is something of a Ptah worshiper, as his work has no value to him but its money returns; and the rest of you who are going to save your models where they cannot be used or do any good, are something like Arachne, the Greek girl, who, as the story is told in Mythland, weaved so beautifully that she became vain and proud of her work, which she did not use to benefit others, but only to show how skilful *she* was. She even claimed that her work could not be rivaled by Minerva herself, who was considered the goddess of wisdom, and so of handiwork; so Minerva punished her for her selfishness by telling her that she should weave for no one but herself, after which she began to grow smaller and smaller, as all people do spiritually, who work for themselves alone, and her form changed at last to the ugly little spider, still spinning and drawing her thread from her own body. This was intended to teach the Greek children, I suppose, the terrible fate that follows those who work for themselves, alone.

“The highest mission that can be given anything, is the mission of usefulness. All the beauty and brightness are shut out from many homes by this kind of idol-worship, which lays aside the work of our hands, as the miser lays aside his gold—to be looked at, and hoarded, instead of blessing with its use. In such homes there is usually one room, commonly called ‘a parlor,’ more properly a ‘lararium’ in which are enshrined the family Lar and Penates, as

verily as though these household gods bore the forms of the ancient Roman deities. If any thoughtful friends give something to make the home bright, it is immediately entombed in this family temple, shut away from daylight, except as a sickly hue penetrates the thick shades and heavy draperies. Of course, on state days and calling times, these shrines are open for the worship of friends and acquaintances, but are considered as altogether too sacred for every-day use. In like manner, such people are very apt to economize their religion, saving it up to die by. They hoard it as a too sacred thing to use in every-day life, but wear it like a black gown one day in the week, and on funeral occasions. One is not more inspiring than the other."

"But surely, Miss Lovechild, you would have us careful and economical!" exclaimed Prudence with true New England sentiment.

"That depends on what you call economy," said Miss Lovechild; "there is a general impression that to be economical one has only to spend as little money as possible, and hoard everything he can get; and as people hoard their religion, which was intended to be a daily inspiration, and overlook its most sacred mission of use, so every pretty and beautiful thing that comes into their house, is considered too sacred for use, and is hoarded—wasted by hoarding. To spend and be spent for others is the highest destiny of every created thing. Economy is not hoarding, but getting the greatest amount of use out of anything. Webster's International Dictionary quotes Swift as defining economy as 'the parent of liberty and ease;' but it is more often, by misunderstanding, made the parent of bondage and drudgery; for when families have but the one thought of saving, they bind themselves to the service of material things as verily as the heathen bow themselves to idols of wood and stone, the only difference being in the shape.

“Many young people have gone into the world for pleasure they could not find at home, where some particularly saving member of the family was ever reminding them of the household Penates, who must not be offended; in other words, of the carpets that must not be walked on, the books that must not be handled, the chairs which must not be sat upon, the ornaments which must not be touched, the paint that must not be scratched. No place is home where one does not feel an ownership in one square inch of the family possessions—where there is nothing which can be used, except under protest. I once heard of a housekeeper who was so saving and careful that her house was too uncomfortably nice to be a home. Nothing could be used; so her boys preferred any other place to the one they should have loved best, and went to ruin because they had no home. What should have been one, was nothing more than a storage for household furnishings, and their mother merely a housekeeper—a worse idol-worshiper than any heathen who ever bowed down to wood and stone!

“When a pretty carpet that might brighten a room is buried in old rugs till it has the appearance of a patchwork quilt, in order to ‘save it,’ there is a wrong idea of economy, which is to get the *most good* out of a thing; for then the carpet wears out in the few exposed places, and by repeated sweepings and cleanings, till it becomes an old carpet, worn out under cover of rugs. It is then taken up, the good places cut out, and another generation of rugs made to cover a new carpet!”

“O but surely, Miss Lovechild,” interrupted Prudence, “you would not wear a new carpet right out with no rugs!”

“Rugs are in place, of course, in front of doors, or a stove, or a grate, where there is unusual wear. The object should be to give it an even wear. There must be wear *on something*, and it is just a

question as to whether you will take the good of the carpet out in an all-over wear, or a wear in spots, then using it for rugs. Some homes never possess anything new except what is locked up or under cover. Even a dress has to be protected with aprons three deep sometimes — an apron to protect the gown, then a ‘second-class’ apron to protect the ‘first-class,’ and another of third degree to protect that. Good gowns must be saved till they are finally so old-fashioned that they have to be remodeled to be wearable; so good furniture is stored in the parlor till it becomes musty, and the life of the family is actually spent in wearing out old things. All the little, bright, pretty things that go to make up the sum total of a happy home, are worse than worn out when they rust out from disuse. But better wear out even unnecessarily some carpets, some furniture, some books and ornaments, and have an attractive, loving home, than wear out our lives, our tempers, and the patience and love of our friends, by preserving, in an immaculately new state, all our possessions. The Father gave us the things of this world to *use*; and in the right use of them, we gain a preparation for the new life in the new world. If we misuse the beauties of this world, the Father’s mental and material gifts here, we lose the preparation for the more perfect gifts of the next life.

“The thought I want you to carry away with you is the thought of using everything the Father has given you. We used a little knowledge, you know, and made our first box; then we used what we gained in the making of that and what we already had, and made another; and so our ability grew as we used what we had. If the widow who fed Elijah had *saved* her last bit of oil and wine, she would have starved. A pool that *saves* its waters, stagnates; moth and rust corrupt the hoarded stores. On the other hand, ‘the liberal soul shall be made fat;’ ‘he that watereth shall be watered

also himself.' You remember the servant to whom his lord gave least—the one talent—felt that he must hoard it because he had so little; so he hid it, and saved it up for his lord's return. Was he blessed?—No, he received a curse instead; because the lord did not want a *hoarded store*; he wanted *use*. The fig tree that hoarded its life-giving sap in its own veins instead of turning it into fruit for the world, was cursed as the servant who hoarded his talent. Through every living thing, are we taught the principle of use. Life depends on use; and we shall be successful in every detail of our lives in proportion as we *use* every ability, every gift, every opportunity bestowed upon us; for the more we use our ability the more we shall have to use. The more we spend of one of God's gifts, the more returns we shall have to spend. The use of one opportunity makes many opportunities. 'There is that maketh himself poor, yet hath great riches;' 'there is that scattereth, and yet increaseth.'

"Then you want us to go home and use what we have made, and when they are worn out, make others like them?" inquired Prudence.

"You will make better ones next time, I hope," replied Miss Lovechild," and you may think of more convenient ways of making the same thing. Never be content with what you or any one manufactures, till you are sure it cannot be improved. Where would our cars, steamers, sewing-machines, and hundreds of other inventions be, if the people of this century had been content with the things of the last century? America would not be America, if it had acted on precedent. The people who made this country had found a better way of worshiping God than was allowed them by home governments; and besides having the ability to recognize the new and better way, they had the courage to live up to it amid dangers and persecutions till they had made a great country and a great people. The spirit

of independent thought that actuated them has repeated itself in the succeeding generations of their children, showing itself in the origination of great inventions, and freedom of thought, speech, and action, that has made America famous. A true American can be content with nothing but progression. Now I see the last model is made, and I propose that we close our University."

"O but, Miss Lovechild, we don't want to close it!" exclaimed Flossy. "I have been dreading to finish this model, because I knew it was the last."

"O you mustn't look at it as ending a pleasant summer; but instead, as a beginning of more like it on the same plan. Perhaps we can have another term of our summer school next year, unless the chipmunks take up our claim on the University in our absence.

"But what is this, Flossy? A surprise? How lovely!" exclaimed Miss Lovechild, as Flossy passed around to each, large photos set in mineral frames.

"They are some papa made of us while we were at work. I didn't know whether you would think the frames ornamental and appropriate," replied Flossy; "but I could think of nothing else for our rough, little cabin."

"They are just right, dear; and we shall all love them, for they will suggest what has been, I am sure, a pleasant summer for us all."

"And you won't think of us as having nothing but corners and angles, will you?" asked Guy. "We have bumped off some of them this summer, don't you think so? I feel as though I must be most a dodecahedron by this time. I believe another summer would make a sphere of me; I've had so many rubs," and Guy looked so serio-comic after his impromptu speech, that the University couldn't resist a laugh at his expense.

Tod tolled his liberty-bell for order, and then Tad and he stood up together and unrolled a very mysterious-looking document, and proceeded to read:—

“Know all men by these presents, that I, John Westerly, in the State of —, in behalf of my sons, Theodore and Thaddeus, for, and in consideration of, favors received, paid me by Pine Log University, the receipt whereof I do hereby acknowledge, have remised, released, and forever quit claimed, and by these presents do remise, release, and forever quit claim unto the said ‘Pine Log University,’ etc., etc., a certain ledge of rock and University buildings thereon, etc., etc.” The double T’s were interrupted just here by a storm of applause.

“This old cabin, you see, is a part of Twins’ claim,” they explained; “and pa thought it too bad that the University should n’t own itself; and he says it shall be fixed up in genuine rustic style another summer, if you will all come here again;” and Tod and Tad concluded their remarks with a very gymnastic bow, and placed the document in Miss Lovechild’s hands.

“Just think what an honor, children, to be made ‘stockholders,’ as well as students, in your University. We are certainly very grateful to our double T’s for so generously sharing their claim, and now I propose that the North, South, and East cheer the West for its kindness and hospitality, always remembering our country’s motto that we are ‘one out of many.’ As the cheers died away, the little school filed down the trail, singing as they went:—

“Land where my fathers died,
Land of the Pilgrims’ pride,
From every mountainside,
Let freedom ring.”

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