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— IN —

LOUISIANA

— AND IN —

THE SOUTHERN STATES.

BY MRS. EMMA B. JOHNSON.

SECOND EDITION.

PRICE, 50 CENTS.

NEW ORLEANS.

GEO. MÜLLER, Printer, 48 Bienville St.

1884.

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INTRODUCTION.

In presenting this, the second edition of my book on "Silk Culture," I take pleasure in returning my sincere thanks to the public for the marked appreciation shown to it.

I would again urgently call the attention of all owners of plantations and farms to the opportunity now offered of adding to their yearly income. Let them, therefore, plant the mulberry tree, and give thereby to their wives and daughters the chance to make a little extra money in rearing the silk worm. The industry is now well established, it is but a question of time before we shall see the result of the efforts put forth by many thoughtful, energetic and patriotic persons.

Let it be remembered that those who will be the first to thoroughly familiarize themselves with the raising of the silk worm will reap the richest harvest as this business will certainly become very important in a few years from now. owing to the great impetus which has been given to it. Competition and high prices do not go very well together, and those will make the most money who will be ready to operate on a large scale before the others are prepared to do so.

We would suggest to the authorities of all our Southern Cities, to have the highways and streets lined with the mulberry, a magnificent shade tree, that grows to a great size and lives hundreds of years.

Before closing, I wish specially to tender my thanks to the business men in our community who have assisted me in my labors with a view to develop this new enterprise throughout the country. In favoring me with their cards they have brought their names forward as men of progress well deserving the patronage of the public in their respective lines of business, and it is my earnest desire that their kind assistance will be duly taken under consideration by an appreciative public.

EMMA B. JOHNSON.

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SILK AND SILK CULTURE.

SILK is a fine thread or fiber, the product of a worm which, on account of this peculiarity, is termed the silk worm.

This worm, from feeding on special leaves, such as the leaves of the osage orange, of the black, but more particularly of the white mulberry, spins it from its mouth out of its body which becomes filled with a transparent substance which hardens into a thread after exposure to the air.

The process, by means of which the silk is produced, no one, so far, has been able to explain. The various transformations of this live silk producing machine are truly wonderful. A tiny worm is born from an egg, no larger than a turnip seed. This worm grows very fast; it sheds its skin four times at intervals of several days, then it shuts itself in its silken house called a cocoon, in which no opening of any sort can be discovered. In this house, the worm changes its shape and appearance. It becomes a chrysalis. It finally emerges from its improvised habitation in the shape of a butterfly, of small size, and of a cream color. This butterfly, some cocoons producing the male, others the female, after mating for the purpose of reproduction lives but a few days without food of any sort and then dies; the female having deposited, for the next season, from 350 to 400 eggs.

The silk worm is supposed to have originated in China from which country it has been carried to various localities. It is now found nearly all over the civilized world. In the United States, where it has been introduced, its cultivation seems to be spreading very fast.

The best known varieties of silk worms are seven in number. The common silk worm (*Bombyx Mori*) is the species most in use, and produces the best silk. It feeds as we all know upon the leaves of the mulberry, and completes its existence from the egg to the butterfly in from 35 to 40 days, according to climate.

There is a species of silk worm (*Bombyx Arrindia*), a native of Bengal and British India, that feeds upon the castor oil plant. It has been successfully propagated in Europe, where its silk product is found to be supple and durable, but almost without lustre. The *Ailanthus* silk worm (*Bombyx Cynthia*) is indigenous to the temperate regions of China. It produces an elongated cocoon of a reddish shade, from which a strong and durable tissue is made. It has been successfully introduced into France. The Tusseh silk worm (*Bombyx Mylitta*) lives in a wild state in Bengal, its food is the jujube tree. Its cocoon produces a fine and brilliant silk. Every effort to introduce it in France has failed.

The wild silk worm of Japan (*Bombyx Yami Mai*), has been successfully reared in France. The leaves of the oak are its food.

The *Bombyx Crecoxia* is indigenous to the temperate regions of North America, and found principally in Louisiana, the Carolinas and Virginia. Its food is the leaves of the oak, the elm, the willow, the common plum, the pecan, etc. The cocoon is of coarse texture though the silk is of brilliant hue.

There are several species of silk worms that produce more than one crop a year. The Annuals make but one crop and have been found most profitable. The Bivoltins make two crops, the silk does not command much price. There are also Trivoltins laying three crops per annum. The Quadrivoltins producing four crops.

The best varieties cultivated are the "Italian" producing a bright yellow cocoon. "French," white and straw color. "Turkish," white. "Japanese," white and green; and the "Chinese" white cocoons.

The white cocoon commands the highest price, provided the cocoons are good, and kept clean. The straw color is next in value and is considered most healthy.

Numerous experiments have demonstrated beyond a doubt that the silk worm can be produced all over the South, especially in Louisiana, where the best eggs and the finest cocoons have been produced. Louisiana seems to offer every facility for the production of silk.

It is neither difficult nor expensive to raise silk worms. A small outlay for the purchase of the eggs, and leaves, and for the rent of a room of sufficient capacity, and a few simple lessons are all that is necessary.

Any one wishing to raise silk worms must procure a book of instruction. This little book will convey the knowledge necessary on the subject for all practical purposes. It must be read carefully, and if in the directions anything should be found wanting, application must be made to the author for additional information.

EGGS.

The eggs will be furnished in any quantity desired. Particular care will be taken that those furnished be of good quality.

So far, the best eggs I can recommend, are the eggs which have been produced in Louisiana, for the last thirty-eight years ; and in order to distinguish them from others, I shall give them the special name of "Louisiana eggs."

The cocoons produced by these worms are of magnificent size and color, and no disease has ever developed among them. These were originally from France, and their great improvement in size and lustre goes to prove how well adapted Louisiana is to the cultivation of the silk worm.

France and Italy rely mainly upon Japan for their supply of healthy eggs. Every year, about fifty Italians and twenty-five Frenchmen go to Yokohama to purchase eggs, and pay from one to three dollars per ounce. These two nations expend a half million dollars in purchasing from a distant nation the eggs which Louisiana could easily supply.

Silk worm eggs are generally termed 'seed' by silk raisers. They are nearly round, slightly flattened, and in size resemble turnip seed. The eggs, when first deposited, are of a light yellow color, but if they have been properly impregnated, will turn a dark lilac and sometimes a dark green, according to breed.

This change should take place, in our climate, from three to five days after the eggs have been laid. If they remain yellow, they have not been impregnated and will not hatch.

The butterfly in laying its eggs, glues them in a more or less adhesive manner to the object upon which they are deposited. Cloth or blotting paper is used to place the butterfly upon at the time of laying. Silk worm eggs are generally kept at the temperature of ice. The reason of this is to prevent the worms from coming forth, as they often will do on warm days; at a time when there is no food for them, that is to say, before the leaves of the osage orange or mulberry have been sufficiently developed to be gathered for the young worms. When the mulberry leaf has attained the size of a half dollar, it is time to begin hatching.

THE REARING OF SILK WORMS.

To those parties who would like to go into the silk business, we would say that the best season in which to do work in our climate is from the first or fifteenth of March to the tenth of June. After that date the hot weather sets in, the work becomes more fatiguing, and the worms more liable to disease. The best breeds to produce from are those which lay eggs but once during the year. These annuals have been found by experienced silk culturists to be the most profitable. In Louisiana, however, we can easily raise two crops of annuals. The first crop from the seed we raise ourselves, beginning the fifteenth of March. This crop would be completed by the first of May: then send North and buy eggs for the second crop, which could be finished by the middle of June.

The climate North is so cold that the mulberry tree does not bud before the first of May, and the eggs are kept in cool, dry cellars until that time.

One dollar will buy a thousand eggs, and fifty cents will buy a book giving full instructions. One tree of ordinary size will more than feed 1000; eight trees of ordinary size

will feed 20,000. One table 6x3 will easily hold 1500 worms. See how small the capital invested! How little risk is run! If one has but one tree he can experiment in rearing the worms and obtain seed enough to enter largely into the business another year.

To rear silk worms, it is necessary to have a room devoted to the purpose. It must be well ventilated. A stove should be in the room to regulate the temperature. Around the walls of the room shelves, about fifteen inches apart, are arranged, one above the other, as high as is necessary to hold the worms. Tables extending the

length of the room, with a space sufficient to pass around and between them, may be made like the shelves, one above the other. Upon these shelves paper of any kind (old newspapers answering the purpose very well), may be spread. The worms are usually fed and raised upon these tables and shelves. This is the French way, but we think that some more convenient manner will be introduced as soon as the American people adopt silk culture as a national industry. (See above cut.)

HATCHING.

The eggs having been kept at a temperature of from 40 to 50 degrees Far. should be brought gradually to the temperature of the outer air. In Louisiana, the first of May, the temperature is generally about 74° Far. Place the eggs in a very shallow paper box. Spread them open, if loose. *An ounce will require a square foot of surface.*

Place each breed in a separate box and each box labelled so as to avoid mistakes. The temperature will probably be about 70° to begin with. It may be increased about two degrees a day up to 85° or even more, but not over 90°.

The atmosphere is likely to become too dry, this may be counteracted by sprinkling or mopping the floor, or by keeping a pot of boiling water upon the stove, if one is used to heat the room. The eggs will hatch generally in four or five days. When the eggs are about to hatch they undergo a marked change in color, passing from dark lilac to a lighter shade. When the worm is out, the shell is left quite white.

The hatching takes place in the morning and lasts three or four successive days, sometimes longer. It is not necessary to catch up each little worm that comes forth, as beginners are apt to do, but save trouble by waiting until a goodly number are out. When the first batch comes forth, spread very coarse mosquito netting over both worms and eggs, spread tender young leaves or finely cut food evenly, but not too thickly over the net. The worms, seeking the food, will soon creep through the net and attach themselves to the buds or leaves. When all have crept through, lift the net containing worms and leaves and place it on the shelf or table where they are to be reared. Repeat the operation for each day's hatch. Mark the day of the month and the number of feeds given. Keep each day's hatch carefully separate.

FEEDING.

Young silk worms should be fed, as soon as hatched, on the most tender leaves. If by beginning too late, tender leaves can not be obtained, cut the leaves very fine, like shredded tobacco, and sprinkle lightly and evenly over the net. Feed every two hours during the first and second ages. If possible the first feed should be given at 5 o'clock in the morning, and the last at 10 or 11 o'clock at night.

After the second age the leaves may be cut a little coarser, and still coarser after the third molt; and whole leaves may be given after the fourth molt. Common sense will teach anyone that the leaves may be older and tougher as the worm grows older. Still, they should always be green, fresh and free from dust, water, or dew. Leaves wet with dew are especially injurious.

The consumption of food increases very rapidly; the worms are said to consume their own weight in leaves daily. One pound of leaves for the first day is necessary for the worms from one ounce of eggs (which produces about 40,000 worms); two pounds the second, three or four pounds the third; after this their appetite decreases as the molting period approaches. During the first and second ages the net should be placed over the worms before each feed, remembering that two pieces of netting, at least, are necessary for each tray, so as to have a fresh clean piece to spread over the worms before each meal. The size of these pieces should be about three feet long by two wide, which should be the size of the tray. After the second age, the worms grow so rapidly that they can no longer pass through the mosquito netting, and some other means must be adopted to feed them and also keep them clear of their dirt. We have no doubt that as soon as a sufficient demand arises for such production the manufacturers of net goods will produce just what is needed in this business. It is only necessary for the ladies to use their energies in making this beautiful industry a national one, and then a thousand improvements will be made in the process of feeding and rearing the silk worm.

Various ways have been tried in feeding the worms to keep them out of the trash, and at the same time avoid direct handling; each silk culturist has his own method. We found that feeding trays, made of frames, of convenient size, say about three feet long and two feet wide, covered with coarse linen mosquito barring (not net), formed good trays for the worms to rest upon. This affords them plenty of air from underneath, which is always necessary. When the netting is discarded—which will have to be done as the worms become large—make frames of the size of the trays upon which the worms rest by cutting little notches in the frame or boring holes, or driving small tacks around the frames, say about an inch apart, and crossing at right angles with coarse, strong cord or twine, forming meshes sufficiently large for the index finger to pass through. The worms have been educated to climb upward, seeking food, therefore, if one of these frames is placed over them and covered with twigs and leaves of the mulberry, they will at once ascend, forsaking the tray beneath. A number of these frames should be made before the time for them arrives. Small pegs, of about two inches, should be in the corner of each frame for it to rest upon, to prevent pressure upon the worms, as they are easily suffocated. Stiff, coarse brown paper, with holes pierced of the size of an ordinary gun-wadding, or perhaps a little larger, is also used by silk culturists to place over the worms before feeding, but I found it very inconvenient and heavy, and hot upon the worms. All these means are used to keep the worms clean, as this is absolutely necessary. They must also have plenty of space and air.

After the third and fourth molt the litter should be removed as often as possible—that is, every two days. Sick worms should be immediately removed; also all dead ones. The consumption of food during the last age is truly astonishing, the worms from an ounce of eggs requiring about fifty pounds of leaves the first day after the fourth molt; one hundred and fifty by the fourth day, and double that about the fifth and sixth and seventh, after which the quantity falls off to about one hundred pounds for the eighth day; but much depends upon the

vigor of the worms and the temperature, which however, should never reach 90°. It should be lowered gradually after the hatching to about 75°. During this last age, which is called the fifth age, the greatest attention is necessary. The amount of work is also greatly increased. During the first and second ages one woman or a half-grown girl or boy can attend the worms from an ounce of eggs, and a man or boy can in an hour or two, furnish the leaves necessary for the worms from an ounce of eggs. Even during the last age one person is sufficient in the cocoonery, with one to gather the leaves for the worms from a half dozen ounces of eggs, or even more, with all proper appliances.

In Europe, the leaves are plucked off separately, whereas in California, after the worms are ten days old, the shoots are cut off with their leaves instead of taking off each leaf separately. The shoots are laid down four at a time, crossing one another at the ends so as to form a square—after the leaves have been eaten off, four more shoots are laid down on top of the others, and this mode of building up is continued and the result is a rectangular pen, the top of which is green and fresh and is occupied by the worms.

To avoid crowding, the space must be increased as the worms grow: they will need double the space the second day. To accomplish this, in feeding, when about half have crept through the net, remove to another place and place a second piece of net and feed the remainder. Do not give more than the worms can eat at a time, as by giving too much it gets hard before they can eat it all; and consequently a great deal of trash accumulates, and often the worms get buried under it and are made weak and sick. A little watchfulness will soon teach the quantity needed. It is a good plan to be methodical from the first and weigh the food given at each meal, and each meal should be numbered to show how many they have eaten in a given time. Mr. Crozier says that after eighteen meals they will go through their first molt, but this rule does not hold good in every case.

It is very important that the worms should grow evenly, therefore the feed should be spread in such a manner that

all eat at the same time. It saves a great deal of trouble to have all of the same tray or shelf begin spinning at the same time.

In cutting the food it is necessary to have a very sharp, clean knife; an old razor is very good. A good way to cut the leaves is to take a large handful, cut the knife down through the center, and then turn both ends together, thus exposing the raw edges, which may then be shaven evenly and rapidly. Gather the leaves in the evening for the morning meal. If rain threatens, gather sufficient for a day ahead and keep in a cool place, stirring now and then to prevent heating and fermentation. If it continues to rain for several days, the leaves must be dried either before a fire or by shaking up in a cool, airy place. If food is scarce, lower the temperature of the room, and the worms will eat less.

If the feeding trays are used as suggested, be careful to prevent the food from falling through the meshes, as the worms will content themselves with that which falls through, and will not rise from the trash.

(Fifth Age.)

MOLTING.

(See *Cuts* pages 14 and 15.)

In common with all caterpillars, the silk worm sheds its skin. It passes through this process four times. These periods are called moltings, and the interval between each is called an age.

From the time of hatching to the first molt is generally about five or six days, according to the temperature and care; five days from the first to the second molt, about the same time between the second and third, and six days between the third and fourth. The worms go through the first molt very easily. The fourth molt is the most difficult. In the molting state the worms are inactive, apparently asleep, or even dead. When this time approaches they lose their appetite and raise their heads; some curve so far back as to make head and tail meet. When disturbed they shake their heads as if impatient. If the worms have been kept even, that is, all eating at the same time from the very first feed, all will begin to molt at the same time; but, as it frequently happens, some begin molting before the others. When any of a batch are discovered in the torpid state, give a very light feed, cut rather finely. This will hurry up those that are backward. With the feeding trays suggested, however, it is easy to find the hungry ones and separate them from the molting ones, those that are molting being of the same age. No food should be given them until a goodly number are observed to be in motion, then only a light cut feed should be given. It is better to let them starve a few hours until all are through, as it will save a vast deal of trouble — still one must be sure not to begin starving too soon. Several very light feeds a day to keep the hungry ones from growing weak, will be necessary. Those that are molting do not eat, and leaves placed over them are apt to sicken and suffocate them.

It is difficult to distinguish a worm just coming out of the molt from one which is approaching to that period. An observant person will know a worm that has undergone the transformation by its lighter color. Its snout

too changes in color and becomes twice its former size. The snout is the only part of the body that grows no more till the next molting. The certain growth of the nose or snout shows a great difference remarkable among all others between the two worms at all the moltings. It is easily remarked by placing the worm that has just molted beside the worm about to molt, side by side. If the worms on the trays should become mixed, watch and separate them. But the feeding trays, at the period of molting, ought to remedy this. It generally takes them about twenty-four hours to shed the skin, but much depends upon the temperature. The worms greatly increase in size after each molt, and consequently the space allotted to them should be doubled. It is well to cut the food fine while young, and coarser as they grow older; but if the leaf is of a fine quality and freshly plucked, they may be fed whole. One's own judgment must teach these little points.

Perhaps the best appliance in use for the purpose of feeding is that taken from Prof. Kerr's chart, represented by the accompanying diagram. It has been recently adopted extensively in France, from the Italian silk culturists of a little province (Frioul) on the North Adriatic near Trieste. To the floor and ceiling (or joists) are fastened a succession of parallel sets of five uprights, bars or sticks, (which should be $1\frac{1}{2}$, 2 or 3 inches thick); two of these sets are represented as touching the floor at 1, 2, 3, 4, 5 and 6, 7, &c. The uprights are about one foot apart in these sets, and the sets running the length of the room, about five feet apart, and the whole should be not less than two feet from the wall.

The uprights have sloping pins or nails driven into them $4\frac{1}{2}$ or 5 inches apart. On these as at A, A, A, A, and C, C, C, C, are laid a series of five bars or sticks, and across these, little rods or straight twigs; the first of these platforms may be 5 or 6 inches from the floor, and the next C, C, C, C, say 2 or 3 feet above that, and so on as high as one chooses to go; but two are as many as can be easily managed without steps. On these platforms are placed the papers or frames containing the young worms, up to the third (or fourth) age, and after that, the twigs or small branches of mulberry leaves with the worms. Note that all the timber of both room and apparatus must be *seasoned*.

The papers or trays containing the young worms may be laid on these platforms.

BRINGING ALL THE WORMS TO THE SAME AGE.

The evenness of the silk worm is of the greatest importance. The age of silk worms is counted by the number of meals they have eaten, and not by the days they have spent from their birth. Their appetite depends upon the temperature. At a cold temperature they are benumbed and eat but little. Hence the rule to feed plentifully in warm weather. The more rapid the breeding, the sooner one is freed from the labor and care incidental to a crop. Some leading breeders say: give fire, air and leaf. In Louisiana our climate furnishes us with air and heat, therefore we have only to keep clean, give plenty of space and leaf.

In order to bring the worms to the same age, take the first day's hatch, place them in a room where it is somewhat cooler than the others are. Feed them only twice or three times a day, meanwhile feed the second day's hatch five or six times a day till the second hatch overtakes the first; then carry the second hatch to the cooler room to join the first, and both are then fed alike but twice or three times a day. The third and fourth may be

pushed forward in like manner by warmth and numerous feeds until all are of the same age and may then be treated alike. They should all go, if possible, through the molt at the same time, then all will go to spinning at the same time. The above has been copied from Mr. Crozier's book on silk culture.

This mode of proceeding requires much care for several days, but it will pay in the end by shortening the number of days of a crop. The above process is not, however, absolutely necessary, and can be dispensed with by parties who do not sufficiently understand how to carry it through. It will only make a difference of a few days, say ten at most, in the result.

SPINNING.

When ready to make their silk, which is eight or ten days after the fourth molt, the worms cease to eat. They become restless, empty themselves, grow smaller in size, and assume a transparent yellowish hue. When any are observed in this state, give a few light feeds to hurry up the entire batch. Some arrangements must then be made for them to spin. If you have but a few, paper cases three or four inches long will do; drop a worm that you are quite sure wishes to spin, into one of those cases and close it at both ends. These make very pure clean cocoons.

If, however, you have a great many, it will be necessary to have light twigs, or rice straw placed very loosely over the twigs on each side of the feeding trays, so that the worms may quit eating whenever they please and go into the branches. The best material we have found for this is the small cane reeds that grow in low places. Cut the reeds near the limbs, so as to bring them low to the shelf. Stand the cane stems on the lower shelf and press the brushy portion up under the shelf above. Two rows, with the branches well and firmly fastened above, forming arches (similar to cut on next page) about fourteen inches

apart is about the best arrangement one can make for the worms to spin upon; but loose straw or wood shavings laid loosely around them will also be used by the worms.

As the worms begin to spin see that no two spin together, as double cocoons can not be reeled. Some breeds of silk worms are much quicker than others in finishing their cocoons, the Japanese green is perhaps the healthiest of all breeds. Their cocoons, however, are small. It generally takes from three to four days for the worms to finish spinning their silk; by taking a cocoon and giving it a gentle shake, if ripe, it will rattle as though a loose pea-nut were in the nut shell.

If the weather should happen to be cool during spinning time, warm the room and keep its temperature at about 80° until the worms are done. This is to facilitate the exudation of the glue which produces the silk.

SUMMING UP.

- To sum up the principle points in silk culture,
1. Have good and healthy eggs.
 2. Have them hatch well and in due season.
 3. Keep as many worms as possible in a uniform state of progress so that all will molt together.

4. Feed regularly, plentifully according to directions given.
5. Give an abundance of fresh air.
6. Keep a uniform temperature avoiding sudden changes.
7. Give plenty of room and avoid crowding.
8. Preserve the greatest cleanliness at all times.
9. Give food of the right kind. The white mulberry being far the best of all kinds.
10. Give fresh leaves—not wet with dew or rain—not dusty nor wilted.

GATHERING AND SORTING THE COCOONS.

In eight or ten days after the commencement of the spinning, the cocoons are ready to gather. Separate the arches of brush carefully. Remove first all discolored and soft cocoons, keeping these separate from the firm sound ones. If kept together the latter would be discolored and much depreciated in value. Tear off the loose (floss) silk which envelopes the cocoons.

CHOKING OR STIFLING THE CHRYSALIDES.

In twelve or fifteen days from the time the worms begin to spin, the moth, or butterfly will issue from the cocoon, and in the process the strands of silk will be cut and spoiled. To prevent this, the chrysalis should be killed—*stifled*. This is commonly and best accomplished by steaming, but as that is troublesome and difficult, without proper appliances, in our climate the stifling may usually be effected by exposing the cocoons to the rays of the hot sunshine from 9 o'clock until 4, for two or three days. A longer time is needed if there is much air stirring, or

the sunshine is not strong enough. The process is surer if conducted in a shallow box under glass, with a crevice for the escape of moisture. In either case guard against ants.

The stifling should be attended to as soon as the cocoons are gathered, lest cloudy weather should intervene. In this case, (and perhaps better in any case) the result may be reached by packing the cocoons in a barrel, carefully lined with paper, so as to be nearly air-tight, with alternate sprinkling of camphor, roughly granulated in the hand, beginning with camphor on the bottom, then three or four inches of cocoons, again camphor and so on, finally closing the barrel for two or three days; using about a pound of camphor to the barrel.

After two or three days spread the cocoons on boards or shelves to dry in an airy room or attic, stirring frequently the first two or three days, and afterwards occasionally, for about two months, when they will be thoroughly dry and may be packed for market. Guard must be well kept against rats and mice, ants and smaller insects, which will penetrate the chrysalis and injure the silk. The latter may be expelled by sprinkling of camphor or by the bark of the sassafras root, or chips of red cedar, tobacco stems, etc., etc.

The above is Professor Kerr's method, yet we think a simple homely way of steaming may be adopted by any housewife who has a large boiler, and an open work basket of any kind. Set the basket containing the cocoons over the boiling water; throw a piece of blanket over the whole, or better still if it can be so arranged as to let the basket into the boiler (but not so low as to touch the water) and all be covered together; not a great deal of water being necessary as it is the hot steam that kills the chrysalids. The water should be boiling before placing the cocoons over it. Stir from the bottom occasionally. In about twenty-five minutes the chrysalids will be dead. Open one or two, and if they no longer move they are dead. Take the cocoons from the boiler and spread them out to dry in the sun, stirring now and then.

THE COCOON.

The cocoon is composed of one continuous thread. The usual size of cocoons raised in this country is somewhat smaller than a pigeon egg—though some breeds produce much larger ones. The shape is oblong with well-rounded ends, and the handsomest ones have a constriction in the center. It is difficult to determine which cocoon contains a male or female chrysalis, however, the larger cocoons, as a general rule, contain the female, as she being full of eggs, of course, requires more room.

The silken cords and cables by which the worm attaches his cocoon to the branches in order to secure it, is the loose floss silk, which commands a small price in market. The real silk is the hard firm shell which surrounds the chrysalis. This shell is formed by the thread from the mouth of the worm which he lays in loops like a figure 8, and as it hardens instantly after leaving his mouth—it becomes a hard shell. The worm continues to turn and spin in small patches as it were until he gets the outside shell formed. He may be seen fitting himself to it, stretching his full length, and holding himself thus while the shell hardens into shape; he then continues to spin layer after layer until all is out of his body, and then sleeps until his resurrection with wings. The thread on these cocoons vary according to vigor, size and breed of worms; some run as high as eight hundred yards.

RAISING OF THE EGGS.

To raise silk-worm eggs for the market, the greatest care is necessary. Select the finest cocoons; those that are most elegant in shape are slender in the middle and roun-

ded at the ends. They must be firm and hard. The soft cocoons should always be removed, as they are defective, the worm having died before completing his cocoon.

If the breed be white, select the purest white, if yellow, the straw colored, or nankin yellow are preferred; if Japanese green, take the sharpest green.

Having selected the cocoons for seed, thread a needle with a strong, but not coarse thread. Pass the needle through a thread or two of each cocoon, being careful not to pierce deep enough to injure the chrysalis, and proceed to string a sufficient number of cocoons to form a wreath or chaplet of convenient size, by tying the ends of the thread together. Suspend these chaplets upon a rod, or stick nailed to, but projecting from the wall in order to keep ants and mice from them. The object of the wreath being to secure cleanliness.

The butterfly comes forth in ten or fifteen days, according to climate. The males are easily distinguished from the females, they are smaller, more slender, with incessant fluttering of the wings. The females are more quiet, they are heavy bodied, being full of eggs. The moths do not fly, and as they come forth every morning, generally they will all be paired or mated by half-past eight. If as it sometimes happens they are some distance from each other, bring close and they will immediately pair.

As soon as your moths are paired, take them, male or female, by both wings, set them upon a piece of blotting paper, pasteboard, or unbleached cotton cloth tacked against the wall or suspended from a rod in a darkened closet or corner, (always mindful of spiders, ants, roaches and mice). If kept in the light, the males keep fluttering

and are apt to be uncoupled and thereby prevent impregnation. They should remain together for six hours, after that they should be separated. Watch them carefully during the six hours to see that they remain together. Should there be more males than females do not throw them away, but preserve the handsomest in a box as some days there may be more females, and they will be needed.

If any moths come forth stained, badly shaped, or looking as though they had been burnt or blistered, and with not enough down or feathery substance upon them—throw them away at once, as they are evidently touched with disease. When large quantities of eggs are produced and many moths are to be uncoupled—always place a gauze veil over the face—as the fluttering of the wings sends forth a kind of down that is not agreeable and from which one can protect himself by the veil.

Take a piece of rather stiff blotting paper, about fourteen inches in length and eight inches in width; tack against the wall so as to let the top extend outwardly after the manner of hanging a mirror or picture frame. The object being to secure cleanliness, as the droppings of the butterflies if allowed to fall upon the eggs, would discolor them and render them unfit for market. Upon this piece of blotting paper, place one hundred and fifty females. they will produce, provided the worm was well fed. one ounce of eggs. The moth will stick to the blotting paper until removed.

Care must be taken to weigh the blotting paper or cloth used to receive the eggs before the moths are placed upon it, in order to ascertain the exact weight of the eggs deposited.

KEEPING OF THE EGGS.

Keeping the eggs from hatching too soon, and also keeping them in proper condition, is of much importance. The eggs should be kept *dry*; they should have air to keep them from molding. There is no danger of eggs

hatching under seven or eight months, even if kept in a kitchen with fire in it, they are like fresh eggs; but as the weather becomes cool the worm begins slowly to form, and in December, a few of the hardiest will begin to hatch; and all through our Southern winters, a few will hatch out on warm moist days. If we had food for them in sufficient quantities we might proceed to hatch out a number and rear them; but as a frost may come any day and kill the leaf, if any should be out, we must not venture upon hatching the eggs too soon. If the eggs could be kept at a temperature of from 45° to 50° F. and have air, up to the time of going regularly to the hatching they would be in a very good condition. Experiments have been made in New Orleans of keeping the eggs hermetically sealed in a tin box kept in ice, and proved complete failures.

The most certain mode of keeping the eggs according to Mr. Rochi, is to send them to some reliable party in the North where they can be kept in dry cellars. A perforated tin box containing millions of eggs may be sent by express for twenty-five cents, to New York, Boston or any other place of same temperature. When ready for them they can be sent for, and will begin to hatch in a day or two after they reach the gulf States.

The eggs must be protected from rats and mice, roaches and a very minute insect that seems to infest them in our climate. I have kept the eggs in a very fine condition, (with an occasional loss of a few during warm days in winter) by simply sealing them in large envelopes and suspending them in a cool airy place.

REGULATING THE HATCHING OF SILK-WORM EGGS.

Duclaux, after a careful observation of the external conditions which favor and influence the hatching of the eggs of silk worms, has prepared the following rules, by attention to which it is said that the development of the eggs can be regulated at will. First to prevent an egg from being hatched at the usual time, it must be kept,

from the period of being laid, at a temperature between 59° and 68° F., and then exposed fourteen days to cold, three months before the time at which the hatching is desired, being subsequently treated in the usual manner. To cause an egg to hatch before the usual time, it must be exposed to cold twenty days after being laid, and kept in that condition for two months, and then removed. Six weeks later it will be in the same condition as an ordinary egg, and can be treated in the same manner. In this way it is possible to have silk worms ready for hatching at any season of the year.

DISEASES OF SILK WORMS.

I do not think it worth while to enter into a minute description of the diseases of the silk worms, as no remedy, so far, has been discovered for any of them. Pebrine is a disease indicated by black spots upon the worm, and the caudal appendage looks as though it had been burnt.

Mr. Pasteur, after long and careful experiments has established the fact that corpuscles are a symptom of pebrine, and excluding each moth invaded by corpuscles from the production of eggs, he almost succeeded in regenerating the race of silk worms.

Blight—*flacherie*—or death by fading or withering, is one of the most dreadful diseases. In most cases, the symptoms commence with a kind of numbness. The worms cannot eat, but show a disposition to leave the tables, wandering off the edges as if to escape. This disease is hereditary and contagious, and any worm showing symptoms of disease should be immediately removed. Flatness is a dreadful disease which attacks the worms just as they are ready to spin. This disease is said to be accidental and sometimes hereditary, but it is not contagious. The *Muscardine* is known by a peculiar floury substance coming upon the worm after death. It is caused perhaps from dampness; bad ventilation, breeding, fermentation

of the accumulated leaves. If the eggs procured are free from disease, the silk culturist need only take care to preserve good hygienic conditions and he is not likely to be troubled with disease among his worms.

ENEMIES TO SILK WORMS.

Rats and mice are very fond of silkworms, and will use every means to reach them. One rat will destroy hundreds of them in a single night. Ants, also, must be guarded against. The red ant is very destructive, eating them gradually, and stinging them to death. Birds will also fly into the cocoonery and seize them almost before your eyes. Tobacco smoke or tobacco smell is death to silk worms. I placed a few young ones in a box that had once contained cigars, but which had been emptied for over a year, but about which still lingered a faint odor of tobacco. The worms all died.

TEMPERATURE.

The first point in raising silk worms is temperature. The worm needs a warmth of 85° for hatching, 75° while feeding. and 80° while spinning. These temperatures are not indispensable, but they are the best. The following table shows the temperature of every month, at various points in the United States, and at certain cities in silk districts of the world:

PLACES.	January.	February.	March	April.	May.	June.	July.	August.	September	October.	November.	December.	Average of Year.
San Francisco.....	49	51	52	55	55	56	57	57	58	54	54	51	54
Humboldt Bay.....	40	43	47	54	53	58	58	57	57	48	48	45	57
Monterey.....	50	50	51	53	56	57	58	59	59	54	54	50	55
San Diego.....	51	53	56	61	62	67	72	73	70	56	56	51	62
Sonima.....	45	47	51	53	62	65	66	66	67	58	58	46	58
Renicia.....	47	52	53	57	59	67	67	66	64	54	54	47	58
Los Angeles.....	52	55	58	..	..	73	75	75	75	59	59	60	..
Jurupa.....	54	54	56	62	63	70	73	73	72	57	57	52	63
Fort Jones.....	31	37	43	49	54	61	71	68	62	41	41	32	51
Fort Reading.....	44	49	54	59	65	79	82	79	71	52	52	44	62
Meadow Valley.....	34	32	41	..	61	66	71	68	57	44	44	32	..
Grass Valley.....	27	37	38	44	49	52	63	58	53	43	43	36	46
Sacramento.....	45	48	51	59	67	71	73	73	66	52	52	45	59
Fort Miller.....	47	53	56	62	68	83	90	83	76	55	55	48	66
Fort Yuma.....	56	58	66	73	76	87	92	90	86	64	64	55	73
Dalles.....	33	40	46	53	59	67	73	70	61	41	41	33	52
Fort Hall.....	24	24	25	42	..	..	..	63	59	34	34	22	..
Salt Lake City.....	27	34	39	50	63	71	76	75	67	41	41	31	52
Fort Defiance.....	26	30	38	46	51	69	69	67	56	36	35	29	46
San Antonio, Tex.....	53	57	63	69	76	80	82	83	79	61	61	50	69
Santa Fé.....	31	33	40	51	57	68	72	70	61	38	38	30	50
Laramie.....	31	32	36	47	56	67	74	73	64	35	35	28	50
Memphis.....	41	45	55	59	68	75	79	78	72	53	53	40	60
New Orleans.....	54	56	62	69	74	79	81	81	78	60	60	56	68
Charleston.....	50	52	58	65	73	79	81	80	76	59	59	52	66
Richmond.....	33	39	47	54	65	73	77	74	67	44	44	38	56
St. Louis.....	32	35	44	58	66	74	78	76	68	40	40	33	55
Cincinnati.....	33	34	43	54	63	71	76	74	66	42	42	33	53
Chicago.....	23	24	32	46	56	62	70	68	60	37	37	29	46
New York City.....	30	30	38	48	59	68	74	73	65	43	43	33	51
Nagasaki.....	43	44	50	61	69	77	80	83	78	53	53	47	62
Canton.....	52	55	62	70	77	81	83	82	80	65	65	57	69
Ambala India.....	51	60	70	80	99	96	84	86	84	64	64	56	75
Constantinople.....	41	42	44	50	61	69	76	74	69	59	56	41	57
Milan.....	33	38	46	54	63	70	74	73	65	45	45	36	54
Madrid.....	44	45	49	55	62	69	76	76	68	46	46	43	58
Toulouse.....	39	41	46	53	61	66	70	71	65	48	48	42	55

THE MULBERRY.

The silk grower must have food for the worms; this is the leaf of the white mulberry, which is the natural food of the silk worm, and of course produces the finest quality of silk, although a very good quality is produced by feeding on the leaf of the black mulberry, and also of the osage orange. The worms, however, should be fed on this leaf from the first, as I found that they turned in disdain from the osage orange leaf after having been fed on the mulberry.

There are a great many varieties of mulberry, but the kind known as the white mulberry, bearing an insipidly sweet white berry, is the best. This species which produces the most beautiful silk has leaves alternate glossy on the upper side, smooth on both sides, oval, tough, with a little heart-shaped cut at the base, denticulated on the edge.

The black fruit *Morus Multicaulis*, with great leaves as large as a dinner plate, soft, silky and fine, is excellent food for the worms while young, that is, in the first and second age; they should, however, be gradually withdrawn, and the white mulberry substituted, which being a little heavier and tougher is better as the worm grows older.

The mulberry is propagated from seed, cuttings and layers. The trees are said to be hardier and live longer when propagated from the seed. The white mulberry is said to grow best in light sandy or gravelly soil. Two hundred trees may be planted on an acre of ground. In three years they will yield, under fair conditions of climate, of soil and cultivation, fifteen or twenty pounds of leaves each, or more than 4500 pounds to the acre. (These calculations are made for the poorest soil, but in the rich lowlands of Louisiana the yield is far beyond this.)

The trees are generally dwarfed or trimmed low and bushy so as to render the labor less in gathering the leaves.

The manner of planting in California is well adapted to the rapid production of leaves. The cuttings with three

eyes each are placed in rows four feet apart, and six inches apart in the rows. The ground should be well cultivated and kept clear of weeds. According to Mr. Haynie, of Sacramento, about eight tons of leaves may be gathered the first year from an acre. The leaves should not all be picked off; at least three should be left. In a proper soil and favorable season the tree will have as many leaves ten days after having been plucked as it had before. A moist soil is necessary to start the growth of the cuttings; and after the tree is several years old it will stand the water as well as the willow. It is therefore in no danger from an occasional overflow.

I would like to call the attention of our farmers to the value of this tree. It grows to the height of forty feet and upwards, with a trunk from four to eight feet in circumference, and forms a beautiful shade tree. It grows rapidly and lives to a great age. The wood has a compact grain that takes a fine polish. It is good for vine and fence posts, as it lasts long in the ground; it is also good for coopers' work, making excellent barrel staves, said to be as good as oak. The bark yields a fine fiber, which may prove of great value in the future. In Louisiana the roots are sought for to make the prows and ribs of small pirogues and skiffs. Doubtless many other uses may be found to which this valuable tree may be applied, of which we know nothing.

PRODUCTION OF THE MULBERRY.

The first question asked by parties interested in silk culture is, "How many worms can be fed from an acre of mulberry trees?" In answer to this, I may say that a great deal depends upon the soil and climate.

Mr. Crozier, an old silk culturist in Louisiana, says that one acre after three or four years will feed from 80,000 to 100,000 worms, or two and one-half ounces; producing from 100 to 150 pounds of cocoons. These

calculations hold good in Louisiana, where the mulberry grows in one season from a small cutting to the height of from ten to twelve feet.

Mr. Fasnack, of North Carolina, where the climate is colder and the soil is less productive, says, that "one acre after three years will yield more than two thousand pounds of leaves. Eighteen hundred pounds of leaves will suffice for an ounce of eggs, that will produce from 50 to 75 pounds of cocoons. After seven or eight years the yield is ten fold."

Silk culture being a new industry in our country, we all have much to learn in regard to it, but enough has been shown to prove that it will be a valuable addition to our yearly crops.

YIELD PER ACRE.

From Agricultural Report of 1868.

An acre planted in mulberry trees, when four years old, should produce 5,000 pounds of leaves to the acre; that is 5,000 pounds suitable for feeding, and, during feeding time, without injury to the tree. Those leaves should feed at least 140,000 worms which will produce 70,000 female moths, and these will lay 300 eggs each, or 21,000,000 in all. After deducting 5,000,000 for possible loss, we have 16,000,000 eggs, or 400 ounces for sale, or \$1,600 per acre. In France the expense of breeding 75,000 worms, including the cost of the eggs, \$6, the leaves, \$28, the labor of two persons for forty days, \$64, fire \$4, and incidental expenses, \$10, amounts to \$112. Mr. Prevost says that one person can do all the work in California for 75,000 worms, and the expense to the farmer who has his own eggs and mulberry plantation should not exceed \$1 per ounce of eggs. At \$4 per ounce an acre would thus yield \$1,200 net. At \$2 per ounce, the common price in France for French eggs, the net yield would be \$400 per acre. Skillful French silk growers expect to get \$800 from an acre of mulberry

plantation. We have followed the best authorities in stating that 5,000 pounds of leaves will feed 140,000 worms, but some writers say 5,000 pounds to 70,000 worms; and their statement must not be left out of calculations. Let us now consider the profit that may be derived from the sale of cocoons. The acre will produce 140,000 worms, or, allowing 35,000 for loss, 105,000 cocoons, which will weigh 420 pounds, and be worth \$1.50 per pound, or \$630.00 in all.

PROFITS OF SILK CULTURE.

Three acres of ground planted in cotton require ten months' work, with mule and plow. These three acres would probably produce the farmer one hundred dollars over and above expenses. Say that the farmer has three acres planted in mulberry trees, one acre of mulberry after three or four years from the cuttings, can feed worms from at least four ounces of eggs. This should produce one hundred and twenty pounds of dried cocoons, at the lowest price say—one dollar per pound, it would bring \$120.00 to the acre, which multiplied by three would be equal to \$360.00 instead of \$100.00 realized in cotton by the planter.

This crop could be made in six weeks' time by the labor of the usually non-producers in the family.

GENERAL OBSERVATIONS.

I find that many persons imagine that silk worms are raised upon the trees in the open air. This would seem to be the most natural, healthy and least troublesome way if the silk worm had not so many enemies; but spiders, birds, rats and mice are very fond of them. Therefore it has been found impossible to rear them profitably on the trees.

Yet I think, if some one who could afford to do so, would experiment in this matter, that excellent results might follow. In Europe the worms have become so impregnated with disease that it is almost impossible to obtain healthy breeds, and many experiments are resorted to in order to regenerate them. One way that is being tried is to plant the trees near the house, and keep them dwarfed and bushy. When the eggs begin to hatch they are placed upon these trees, and the young worms soon spread themselves upon the tender leaves. A white cloth is suspended over the top of the trees to protect the worms from the heat of the sun, and from the dew, which is hurtful, and from beating rains, birds, etc. In this way they raise very active, healthy worms to breed from.

In connection with this idea I have thought how easy it would be for our planters, who always have plenty of sheds and shelter, to try some experiments with our native silk worms.

Last fall I gathered a number of native silk worms, of magnificent size. The silk though coarse, had a splendid lustre. It was also very strong. I found that the butterfly does not cut the thread in coming forth, as there is a small opening in the end of each cocoon for the egress of the moth. These cocoons were gathered upon the pecan, the common plum and the willow; showing that the worm had fed upon the leaves of these trees. In order to obtain any good results from these splendid specimens, it would be necessary to compel them to eat the mulberry leaf, else the silk would never be fine.

I suggest that some one gather a number of these silk cocoons and keep them in a comfortable room until spring. About the first of April, the butterfly of magnificent color and size will come forth. Let a square frame be made covered with mosquito netting, and place it over a dwarfed mulberry tree. Under this frame turn the butterflies loose. They can then be able to fly around and seem natural. They will soon mate, and deposit their eggs in about twenty-four hours. As they cannot escape to place them elsewhere, they will be obliged to leave them on the mulberry. In about two or three weeks from the time of laying the eggs, the young worm will hatch and will then

eat the food nearest it. This plan I beg some of our Louisiana silk culturists to adopt. If they succeed in obtaining but *one pair* that ate the mulberry, these will be worth their weight in gold. From this pair a splendid breed could be domesticated that would prove of great value to the owner. These worms are trivoltines laying and hatching at least three crops in the year.

GENERAL MANAGEMENT OF A COCOONERY.

It is necessary in all well managed cocooneries to have a thermometer and observe and record the temperature each day.

I would caution any one against the teachings of some treatises on silk culture in which it is claimed that silk worms can be raised in most any sheltered place. It may happen that some unusually fine spell of weather may enable one to raise a crop in this manner, but in our variable climate one cannot rely upon it.

A uniform temperature, as I have said, is very important if one wishes to do the business well. The temperature should never be allowed to fall below 68 or 70°, and at that temperature it should remain but as short a time as possible. If at any time during the education of the worms, the cocoonery should be overtaken by hot days make every effort to keep the mercury from going above 90°. To prevent this, the floor must be frequently sprinkled with cold water. This may prevent the jaundice or grasserie, a prevalent disease among silk worms in this country.

It is a good plan to accelerate the education of a crop of silk worms by all proper means. With the thermometer kept at 75 or 80°, a crop should be completed from hatching to spinning in 24 or 25 days. Of course good food, fresh and plentiful, should be on hand and freely given. A vigorous ventilation should be in every cocoonery—still there should never be a draft upon the worms.

It is a good sign of success when all the worms on the shelf or tray are of the same size. To accomplish this they must be made to molt and awaken as nearly as possible at the same time. The clearing of the litter every two days during the first and second ages, and every day the forth and fifth age, cannot be too much insisted upon. By all means keep the worms from getting too much crowded. Keep them apart. Do not let them pile up. Attend to this at whatever cost of time and labor.

Superficial Space required for Worms from one Ounce.

First Age,	1 sq. yard.
Second Age,	3 sq. yards.
Third Age,	6 to 7 sq. yards.
Fourth Age,	15 to 18 sq. yards.
Fifth Age,	30 to 36 sq. yards.

PIERCED COCOONS AND FLOSS SILK.

Pierced cocoons and floss silk may be prepared for market by soaking them in water for three or four days. Then boil them in weak lye water for half an hour or more.

Wash them clean in several waters. Pull the silk and spread out to dry. When perfectly dry they may be carded like cotton and spun if desired.

In this condition the articles will command a better price.

REELING.

It is by no means an easy thing to reel silk. There are certain rules and quantities required by manufacturers, which it would be difficult to teach in a book of this kind. The only way to learn how to reel silk is to

see the operation performed. It would be better for the present for parties raising cocoons to sell them to large steam filatures or to associations that will pay a remunerative price per pound. There is always a sale for cocoons. A lady having plenty of spare time might go to the trouble of reeling silk, and find after all was finished, that it was not reeled in a proper manner and all her time had been thrown away.

I consider that the rearing of silk worms ends with the gathering of the cocoons, therefore I advise all parties engaged in silk culture to attempt no more.

I annex a cut and description of a reel, which is copied from Miss Rossiter's excellent little work on silk culture, in order to give an idea of the process, and enable those who are desirous of reeling their own silk, to form some idea of what is necessary :

"Raw silk is divided into three classes, "organzine" "tram" and "floss". "Organzine" is well twisted and is the choicest ; "tram," made from inferior cocoons, is but slightly twisted ; "floss" is made from loose silk carded and spun like cotton. The persons reeling silk are generally women, one of whom sits or stands before each basin of which she has entire charge. The basin is made of tin or copper, heated by a charcoal or oil fire. In large establishments the water is heated by steam.

The cocoons are plunged in the water when it is near the boiling point, and are moved about so that the gum which fastens the threads is thoroughly softened. They are then stirred or beaten with a small bunch of birch twigs with split ends, or with pieces of broom corn tied in a bunch, to which the ends of the threads will attach themselves. The reeler will then shake the cocoons till each one hangs by a single thread. She now takes up five or more threads, according to the quality of silk wanted, unites them, and puts the combined strand through a little glass eye, or large glass bead, fastened to one side of the reel-frame. She then forms a similar strand and puts it through another eye on the other side. The strands are then brought together, twisted several times, separated above the twist and put through two other glass eyes or wire loops through which they run, one to each end of

the reel, which is kept revolving in a steady, rapid manner, and to which is given a sideways motion which crosses and re-crosses the silk in such a manner that it will not stick or glaze. The uniformity of the thread depends entirely on the skill of the reeler, who must attach a new thread as soon as one breaks or a cocoon gives out. This is called nourishing the silk, and is done by dexterously attaching the new thread to the combined strand to which it immediately adheres. In this much judgment must be used, for as the silk on a cocoon gets lighter and finer as it nears the end, the uniformity of the strand does not entirely depend on the number of individual threads forming it. When the silk comes off the cocoon in bunches, the water is too hot; when it unwinds with difficulty it is too cold, and it must be regulated as the operator sees it necessary. This is the operation of reeling; but before the skeins as they come from the reel are ready for the manufacturer, they must be passed through a cleanser — a clasp lined with cloth which catches any loose silk or other matter adhering to it. It is further cleansed by being passed through four similar cleansers, twisted about five hundred times to the yard, doubled and again twisted four hundred times to the yard. It is finally run on reels about one and a half feet in diameter — then taken off and twisted in knots or hanks in a peculiar manner. Through all these operations the oscillating motion is continued, to produce the crossings of the strands. In the end it will be seen that it takes five or more of the simple threads spun by the worm to compose the staple thread.

IMPROVED LOMBARDY HAND REEL.

This cut represents a hand Reel, set up, and ready for work. Though made on the same principle as the old French Reel of forty years ago, it is as good as any now in use. The reeler sits on the stool in front of the pan. The other stool is occupied by the one turning the crank.

DESCRIPTION OF CUT.—*a* Tin basin with copper bottom, for holding water, in which cocoons are soaked. *b* Square tin tray for reception of cocoons. *c* Short stick inserted in a holder (*d*) on which the ends of the cocoons are wound so as to be ready for use. *e* Spicket to leave water off from the basin. *f* Door of furnace wherein fire is lighted to heat water in *a*. *g* Flue Pipe—This is necessary to carry off the fumes of charcoal, etc., which should be carried into a chimney or the open air, (gas or oil stoves are often used for the purpose of heating the water). *h h* Glass eyes on wire holders, through which the threads from the cocoons pass to the pulleys at *k*. *i* A former arrangement for twisting the threads. This is now discontinued as unnecessary, since the twists given to the threads at *k*, and continued downward, effects its purpose. This twist is effected by passing one thread around the other, as shown in small drawing of pulley *k*. *kk* Rollers or pulleys revolving on bent wire holders, between which the threads pass to reach *o*. *n n* A grooved arrangement, by which the long guider working to and fro distributes the threads to the reel. Unless the thread be wound in this way it cannot be unwound at the mills. *o* The top of the reel on which the silk is wound. *p* Handle of machine.

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Books are open for orders for Silk worm eggs and mulberry trees. Parties interested in the silk business would do well to send orders at once.

The mulberry trees or cuttings may be successfully planted from the dark of the moon in August until May.

I have on hand a few ounces of a breed of silk worms which I have named the "Louisiana Breed." The cocoon is of magnificent size and lustre, and this breed has been reared in Louisiana for 38 years. I have also a quantity of fine eggs of French, Japanese and Italian breeds. All warranted free from disease.

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