The Cocoanut Tree.

This palm does not grow spontaneously on Key West or on any of the other Florida islands, as the violent north winds which often prevail in winter reduce the temperature of southern Florida too low for this heat-loving tree, although when planted and cared for while young it grows to a moderate size on the keys, and sometimes bears fruit; otherwise the nuts which are cast upon those shores by the Gulf Stream would have produced plants that would gradually have covered them, for it is in this way that the cocoanut has been able gradually to spread over all the sandy coral shores of the tropics of the two worlds. The place of its first home is uncertain. It was believed by the younger Candolle to have first appeared on some of the islands of the Indian Archipelago, whence it was carried either by ocean currents or by man to the southern coast of Asia, east tropical Africa, and to the islands and shores of Pacific tropical America. Undoubtedly it was brought by man to the West Indies and Brazil after the discovery of America by Europeans, although it has now so spread, through the action of ocean currents or by the agency of man, that it has every appearance of being indigenous on the shores of east tropical America.

The cocoanut palm is a magnificent plant, well named "a prince of the vegetable kingdom," with tall, slender columnar stem eighty or a hundred feet high, and rich pale yellow-green leaves which are thirty or forty feet long, and flutter and rustle with every breath of wind.

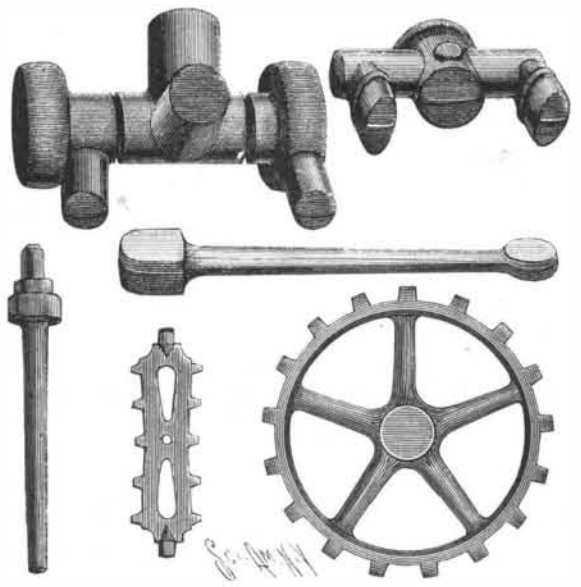
The cocoanut grows only near the shore, where its roots, penetrating the sandy soil, may drink freely from clear underground springs. Of all trees it is the most useful to man, furnishing food, shelter and employment to hundreds of thousands of the human race. In tropical countries, especially in southern India and Malaya, the cocoanut supplies to whole communities the chief necessities of life. Every part is useful; the roots are considered a remedy against fevers; from the trunk houses, boats and furniture are made; the leaves furnish the thatch for houses and the material from which baskets, hats, mats and innumerable other articles are made; the network of fibers at their base is used for sieves and is woven into cloth; from the young flower-stalks a palm wine, called toddy, is obtained, from which arrack, a fiery alcoholic drink, is distilled. The value of the fruit is well known. From the husk, which is called coir, commercially, cordage, bedding, mats, brushes and other articles are manufactured. In the tropics, lamps, drinking vessels and spoons are made from the hard shells. The albumen of the seed contains large quantities of oil, used in the East for cooking and in illuminating; in Europe and the United States it is often made into soap and candles, yielding, after the oil is extracted, a refuse valuable as food for cattle, or as a fertilizer. In some parts of the tropics the kernel of the seed forms the chief food of the inhabitants. The cool, milky fluid which fills the cavity of the fruit when the nut is young affords an agreeable beverage, and the albumen of the young nut, which is soft and jelly-like, is nutritious and of a delicate flavor.

As might be expected in the case of a plant of such value, it is often carefully and extensively cultivated in many countries, and numerous varieties, differing in the size, shape and quality of the fruit, are now known. The cocoanut is propagated by seeds; the nuts are sown in nursery beds, and at the end of six or eight months the seedlings are large enough to plant. The plants are usually set twenty-five feet apart each way in carefully prepared beds filled with rich surface soil. Once established, a plantation of cocoanuts requires little care beyond watering, which is necessary in its early years to insure a rapid and vigorous growth. In good soil the trees usually begin to flower at the end of five or six years, and may be expected to be in full bearing in from eight to twelve years. Thirty nuts from a tree is considered a fair average yield, although individual trees have been known to produce an average of three hundred nuts during a period of ten years. An application of manure increases the yield of the trees, although probably the value of the additional crop obtained in this way is hardly large enough to justify much expenditure.

In recent years the cocoanut has been cultivated on a very large scale in British Honduras, Jamaica and other parts of Central America, as well as on the northern coast of South America and the West Indies. The consumption of cocoanuts in the United States has become very large, as many as twenty millions being imported to this country every year. They are brought largely in steamers with other cargoes, although there are sailing vessels engaged in this trade exclusively, and last month two schooners discharged in this city, respectively, 170,000 and 260,000 nuts. Those which come from San Blas are considered the most desirable, since they shell more easily, while the meat is richer in oil and retains its flavor longer than others. Those from Baracoa are larger, but they lack oil and flavor, and cost less. After they are unloaded the nuts are sorted here and divided into three grades, according to size. The present price for select nuts from San Blas is $28.00 a thousand, from Jamaica $25.00, and from Baracoa $20.00, while the other grades are correspondingly lower; the lowest class, known to the trade as "eggs," brings only $10.00 a thousand. More than one-half of all the cocoanuts imported are bought by the confectioners, a single firm in New York using as many as forty thousand a month, and it is possible to fill this large standing order because importations are made all the year round. Of the remainder the larger portion goes to the desiccating establishments, while only a few are now sold in the stores in their natural condition.—*Garden and Forest.*

BICYCLE DROP FORGINGS AT THE CYCLE SHOW.

The production of drop forgings may be considered a distinctively modern development in metallurgy. Where a large number of pieces of identical shape have to be produced, such method becomes most available. The original dies are expensive, though their manufacture has been cheapened by utilization of the die-sinking machine, a tool which resembles a drill press, but which is provided with mechanism for feeding the die while it is being cut by a species of drill. In some cases a good deal of hand work is required to finish the die. For each forging operation a pair of dies are needed. One is mounted in the hammer head, the other on the anvil, and they are accurately adjusted so as to come together in the precise position required. Three classes of dies are used. The breaking-down dies are employed for the first attack upon the metal, to bring it to its approximate shape. These require special skill in their designing, the problems of approximating to the final shape being often very difficult. The finishing dies are the precise shape of the finished article with due allowance for shrinkage if required.



J. H. WILLIAMS & CO.'S BICYCLE DROP FORGINGS.

Finally, the trimming dies for removing surplus metal from the forgings may be applied.

It is not every forging which requires all three classes of dies. A single set may complete a simple shape. Where great accuracy is required, cold stamping is applied. This gives a finish to within 0·001 inch of the desired dimensions.

The testing of the finished dies before use is accomplished by pouring melted lead into their cavity, giving a casting which accurately represents the product they will give in steel.

At the recent bicycle exhibition held in this city, much attention was excited by the exhibit of drop forgings of the firm of J. H. Williams & Co., of Brooklyn, N. Y. This included a variety of bicycle parts aptly designated the "keystones of the wheel," so smoothly finished as to be almost ready for the nickel plater or enamel oven.

Some typical forms are shown in the accompanying cut. The sprocket wheel, pedal pin, pedal foot plate, crank arm, crank bracket, and front fork crown are shown. As they leave the dies, the pieces are almost perfect. On the round pieces, such as the pedal pin, no fin exists. A little polishing, boring out, turning and threading in places, completes these articles. It is clear that the day of castings in bicycles is gone forever.

Rustless Coating for Iron, Tinning and Enameling.

The following is a translation given in the *Journal of the Society of Arts*, by Mr. Frederic W. North, of a paper read before the Paris Societe d'Encouragement by M. Octave de Rochefort-Lucay, on the new Bertrand processes for coating with magnetic oxide and enameling iron and iron carburets, and on a new process of tinning for cast iron.

Messrs. Barff and Bower were the first to practically coat iron, steel, and cast iron with magnetic oxide, so as to form, at the cost of the metal itself, the protective layer that is obtained usually from paint, or from enameling, etc., with a thin coating of a metal that is not oxidizable.

The Bertrand processes are more simple than those of Bower and Barff, and are based on a new discovery in chemistry, and may be stated thus: If a thin adherent film of another metal is formed on the wrought iron or on the cast iron, and this iron or cast iron, heated to 1,000°, is exposed to a current of oxidizing gas, the oxygen penetrates through the film, oxidizes the iron or the cast iron, and under these conditions, magnetic oxide is the result. The formation of magnetic oxide, thus obtained, continues indefinitely, and the thickness of the coating of oxide increases according to the period of exposure to the oxidizing current, provided the temperature remains at about 1,000°.

As to the film of metal deposited in the first instance, it disappears in some obscure way, forming oxides which mingle with the magnetic oxide or volatilize according to the nature of the metal of which they are composed. M. Bertrand had then to find the best metal and the best method for depositing it on the article to be coated, and he has found that bronze, a mixture of copper and tin, gives, from a practical point of view, every satisfaction. For depositing this bronze on the wrought iron and cast iron, M. Bertrand uses electricity or wet baths, and uses sulphophenolic acid.

The following is the method adopted in the Bertrand manufactory for an oxidation: The article is cleansed (the cleansing is not indispensable), then dipped a few moments in a bath containing a solution of sulphophenate of copper and tin. The coating of bronze being formed, the article is immediately washed with cold water and dried with sawdust. The article dried is put into a furnace. Oxide forms, and at the end of fifteen to thirty minutes (according to the articles) the article is taken out, sufficiently oxidized. The coating produced varies from $\frac{1}{10}$ to $\frac{1}{5}$ of a millimeter.

M. Bertrand uses electricity to ascertain if the coating is of sufficient and uniform thickness, and in doing so he makes use of bells. If in putting the two wires in contact with the oxidized article the bells ring, the current passes—the oxidation is insufficient; if it remains silent, the oxide formed is of sufficient practical thickness, because it prevents the electric current from passing.

Process for Tinning Cast Iron.—M. Bertrand has also used sulphophenolic acid to obtain tinning on iron. He dissolves salts of tin in a mixture of water and sulphophenolic acid at the rate of 1 per cent of tin salt and 5 per cent of sulphophenolic acid. In this mixture the article, which is previously cleaned, is dipped; and is at once covered with an adherent coating of tin, and afterward by the means of rotating brushes in wire and cloth, the coating of tin is polished, and a result obtained which is both effective and cheap.

Process for Enameling.—There are not more than two processes for enameling cast iron. In the first, called hot, the iron, heated to a vivid red, is powdered with a flux powder (borosilicate of lead), distributed with a sieve, then it is heated, and when the flux fuses, it is powdered afresh with glass more soluble, forming the glaze of the enamel. This process, the only direct enameling, is dangerous to the operator, and even impossible for large articles, nor does it allow of decorations. The second process consists of dressing the cast iron either by three distinct and successive operations in the furnace with a kind of pottery. In the Bertrand enameling, the article is first coated with magnetic oxide, then dipped in borosilicates of lead, colored by metallic oxides, in which is added a little pipe-clay in order to give rather more body. The article thus covered cold, by dipping or with brushes, is put into the furnace; the enamel adheres and vitrifies at the usual furnace temperatures used by enamelers. By putting a coating of colored enamel with a brush on a first coat simply plain, it is possible to make any decorations desired, which may be burnt in at one operation for outdoor vases, etc. These results, due to the first oxidation with magnetic oxide, are remarkable, as much for the color as for the tenacity of the enamel and its resistance to rough usage.

Chemical Method of Engraving on Wood.

M. Delaurier, in the course of his business, employed wooden agitators to dissolve the bichromate of potash or other salts, which he put into a mixture of sulphuric acid and water. These agitators gradually dissolved, without being carbonized, as would be the case with sulphuric acid alone, especially if at all concentrated; and without softening, either, as with nitric acid. M. Delaurier has not endeavored to ascertain why this should be so, although he has no doubt that the investigation would be of scientific importance and of interest to trade, but he suggests that his observation be utilized for a method of engraving on wood, the block being coated with a resist varnish, the design being drawn in with a point as when engraving on metal, then to etch away the wood by immersion in the following mixture:

Sulphuric acid	4 parts.
Soda bichromate	1 part.
Water	6 parts.

M. Delaurier made the experiment with perfect success.—*British Lithographer.*