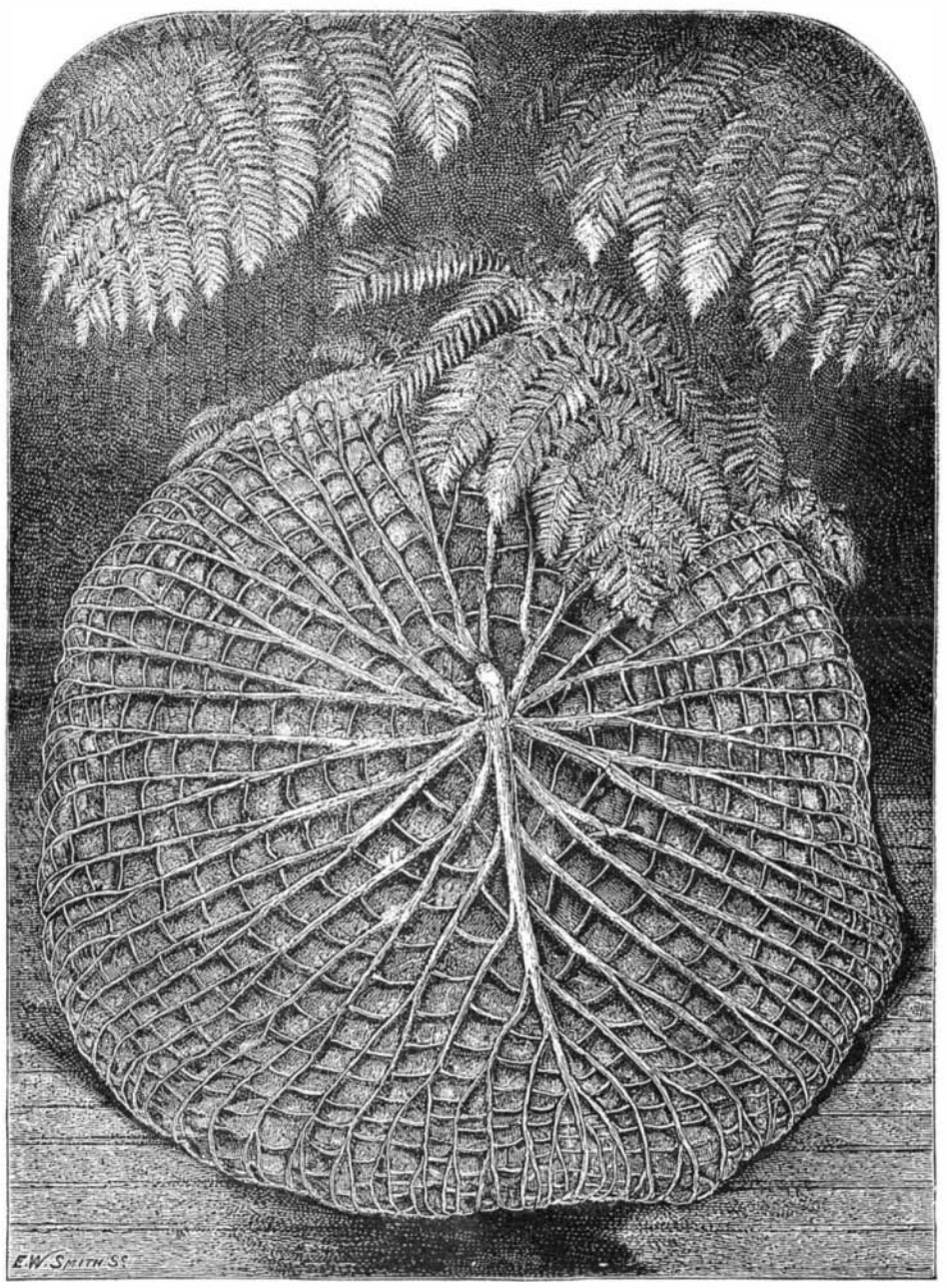
THE VICTORIA REGIA.

This remarkable water plant is found growing with great luxuriance on the Panama River, and other streams in South America, where it reaches gigantic proportions. Its leaves float upon the surface of the water, are of circular form, in some cases ten feet in diameter, the outer edges turned up, to the extent of from 2 to 6 inches, so as to present the appearance of a great pan. The strength and buoyancy of the leaf are so great as to support on the water the weight of a man. In a properly warmed hot house, the plant may be readily raised from seeds in suitable water tanks, and when thus produced the growth and expansion is a most interesting study. The water is kept at a temperature of from 75° to 80°. The flowers are from 10 to 12 inches in diameter, on first opening white, but soon changing to clear rose pink, delightfully fragrant. Our engraving is from the *Gardeners' Chronicle*, and represents a leaf from some plants that were recently grown with much success at Cherkley Court, England.

Reference to our illustration will serve to give a good idea of the marvelous strength of these leaves when in vigorous condition, as at Cherkley Court. The secret of their great buoyancy is to be found on the under side, where a wonderful provision of nature for sustaining the gigantic leaves, even in troubled waters, is arranged along the entire system of ribs and nerves. Strong cellular structures, as in Euryale ferox, follow every nerve of the leaf, being thickest near the stalk and gradually tapering off to the edge of the blade, acting like continuous cork floats all along the ribs, the greatest sustaining power being placed exactly where most needed—near the leaf stalk—so as the better to counteract or break the force coming from any sudden rise or fall of the water level. Indeed, the whole plant, from the root to the flower, is a study of nature's engineering.



UNDER SURFACE OF LEAF OF VICTORIA REGIA.

American Pumps for the Soudan.

While some of the best authorities in England express approval of the placing of the order in this country for pumps to be used on the Suakim-Berber route, there are others who seem to find material therein for a good deal of carping criticism. The order was for six duplex Worthington pumps, of a size larger than usually made or ever kept in stock in England, and the subcontractor who had engaged to supply them naturally felt more confidence, where pumps were required to work under a pressure of upward of 1,000 pounds, in thus coming to a firm which had long experience and an established reputation in just this kind of work. Nevertheless, according to the *Ironmonger*, "various makers of pumps have protested against the order being sent to the United States, especially at a time when trade is in such a depressed condition at home," and our contemporary quotes a leading firm as saying "that they could have guaranteed delivery of six duplex pumps, equal in capacity to those purchased in America, within thirty days, at a cost of about £2,000, instead of the £4,000 given to the American firm."

As against this view of the case, however, a statement was made in the House of Commons to the effect that "the duty required of the pumps in question was so great that there was not the slightest chance of any suitable for the work being in stock in England, and many months would be required to make them." The uses to which the pumps are to be put are such as to leave no time for experiment, and any failure to do the work required of them would be disastrous; therefore American pumps have been chosen, although, as it seems, to the mortification of some of the English pump makers.

THE SHARPENING OF TOOLS.—Instead of oil, which thickens and smears the stone, a mixture of glycerine and spirit is recommended. The proportions of the composition vary according to the class of tool to be sharpened. One with a relatively large surface is best sharpened with a clear fluid, three parts of glycerine being mixed with one part of spirit. A graver having a small cutting surface only requires a small pressure on the stone, and in such cases the glycerine should be mixed with only two or three drops of spirit.

Steel Taking the Place of Wrought Iron.

Few people not actually engaged in the metal trade are aware of the wonderful strides made by steel in recent years. In fact, steel is wholly taking the place of wrought iron. Steel is simply a mixture of iron and carbon, the quantity of carbon ranging from 0·25 to 0·02 per cent of the mass. It is not only stronger and for almost every purpose better than wrought iron, but it is cheaper.

Its first victory over wrought iron was obtained in England, where steel rails for railroads were found to be much better than iron in several ways. They did not wear away so rapidly under the wheels, and they were able to stand a greater strain. The first Bessemer steel plant in this country was started in 1867. Its product was used for making rails; and the total amount for that year was 3,000 tons. For a number of years the Bessemer steel was almost wholly devoted to that purpose, the high price at which it was sold making it unprofitable for other uses to which wrought iron was put. Steel rails brought $160 a ton in 1867. But after the panic of 1873 prices came down, and in 1875 the rails brought $75. The hard times of 1879 lowered the price, in spite of combinations among owners, and in 1883 steel rails sold for $40 a ton. Since that time the price has fallen steadily, and a recent price list puts the price of rails at $29, and of steel slabs, ready to be rolled or forged into any shape, at $28 per ton.

The result of these low prices is that bridges are no longer made of iron. Steel beams have taken the place of iron in the fireproof buildings. Steel ships are built instead of iron ships. Steel boilers replace iron boilers. Steel rifles replace the old cast iron cannon. Wherever tensile strength is required, steel is used.

The use of steel in beams and girders for houses and bridges was a natural sequence of its use in railroad tracks. But the use of this steel has not been confined to railroads and steamships. The big tin plate factories in Wales began to experiment with steel instead of iron about two years ago. Tin plate contains about 93 per cent of iron and 7 of pure tin. The steel plate was found to be cheaper, and the articles made of steel tin plate were superior. For making tin dishes without seams or soldered joints, the Siemens process steel plate is not only superior, but it is about the only kind that can stand the spinning process. This country now imports 240,000 tons of tin plate annually, and it is all made of steel plate with a tin coating.

One field in which steel has not yet wholly displaced iron is in the manufacture of nails. The plates from which nails are cut can be rolled from steel ingots as easily as from puddled iron, but the steel plate is harder to cut, and the cutters charge a little more for the work. The plants engaged in making steel nails are limited in number, and the price of steel nails is higher than that of iron. The steel nail is smoother, stronger, and handsomer, and has made its way in spite of the higher price, but the difference in price is rapidly dwindling, and will, no doubt, soon disappear altogether. In November, 1884, the Wheeling manufacturers charged thirty cents and the Troy men twenty-five cents a keg more for the steel nails. Quotations during the last of February this year were $2.10 per keg for steel nails and $2 for iron. The profit to the manufacturer of the steel nails is much greater on account of the smaller cost of the plates, and the only thing that prevents the iron nail makers from using steel plates entirely is that it takes money to change the plant, and after the great depression of the past two years money is not overabundant among iron manufacturers in any branch of the trade.

A curious outgrowth of this improvement in the manufacture of nails is the action taken by the trades unions in the West at the instigation of the puddlers. By the old puddling process of making iron plates for nails, the pig iron was melted in a grate furnace, and a small army of men stirred up the melted mass with long rods until the impurities were burned out and the iron became pasty instead of liquid. By the new process the melted pig iron in a big pear-shaped kettle is subjected to a powerful blast of air, which is forced up through it from the bottom until the impurities are burned out. Then another small amount of melted pig iron is poured in, and the mixture is ready to be cast into ingots. By the old process, twenty skilled men could turn out fifteen tons of nail plate in a day, while by the new process four common laborers and one skilled mechanic can turn out from 150 to 250 tons in a day. Naturally, the puddlers must lose their occupation. They have induced the Contractors' and Master Carpenters' Association of Wheeling to boycott the steel nails, and all union builders will be asked to boycott them also.

There is one thing that has not yet been successfully made of steel, and that is a propeller shaft for a steamship. Experiments were made in England, and after considerable money had been lost, the attempt was abandoned. Then the wise men who were going to rebuild the American navy took up the abandoned idea, and ordered steel to be used in the shafts for the new cruisers. John Roach objected, but the Advisory Board insisted, and Roach gave the contract to other parties. The Dolphin got her shaft, and started on her trial trip up the Sound, and after a short trip the shaft broke. Then the plans of the other cruisers were altered, and it is said that the change has involved a fatal weakening of the sterns of the new commerce destroyers.—*Sun.*

Fuel of Large Steamers.

An English contemporary, in replying to a correspondent who asks how many tons of coal a large steamship consumes in a day, quotes the following facts from a pamphlet entitled Bottled Sunshine, issued by T. B. Purnell & Sons, of Exeter: "Ocean steamers are large consumers of coal. The Orient line, with their fleet of ships running to Australia every two weeks, may be mentioned. The steamship Austral went from London to Sydney in thirty-five days, and consumed on the voyage 3,641 tons of coal; her coal bunkers hold 2,750 tons. The steamship Oregon consumes over 330 tons per day on her passage from Liverpool to New York; her bunkers will hold nearly 4,000 tons. The Stirling Castle last year brought home in one cargo 2,200 tons of tea, and consumed 2,800 tons of coal in doing so. Immense stocks of coal are kept at various coaling stations, St. Vincent, Madeira, Port Said, Singapore, and others; the reserve at the latter place is about 20,000 tons. It is remarkable with what rapidity these steamers are coaled; for instance, the Orient steamship last year took in over 1,100 tons at Port Said in five hours."