

THE VICTORIA REGIA HOUSE AT CHATSWORTH, ENG.

The celebrated residence of the Duke of Devonshire, at Chatsworth, owes its renown to the grand scale on which the science of horticulture is there carried on. The credit of the formation of the gardens, as they at present exist, is due to Mr., afterwards Sir Joseph, Paxton, whose ingenious system of ridge and furrow glasshouse building, first designed by him for the Duke's hot houses, was carried out on a very large scale in the structure for the Great Exhibition of 1851, which is now the Sydenham Crystal Palace. The vineries, pinneries, strawberry beds, and vegetable gardens at Chatsworth are such as only the highest taste and skill, supplemented by great wealth, could organize and maintain.

We present herewith a view of the hot house in which the Victoria Regia, the superb water lily of the Amazons, is to be seen in its greatest luxuriance. The large tank, seen in the center, says *The Garden*, to which we are indebted for the illustration, contains another tank, 16 feet in diameter, and considerable deeper than the outer portion; this contains the soil in which the Victoria lily is planted. The walls of the tanks are built of brick, and the bottom is paved with stone; the tanks are lined with lead throughout, and the two inch hot water pipes which supply them are also made of lead.

While the plant is growing, a little wheel, in the form of an overshot mill wheel, is fixed near the edge of the tank, and continually kept in motion by a small jet of water from a tap immediately over it; thus the surface of the water is always rippled. The Victoria Regia, being an annual, dies in November, when the water in the tank is drained off, and the soil contained in the inner part removed. The lilies in the angular tanks, being also out of season, are, about the same time, mostly cleared away and stored in troughs filled with water in the cucumber house. The aquarium, thus stripped of its summer occupants, is filled in winter with large chrysanthemums for furnishing cut blooms. As the Victoria lily annually produces and ripens a good stock of seeds, these are preserved in vessels of water until sowing time comes round, which is generally about the middle of December, or between that and January. The plants are potted singly, and re-potted as they advance in growth, until they have attained sufficient strength, when the best plant is planted out in a heap of fresh soil. At Chatsworth this lily luxuriates better and flowers more freely than it does in any other place in England, the largest leaves in summer measuring as much as 7½ feet in diameter.

Nickeling.

BY S. P. SHARPLES, MASSACHUSETTS STATE ASSAYER.

In answer to numerous inquiries, I again give a brief description of the process of nickeling. The patent is still before the courts, and no decision has been reached in regard to it.

The double sulphate of nickel and ammonium, which is the salt that is generally used, may now be had in commerce almost pure. It is manufactured on a large scale by Joseph Wharton, of Camden, N. J., who controls the nickel market in this country. Cast nickel plates for anodes may be obtained from the same source. The anodes should considerably exceed in size the articles to be covered with nickel. Any common form of battery may be used. Three Daniell's or Smee's cells, or two Bunsen's, connected for intensity, will be found to be sufficient. The battery power must not be too strong, or the deposited nickel will be black. A strong solution of the sulphate is made and placed in any suitable vessel: a glazed stoneware pot answers very well if the articles to be covered are small. Across the top of this are placed two heavy copper wires, to one of which the articles to be covered are suspended, to the other the anode. The wire leading from the zinc of the battery must then be connected with the wire from which the articles are suspended, the other battery wire being connected with the anode.

In order to prepare the articles for coating, they must be well cleaned by first scrubbing them with caustic soda or potash, to remove any grease, and then dipping them for an instant in *aqua regia* and afterwards washing thoroughly with water, taking care that the hand does not come in contact with any part of them. This is accomplished by fastening a flexible copper wire around them, and handling them by means of it. The wire serves afterwards to suspend them in the bath.

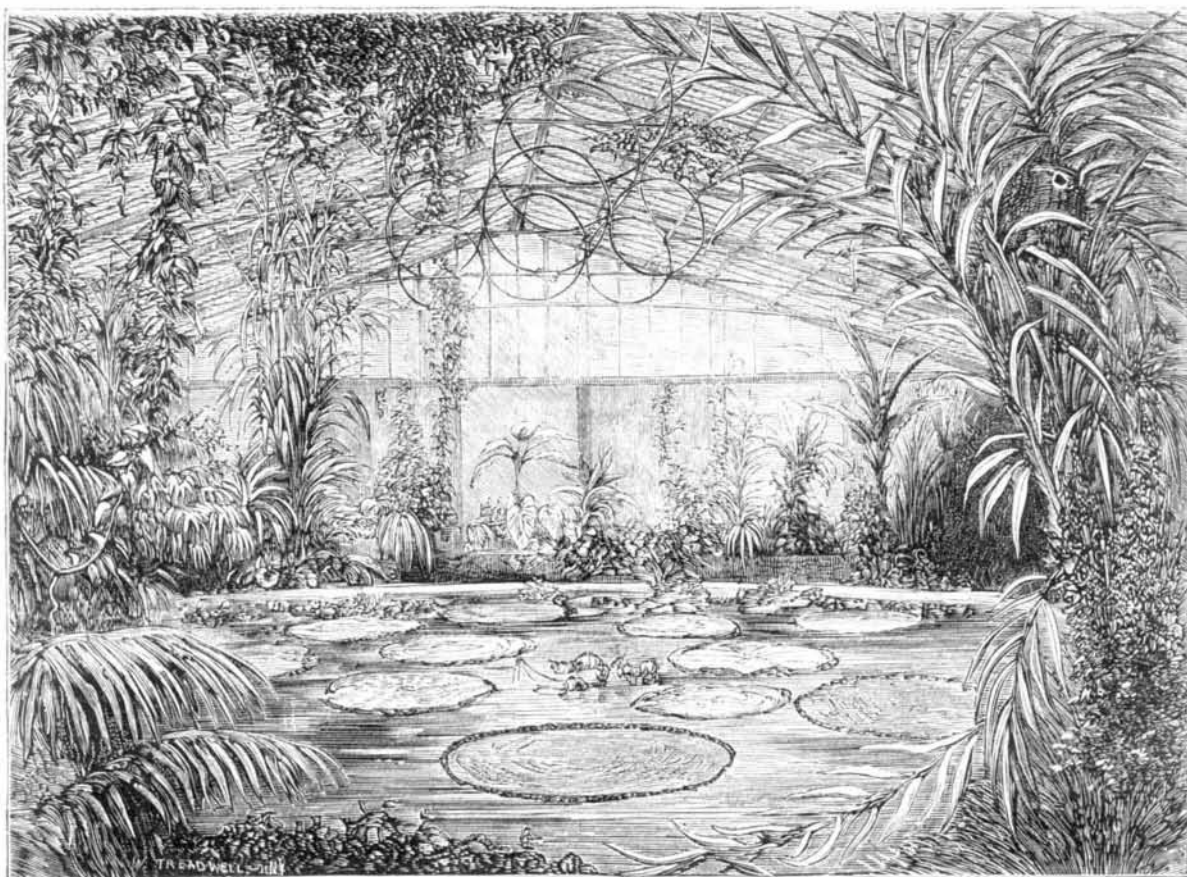
If the articles are made of iron or steel, they must be first covered with a thin coat of copper. This is best done by the cyanide bath, which is prepared by dissolving precipitated

oxide of copper in cyanide of potassium. A copper plate is used as an anode. After they are removed from the copper bath, they must be washed quickly with water and placed in the nickel bath; if allowed to dry or become tarnished, the nickel will not adhere.

Great care must be used through the whole process to keep all grease, dust, or other dirt from the articles to be covered, or else the result will be unsatisfactory. The whole process is one of the most difficult that is used in the arts, it being far easier to gild, plate, or copper an article than to

boats propelled by a screw and driven by powerful springs, and a year later exhibiting his plans in London, and seeking to convince others of their feasibility. From this period dates his public—if so we may term it—life, and contemporary journals now come to our aid in preparing this brief account of his labors. An old volume of the English *Mechanics Magazine* is before us, and in its pages, now yellow with time, we find the reports of the earliest trials of the then novel mode of propulsion. Let us here remark that to the subject of our sketch is not due the credit of inventing

the screw propeller; for as early as 1727, one Duquet, a Frenchman, proposed to force a "vessel up a river against the current by means of screws," and there are no less than fifteen mentions of applications of the principle—including two American patents for "screw propelling wheels to boats," and for "a screw or spiral lever for propelling vessels"—of prior date to the patent of Sir Francis; but to him, however, is to be ascribed the honor of first successfully demonstrating the practicability of the plan by devising a means and proving its value by direct experiment. The patent of Sir Francis is dated May 31, 1838, and it claims "a propeller, whether arranged singly in an open space in the dead wood, one on each side of the same, or more forward or more aft, higher up or lower down, completely or partially immersed." This was afterwards modified to make the screw of a single thread, a double thread, or of a thread of two turns, located singly in the center of the dead wood. On obtaining his letters, Sir Francis constructed a small steamboat of 10 tons burden



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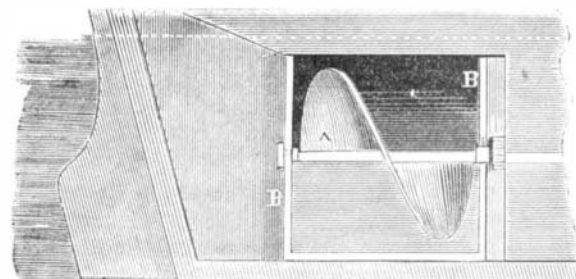
and six horse engine power, which he tried on the Paddington canal and on the Thames river with satisfactory results. During the following years he was put to sea, visiting points along the coast, and proving so completely successful that the Lords of the Admiralty directed further investigation into the invention, with a view of its introduction into the Royal Navy. Mr. Smith, aided by the Messrs. Rennie, engineers, then constructed a larger vessel, the *Archimedes*, a ship 155 feet long, of 237 tons burden, and ninety horse power engines. The old periodicals before us contain numerous reports of this boat's performances, but there is a vein of dubiousness running through all the comments, that shows that the editor had little faith in the new fangled idea.

SIR FRANCIS PETTIT SMITH.

Sir Francis Pettit Smith, an inventor whose celebrity in connection with the development of screw propulsion and its introduction into steam navigation is worldwide, recently died in England. We publish herewith a portrait of this eminent man.

Like many others to whom mankind is indebted for great inventions, he began life as a farmer, a calling which gave little promise of leading him to the conceptions which have

terminated in such priceless results. Possessed of a strong taste for mechanics, however, he soon abandoned agricultural pursuits to prosecute his favored study, and to carry on investigations and experiments in the subject which, from an early date, engrossed almost his entire thoughts. In 1834, at twenty-six years of age, we find him trying models of



In 1839, however, he published a cut of the new vessel, a portion of which, showing the screw, we reproduce in facsimile. A, the blade of the propeller, forms an angle of about 40° with the shaft, and is made of iron plates. B is the frame in the dead wood of the vessel. The diameters of the screws used were 5 and 7 feet, and their lengths 7½ and 8 feet. It is curious, at this day, to read the remarks made upon the invention, in the article accompanying the engraving: "It has, altogether, great defects, which will prevent it from competing with the common paddle wheel, both in point of economy and of power." "Useless, on account of the impracticability of keeping the whole screw under water." "Engines and boilers will require the whole space up to the deck:" are examples in point. In a number of the same journal, of later date, is a most elaborate treatise on the subject, in which the author completely demonstrates the screw to be absolutely worthless; but despite this wholesale condemnation, the inventor calmly continued his experiments, built more vessels, and ended by proving his device so unequivocal a success that the Government began to apply it to naval ships. In 1842 H. M. S. *Rattler* was constructed, and a series of investigations made by Mr. Smith and Mr. Brunel to determine the best proportions of the screw; while, at the same time, another craft, the *Alecto*, was built on precisely the same lines as the *Rattler*, but with paddle wheels, in order to institute a comparative test. The superiority of the *Rattler* was so evident that the Admiralty at once ordered the Queen's yacht *Fairy* and twenty other vessels to be built for screw propulsion under Mr. Smith's direction.

The subsequent rise and progress of the system is within the memory of most of our readers. Before 1850, when Sir Francis retired from the business, more than a hundred