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THE MANUFACTURE OF SILVER-PLATED WARE.

From the plain porcelain and pottery of bygone times we have passed to more and more elegant articles of table furniture and ornament, until neither art nor imagination can suggest anything more exquisite and tasteful than some of the modern articles of silver-plated ware made for use, and for the adornment of the table and sideboard. The large and still growing industry, which we have chosen as a subject for illustration, is one that may be regarded as an index of growth in refinement, for as tastes in household matters are cultivated and manners become more refined, the progress is sure to exhibit itself in the appointments of the table.

Formerly the costliness of solid plate confined the luxury of a beautiful and well furnished table to the wealthy; but since the advent of electro-plated ware, almost any one may possess needed articles of table furniture having the most elegant of modern designs and being equal in appearance to the solid silver ware.

In the manufactory of Messrs. Reed & Barton, located in the quaint little city of Taunton, the work of making plated ware is carried on by an army of men and women, numbering in all about six hundred.

The foundation of this business was laid as far back as 1824, and, after passing through several hands, it came into the possession of its present owners in 1837. At that time the manufacturing was all done in one small three-story brick building, and one of the present members of the firm, who had learned the business as an employé of the original owners, took upon himself the practical direction of the work, and has retained it until the present time. His love for the work is very strong, and he may be found employed now here, now there, suggesting, watching, and showing with his own hands how the work should properly be done.

The metals used in this factory for making the alloys are obtained in pigs as they come from the mines. The white metal, as it is called, is composed of tin, copper, and antimony.

These metals are broken into fragments and purified by smelting; they are afterward mixed in proper proportions and transferred to a large iron caldron, where the alloy is kept at a suitable temperature to prevent the formation of dross. From this caldron the metal is dipped and poured into moulds forming ingots; these are rolled into thick sheets, which are scraped on either side to remove scale, dross, etc., and are then again rolled to the proper thickness for use. Some of the metal is compounded expressly for casting, the mixture being such as to run sharply in the moulds. Metallic moulds are used in casting handles, spouts, legs, etc., and the castings are made hollow by pouring the melted metal into the moulds, then immediately pouring out as much as will run out. This leaves a thin shell of metal of the required thickness adhering to the sides of the mould. The department in which the casting is done is shown in one of the upper views of the engraving.

The first operation in making a piece of table ware is to make a perfect model in wax, then a cast in plaster, from which the mould is made. The artistic part of the work falls upon the designer, the rest is purely mechanical.

The sheets of metal, after rolling, are cut either into strips or disks, according to the use to which they are to be applied. The strips are passed between engraved rollers which press upon them the figures of leaves, vines, flowers, or other ornamentation. The disks are stamped in a drop press, then spun into shape upon a lathe. As the operation of spinning was described not long since in our columns, we will not here give the process in detail. Some of the more complicated forms are spun upon separable blocks or moulds, which are withdrawn from the piece, a portion at a time, after the work is done.

After spinning, the trimmings formed of the ornamental strips are inserted, and the legs, handles, spouts, etc., are soldered on. This operation is carried on in the department shown in one of the lower views. The soldering is done with blowpipes attached to flexible tubes, which supply both air and gas. The solder used is similar to the white metal forming the body of the vessel.

After soldering, the piece is ornamented by chasing or by hand or machine engraving. The piece to be chased is filled with pitch, which, after hardening, gives a solid support to the sides of the vessel; the design is traced by small steel punches, which are rapidly struck by small hammers, quickly developing the pattern by indenting the surface of the metal. Hand engraving is done by the well-known method, and the machine engraving, or engine turning, is done by an intricate piece of machinery which forms those beautiful waved and striated surfaces seen on some of the finer kinds of ware.

The satin finish, now so much in vogue, is produced by a curious device consisting of a great number of steel wires jointed loosely to a spindle which revolves with great velocity. The work is held just below the spindle, so that the ends of the wires strike thousands of little blows upon the article held within the path described by the ends of the wires. The department in which this work is done is shown in one of the lower views, and just above the lathe carrying the satin-finishing tool will be seen one of these tools at rest.

The ware, after these several operations, is cleaned and polished and conveyed to the plating department shown in the larger view. Here the articles are submitted to a further cleaning, and then placed in a striking bath where they receive the first coating of silver. The bath is composed of the double cyanide of potassium and silver; the article is hung from one electrode, and a huge plate of silver from the other. The electrical current for plating purposes is now generated by means of the dynamo-electric machine, instead of the disagreeable and expensive batteries of former years.

After a very short treatment in the striking bath, the articles are washed in both warm and cold water and brushed; they are then placed in the plating bath, where they remain until the desired thickness of silver has been deposited.

The gold lining of vessels is applied by placing the gold solution in the vessel and using the vessel as one pole and stirring the solution about with a piece of gold attached to the other pole.

If it be desired to plate one portion of an article with silver and another with gold, or with two shades of gold, they are taken over to a bench, at which women paint the parts with a "resist," as it is called, of black varnish. After the exposed parts are plated this is easily removed, and other portions treated in the same way, while those at first covered receive another color.

When the deposition of silver is complete the article is removed from the plating vat and plunged into cold water for a moment, and then into hot, and handed over to a polisher, who holds it for another moment against a rapidly revolving fine wire brush, which partially removes the white bloom from its surface, and it is then ready to be burnished.

The surface of the work is burnished by rubbing it over with a set of polished steel tools so formed as to fit into all of the intricate curves in the ornamentation. The surface of the article is kept wet with soap and water. Spherical articles, having a considerable plain surface, are placed upon a lathe and burnished while in rapid motion. In this case the burnishing tool is a piece of highly-polished bloodstone cemented to a wooden handle, and the article is kept wet with stale beer.

After burnishing the articles then go into the papering room, where girls are busy all day long in wrapping the finished ware in several thicknesses of tissue paper, sealing those up in heavy wrappers, and marking them with the number of the pattern and other data. At last they are entered on the stock books and placed in the warerooms, and when sold are packed in tin lined wooden cases, and shipped to all parts of the world.

Some of this ware is represented in the upper central figure of the engraving, and the extensive establishment of Messrs. Reed & Barton is shown below.

We have recently had the pleasure of examining some of the ware made by this firm, and were impressed with the truly artistic character of the work. Their improvements in the construction of the ware, together with new and unique designs, indicate that this firm are thoroughly alive to the demands of trade.

AGRICULTURAL INVENTIONS.

Mr. Adam Hancock, of St. Albans, West Va., has invented an improved feed cutter, which consists of a rectangular box, open at the top and rear, and having a vertically movable front, whose lower edge is furnished with an inclined cutting blade. A lever, one end of which is fast in a rocking shaft fixed between the sides of the box, projects through a central opening in the movable front, and is the medium through which the device is operated.

Messrs. James P. Hall and Henry Jacobsen, of Niantic, Ill., have patented an improvement in check row planters; the rotating marker wheels vibrate the seed slide at the same time that the wheels are free to oscillate and follow the in equalities of the surface of the soil.

An improved check rower, to be attached to corn and other seed planters, has been patented by Messrs. Robert H. and William A. McNair, of Elsah, Ill. This invention consists of two spiders pivoted to a frame eccentrically in relation to each other, and carrying between them spades, which are always kept in a vertical position as they are carried around by the spiders.

Mr. Hiram S. Smith, of Austin, Minn., has patented an improvement in harrows, which consists in a beam and tooth fastening for harrows, formed of two straight parallel bars and two or more socket bands, which latter serve the double purpose of securing the bars together and clamping the teeth between them, so as to permit their adjustment wider apart or closer together, as may be desired.

Uriah A. Boyden.

The well known hydraulic engineer and inventor, Uriah Atherton Boyden, died, October 17, at Boston, Mass., where he had resided for several years. Mr. Boyden was born in Roxborough, Mass., February 17, 1804. His early life was spent on a farm, and in assisting his father in the management of a machine for splitting leather, invented and constructed by the senior Boyden. When he became of age, Uriah removed to Newark, N. J., where he joined his elder brother, Seth, in the manufacture of malleable iron and patent leather. He returned to Massachusetts about the time the first surveys were made for the Boston and Providence Railroad, and was employed on the survey. He afterward took part in the construction of the Lowell Railway and in the construction of the Suffolk, Tremont, and Lawrence mills.

In 1833 he opened in Boston an office, which he occupied until his death. The Nashua and Lowell Railway was built under his direction in 1836–8. For several years he was engaged as the engineer of the Amoskeag Company in establishing their extensive hydraulic works at Manchester, N. H. In 1844 he designed for the mills of the Appleton Company, at Lowell, a turbine wheel, which gave such satisfaction that in a little while that type of wheel was adopted for nearly all the Lowell mills. The Boyden turbines were also widely substituted for the older forms of water wheels in the best mills throughout the country, and Mr. Boyden soon accumulated a large fortune by his inventions and services. He retired from the practice of his profession some years ago, and devoted himself to scientific investigations, making many inventions in connection with philosophical and chemical, metallurgical, electrical, and other apparatus. Latterly the theory of radiation has engaged his attention, a recent number of the Journal of the Franklin Institute containing an advertisement to the effect that he had deposited with the society $1,000, to be awarded "any resident of North America who shall determine by experiment whether all rays of light are or are not transmitted with the same velocity." His other contributions of money in aid of physical research and for the advancement of mathematical studies were many and generous. It is reported that he leaves the greater part of his property for the purpose of making scientific investigations of the properties of heat and the phenomena relating thereto. When such investigations have been thoroughly made, he requests an expenditure for observatories to be built on prominent peaks for the gratuitous use of young students in astronomy and kindred sciences.

Henry C. Carey.

Henry Charles Carey, the venerable publisher, author, and philanthropist, of Philadelphia, died at his residence in that city, October 13, at the advanced age of 86 years. From his eighth to his forty-second year Mr. Carey was engaged in the business of publishing and bookselling, founded by his father. In 1835 he withdrew from trade and devoted himself to study and writing. The next year he published his essay on "Rates of Wages," which he afterward expanded into a large volume entitled "The Principles of Political Economy." This was the foundation of what is known as the American School of Political Economy; and with many of his later works it has been republished in German, French, Russian, Italian, Swedish, and Japanese, powerfully influencing the course of thought abroad as well as at home. Personally Mr. Carey was greatly beloved as well as honored by a wide circle of acquaintances.

Dr. F. Julius Le Moyne

Dr. Le Moyne, so widely known through his advocacy of cremation instead of burial, died at his home in Washington, Pa., October 14, in his 81st year. He was a man of great wealth and learning, as well as of marked eccentricity of character. In early life his decided position in favor of the abolition of slavery brought even more violent enmity than he aroused in his old age by his public efforts to introduce the practice of cremation. He offered to build a crematory for public use in the Washington cemetery, but his offer was declined without thanks. He then built on his own land the furnace in which Baron de Palm and Mrs. Ben Pitman were cremated, and wherein his own remains have since been converted into ashes. He was a large man, weighing 200 pounds; after cremation his ashes weighed seven pounds.

The Philadelphia Elevated Railway.

Philadelphia papers state that the contract for the iron to be used in the Pennsylvania Railway Company's elevated road, in that city, has been awarded to the Edgemoor Iron Works. The contract calls for about five and a half million pounds of iron.

The company promises the completion of the road by July 4, 1880, from the proposed central station at Fifteenth and Market streets, across the Schuylkill, to connect with the Pennsylvania surface road near Thirty-fifth and Market streets. The contract for the bridge over the river has been given to Keller & Goll, of Lancaster Pa., who enter upon the work at once. The bridge is to be what is known as the double intersection Warren girder, wrought iron, an old English style of bridge, improved somewhat by the Pennsylvania Railroad, and similar to the bridge over the Susquehanna river at Rockville, and the one over the Delaware at Trenton. The superstructure will be 30 feet wide, to accommodate three tracks, two for passenger and one for freight traffic. The west span will be 144 feet long, and the other two each 160 feet, making the entire length of the bridge 464 feet.

Electrical Test for the Mechanical Equivalent of Heat.

In a series of experiments recently described to the Vienna Academy, Professor von Waltenhofen has sought to deduce from a direct measurement of the work done in induction of an electric current in a closed circuit of given resistance, the mechanical equivalent of heat. For induction, a magneto electric machine was used, whose electromotive force was ascertained to be proportional to the number of revolutions. A dynamometric handle of the newest construction was attached, and it was furnished with an arrangement for receiving the work diagrams. The induced currents were measured by means of a tangent galvanometer. The results were found to be in satisfactory agreement with Joule's equivalent.